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Commute satisfaction, neighborhood satisfaction, and housing satisfaction as predictors of subjective well-being and indicators of urban livability

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ABSTRACT

Commute satisfaction, neighborhood satisfaction, and housing satisfaction can be used as indicators of urban quality of life and livability due to their potential contribution to subjective well-being. This study aims to uncover whether these three concepts are indeed predictors of subjective well-being and reliable indicators of livability and quality of life in cities. The study presents and tests a model that examines the pathways between commute satisfaction, neighborhood satisfaction, and housing satisfaction, satisfaction with other life domains, and subjective well-being components – life satisfaction, affect, and eudaimonia. Data are obtained through a survey in the city region of Oslo, Norway and are analyzed with structural equation modeling. Findings show that commute satisfaction, neighborhood satisfaction, and housing satisfaction are all significantly associated with subjective well-being. Commute satisfaction was found to be linked to subjective well-being indirectly, mainly via neighborhood satisfaction and job satisfaction. Neighborhood satisfaction was found to relate to subjective well-being directly, but also indirectly via personal relationships satisfaction, housing satisfaction, and leisure satisfaction. Housing satisfaction was found to have a significant direct association with subjective well-being. These findings suggest that commute satisfaction, neighborhood satisfaction, and housing satisfaction are reliable indicators of urban livability. Consolidating these indicators provides a platform for future measurements of urban quality of life for research as well as public policy purposes.

1. Introduction

Achieving high subjective well-being is recognized as one of the main personal goals in life, but has also emerged as a major goal for public policy (Diener et al., 2009; Dolan and White, 2007; OECD, 2013; Stiglitz et al., 2009; Veenhoven et al., 2004). Subjective well-being is one of the major components of social sustainability (Cloutier and Pfeiffer, 2015; Rogers et al., 2012) and a subjective indicator of livability in cities (Ballas, 2013; Commission, 2016; Newton, 2012; Okulicz-Kozaryn and Valente, 2019). To assess quality of life and livability within cities themselves, researchers often use subjective indicators directly related to urban life (Ma et al., 2018; Marans et al., 2011; Wang and Wang, 2016; Zhan et al., 2018). Commute satisfaction, neighborhood satisfaction, and housing satisfaction can be considered urban livability indicators assessing distinct aspects of urban life: the commute, the neighborhood, and the dwelling (Davis and Fine-Davis, 1991; Ettema et al., 2011; Howley et al., 2009; Kovacs-Györi et al., 2019). The theoretical underpinning of using these three measures is their possible function as mediators between the characteristics of the urban environment and subjective well-being. In other words, both objective and perceived characteristics of the urban environment may

influence domain satisfactions such as commute satisfaction, neighborhood satisfaction, and housing satisfaction, thereby influencing subjective well-being (Campbell et al., 1976; Marans, 2003).

However, commute satisfaction, neighborhood satisfaction, and housing satisfaction have not thus far been sufficiently assessed for their contribution to subjective well-being. There is limited evidence on how these three indicators in conjunction with other domain satisfactions relate to the three major components of subjective well-being: life satisfaction, affect, and eudaimonia. This study aims to address this gap and uncover whether these three indicators are indeed predictors of subjective well-being. This will help us understand whether commute satisfaction, neighborhood satisfaction, and housing satisfaction can be considered important measures of domain satisfaction and useful indicators of livability and quality of life in cities. Examining this topic will also contribute to expanding previous theories on the influence of the urban environment on subjective well-being via life domains (Mouratidis, 2018) by examining additional domain satisfactions as possible mediators. Finally, this new knowledge on commute satisfaction, neighborhood satisfaction, and housing satisfaction will contribute to future research on urban quality of life (Cloutier and Pfeiffer, 2015; Marans, 2003, 2015; Musa et al., 2018; Papachristou and Rosas-Casals,

2019; Van Kamp et al., 2003).

This study investigates the links between commute satisfaction, neighborhood satisfaction, and housing satisfaction, satisfaction with other life domains, and subjective well-being measures – life satisfaction, happiness, anxiety, eudaimonia. The main research question is "how do commute satisfaction, neighborhood satisfaction, and housing satisfaction relate to subjective well-being?" The study is based on data from a questionnaire survey conducted in the city region of Oslo. A theoretical model linking commute satisfaction, neighborhood satisfaction, housing satisfaction, other domain satisfactions, and subjective well-being is developed and tested using structural equation modeling.

2. Theoretical background

Subjective well-being – a cognitive and affective evaluation of one's life (Diener, 2000, 2009; Veenhoven et al., 2012) – has become the standard for subjective evaluations of quality of life (Sirgy, 2012) and an indicator for subjective measurements of urban livability (Mouratidis, 2018). Subjective well-being comprises life satisfaction, eudaimonia (i.e. self-actualization and meaning in life), and affect (also called emotional/hedonic well-being) (OECD, 2013; Sirgy, 2012). These three components of subjective well-being are based on philosophical distinctions (Haybron, 2000; Seligman, 2002). The operationalization of subjective well-being also distinguishes between these three main components: evaluations of life as a whole (life satisfaction), evaluation of meaning in life (eudaimonia), as well as the experience of positive and negative emotions during a specific time frame (affect) (Dolan and Metcalfe, 2011; European Social Survey, 2012; OECD, 2013). Livability could be described as "the quality of the person-environment relationship, or how well the built environment and the available services fulfill the residents' needs and expectations" (Kovacs-Györi et al., 2019). Cities promoting well-being for all residents would be considered livable (Mouratidis, 2018; Newton, 2012).

The pathways between the urban environment – which includes both the physical built environment and the social environment – and subjective well-being can be explained by life domains that mediate this relationship, as argued by previous relevant theories (Campbell et al., 1976; Marans, 2003; Mouratidis, 2018). To operationalize these pathways, researchers often measure the satisfaction with life domains (domain satisfactions). The urban environment might be additionally linked to subjective well-being in a direct way that may not be captured by domain satisfactions. The influence of the urban environment on subjective well-being via domain satisfactions is depicted in Fig. 1. Life domains that can be influenced by the urban environment are health (Markevych et al., 2017; Northridge et al., 2003), social life and personal relationships (Boessen et al., 2018; Mazumdar et al., 2018; Mouratidis, 2018), and leisure activities (Mouratidis, 2019; Nordbø et al., 2018). Emotional responses to the urban environment are also considered as a pathway between urban environment and subjective well-being (Mouratidis, 2019; Seresinhe et al., 2019).

Commute satisfaction, neighborhood satisfaction, and housing satisfaction are direct ways to assess different aspects of urban livability and have been considered as domain satisfaction measures that play a role in subjective well-being. Satisfaction with daily travel has been considered as a domain satisfaction measure with links to subjective well-being (De Vos et al., 2013; Ettema et al., 2011, 2010). Neighborhood satisfaction and housing satisfaction – the level of contentment with one's neighborhood and dwelling respectively – together comprise residential satisfaction which has been suggested as an independent domain satisfaction (Sirgy, 2012).

Commute satisfaction aims to capture the influence of one's commuting on subjective well-being. Commute satisfaction is an important component of satisfaction with daily travel (travel satisfaction). Some studies found that commute satisfaction is positively associated with subjective well-being (e.g., Olsson et al., 2013). However, another study examined travel satisfaction together with satisfaction with other life domains such as social life, health, and leisure, and found that it was not significantly associated with subjective well-being (Gao et al., 2017). It has been suggested that travel satisfaction mainly has an indirect effect on life satisfaction, through participation in – and satisfaction with – leisure activities (De Vos, 2019). It has been argued that travel affects subjective well-being by allowing people to participate in activities and achieve their goals as well as by influencing their emotional state through affective factors such as safety and comfort during travel (Ettema et al., 2010). Long commute times, on the other hand, are associated with lower job and leisure time satisfaction (Clark et al., 2019; Mouratidis, 2019). Thereby, all subjective well-being components – life satisfaction, affect, and eudaimonia – could be potentially affected by travel and travel satisfaction (De Vos et al., 2013; De Vos and Witlox, 2017). Travel satisfaction depends on a wide range of factors such as travel mode, trip duration, safety, comfort, and cleanliness (Ettema et al., 2016; Mouratidis et al., 2019). Urban form plays an important role in commute satisfaction by significantly affecting trip duration and travel mode choice (Mouratidis et al., 2019).

Neighborhood satisfaction aims to capture the influence of one's residential neighborhood characteristics on subjective well-being. Therefore, it has been considered to mediate the relationship between the urban environment and subjective well-being. Objective and perceived characteristics of the urban environment shape neighborhood satisfaction which may in turn influence subjective well-being (Campbell et al., 1976; Cao, 2016; Lee et al., 2017). Some studies find that neighborhood satisfaction is positively associated with the life satisfaction component of subjective well-being (Cao, 2016; Cummins, 1996; Rojas, 2006). Environmental correlates of neighborhood satisfaction are categorized as objective and perceived/subjective. Objective characteristics that have been found to be associated with neighborhood satisfaction are the presence of and accessibility to facilities as well as the location of the neighborhood within the city (Lovejoy et al., 2010; Mouratidis, 2018; Yang, 2008). Perceived characteristics are more strongly associated with neighborhood satisfaction than objective ones but are of course influenced by objective ones (Cao et al., 2018; Lee et al., 2017; Permentier et al., 2011). Perceived characteristics that are associated with neighborhood satisfaction are perceived safety and fear of crime, place attachment, perceptions of accessibility, neighborhood social cohesion, attractiveness, and quietness (Buys and Miller, 2012; Davis and Fine-Davis, 1991; Grogan-Kaylor et al., 2006; Hur and Morrow-Jones, 2008; Hur and Nasar, 2014; Lee et al., 2017; Parkes et al., 2002).

Housing satisfaction aims to capture the influence of one's dwelling characteristics on subjective well-being. Housing satisfaction and neighborhood satisfaction were both found to be positively associated with life satisfaction in some earlier studies (Davis and Fine-Davis, 1991; Sirgy and Cornwell, 2002). Other studies find that only certain aspects of housing satisfaction are conducive to higher subjective well-being (Clapham et al., 2018; Foye, 2017; Tsai et al., 2012). Among factors associated with housing satisfaction are: the construction quality, plan, and design of the dwelling; the dwelling size; the adequacy of interior space; the housing amenities; and the price of the dwelling (Aigbavboa and Thwala, 2016; Davis and Fine-Davis, 1991; Galster, 1987; Nguyen et al., 2018). It has been argued that smaller
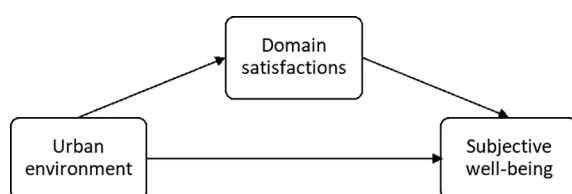

Fig. 1. The influence of the urban environment on subjective well-being via domain satisfactions.

dwellings (up to a minimum standard) do not necessarily lead to lower needs satisfaction and lower subjective well-being (Stefánsdóttir et al., 2018; Xue et al., 2017).

Although there are studies examining associations between commute satisfaction, neighborhood satisfaction, and housing satisfaction and subjective well-being (e.g. Davis and Fine-Davis, 1991; Olsson et al., 2013; Sirgy and Cornwell, 2002), there is not enough evidence on how these links are shaped nor on differences between the subjective well-being components. There is a lack of research as to how these three domain satisfactions acting together with satisfaction with other life domains relate to the different components of subjective well-being – life satisfaction, affect, and eudaimonia. This study attempts to fill these gaps. The study will examine the pathways between commute satisfaction, neighborhood satisfaction, and housing satisfaction, other domain satisfactions, and different subjective well-being components. It will thus attempt to provide understanding on whether and how these three measures relate to subjective well-being and whether they represent robust indicators of urban livability.

To explore the pathways between domain satisfactions and subjective well-being, the study develops and tests a relevant theoretical model (Fig. 2). The main outcome variables are the different components of subjective well-being: life satisfaction, affect (measured here with happiness and anxiety), and eudaimonia. Four structural equation models will be tested in the study: one for each measure of subjective well-being (life satisfaction, happiness, anxiety, and eudaimonia) as final endogenous variable.

The final theoretical model of the study, presented in Fig. 2, is based on the following theoretical considerations. Commute satisfaction may relate to subjective well-being indirectly via other domain satisfactions such as leisure satisfaction since daily travel allows people to participate in activities and achieve their goals (De Vos, 2019; Ettema et al., 2010). Long commutes allow less time for leisure, and are associated with lower levels of physical activity and lower leisure satisfaction (Clark et al., 2019; Mouratidis, 2019). Individuals who have low commute satisfaction due to long commute times may thus evaluate leisure satisfaction less positively. The theoretical model of the study therefore tests whether commute satisfaction contributes to subjective well-being via other domain satisfactions including leisure satisfaction, job satisfaction, and personal relationships satisfaction. The location and internal characteristics of a neighborhood can influence how people travel and how satisfied they are with their daily travel (Mouratidis et al., 2019). This consideration could in turn influence their evaluation of neighborhood satisfaction. Thereby, commute satisfaction may contribute to neighborhood satisfaction, as also suggested by De Vos and Witlox (2017). Neighborhood satisfaction could also be shaped by emotional responses to the neighborhood environment. For example, an unsafe neighborhood environment could trigger negative emotional responses and in turn result in lower neighborhood satisfaction. Since the residential neighborhood can influence life domains such as personal relationships (Boessen et al., 2018; Mazumdar et al., 2018; Mouratidis, 2018) and leisure activities (Mouratidis, 2019; Nordbø et al., 2018), the study will explore whether neighborhood satisfaction is linked to subjective well-being via satisfaction with such life domains. Although housing satisfaction measures satisfaction with the dwelling itself, it is closely linked to the neighborhood environment and neighborhood satisfaction (Davis and Fine-Davis, 1991; Sirgy and Cornwell, 2002). Neighborhood characteristics influence how satisfied people are with their neighborhood and this satisfaction, and potential neighborhood attachment, may influence how they evaluate their dwelling, as also suggested by Davis and Fine-Davis (1991) and Sirgy and Cornwell (2002). For example, some people are happy to live in a dwelling of poorer quality or smaller size in order to live in their ideal neighborhood. This satisfaction they get from their ideal neighborhood may make their low-quality dwelling appear more satisfactory. Another example would be that of being dissatisfied with an extremely unsafe neighborhood, and this in turn could make a high-quality dwelling appear less satisfactory. Housing satisfaction is not expected to pose substantial direct influence on job satisfaction, leisure satisfaction, and personal relationships satisfaction; therefore, it is considered as endogenous mediating variable together with these domain satisfactions. Health (self-reported) is included in the model as exogenous variable, together with commute satisfaction and emotional response to neighborhood. Health is in turn linked to all other domain satisfactions. Health problems may cause discomfort during daily travel, pose restrictions on daily travel or may trigger negative emotional responses. Simultaneously, daily travel and emotional responses can contribute to health outcomes. Therefore, commute satisfaction, emotional response to neighborhood, and health are considered to correlate in the theoretical model. Considering health as exogenous variable means that it could contribute to all other life domains, for example by posing constraints and limiting capabilities in life. Being hampered by health problems (or simply feeling less healthy) might negatively influence
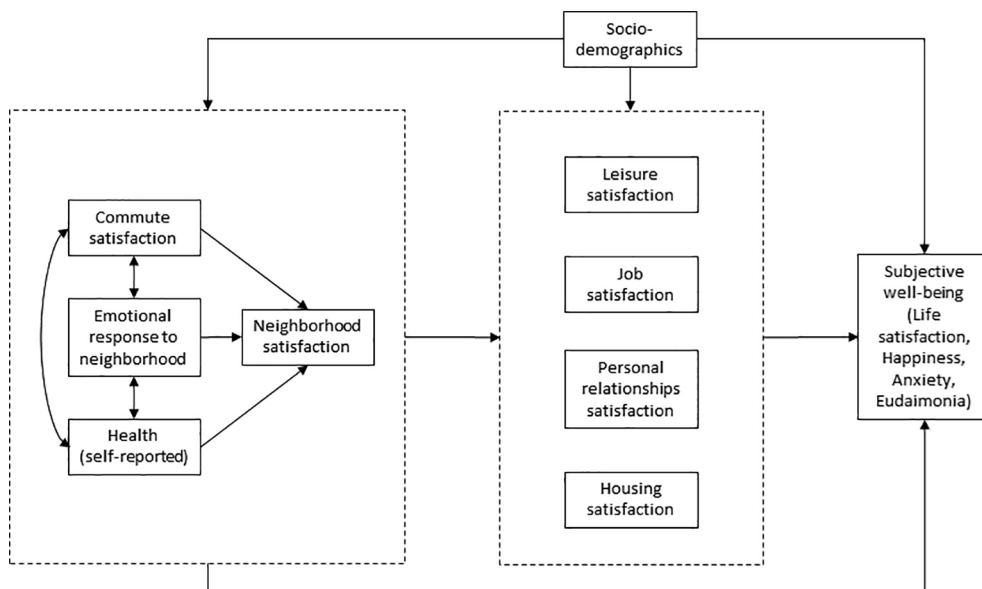

Fig. 2. Theoretical model linking commute satisfaction, neighborhood satisfaction, and housing satisfaction, satisfaction with other life domains, and subjective well-being.

daily life in the neighborhood or might negatively influence mood, and in turn negatively influence evaluations of neighborhood satisfaction. An important reason for considering health as exogenous variable in the model is that it provides greater robustness to the estimates for the variables of interest – commute satisfaction, neighborhood satisfaction, and housing satisfaction – as it reduces the risk of omitted variable bias. Controlling for health, has been common practice in studies on domain satisfaction and subjective well-being (Diener, 2009).

Naturally, there could be two-way relationships between some domain satisfactions in the theoretical model in Fig. 2. For example, health can influence satisfaction with other life domains, but also satisfaction with other life domains can influence the subjective evaluation of health. Neighborhood satisfaction could contribute to housing satisfaction, but housing satisfaction may also contribute to neighborhood satisfaction. Such two-way relationships have been explored with additional models and analyses presented in the Appendix.

3. Data and methods

3.1. Data

The study uses survey data from the metropolitan area of Oslo, the capital of Norway. In 2018, the population of the metropolitan area of Oslo was approximately 1,300,000–1,500,000. Oslo is considered a livable city and was ranked first in Europe in city satisfaction according to the Eurobarometer survey on quality of life in European cities (European Commission, 2016). Despite this, important differences in terms of both built and social environment exist in Oslo, with subsequent links to life domains and well-being (Brattbakk and Wessel, 2013; Mouratidis, 2018; Wessel, 2000).

The questionnaire survey for this study was conducted in May-June 2016. Participants were residents of 45 neighborhoods across the metropolitan area of Oslo (Fig. 3). The neighborhoods of the study cover various locations in the inner city, inner suburbs, and outer suburbs. Diverse types of urban form are represented including low, medium, and high-density neighborhoods. Neighborhoods also vary in terms of sociodemographic profile, including both poorer and richer inner-city areas as well as poorer and richer suburbs. The target population of the survey was adult residents from all age groups residing in the 45 neighborhoods of the study. The total sample is 1344 residents (see Table A1 in Appendix A for details). The age of survey participants varied between 19 and 94 years. The survey's response rate was 13.8%. The survey's response rate is rather low, so non-response bias might be relevant. However, non-response bias does not necessarily lead to biased results (Rindfuss et al., 2015). The main aim of the study is not to describe the univariate distribution of domain satisfaction or subjective well-being, which would require a high response rate, but to understand how domain satisfactions relate to subjective well-being using path analysis models that control for sociodemographic attributes. The low response rates in such analyses are not expected to substantially influence the results (Rindfuss et al., 2015). The sample was randomly selected for each of the 45 neighborhoods of the study. The addresses of all residents living within the postal zones of these neighborhoods were collected from municipal registers. Randomly selected residents received a letter by post inviting them to participate in an online survey. The invitation was sent only to one member per household. To encourage the participation of non-Norwegian speaking immigrants, the invitation letter as well as the online survey were written in both Norwegian and English. The study has received ethics approval by the Norwegian Center for Research Data (NSD).

3.2. Variable descriptions

Table 1 presents descriptive statistics for all the variables used in the study. Subjective well-being was measured following the guidelines of OECD (2013) and the European Social Survey (2012). The study uses
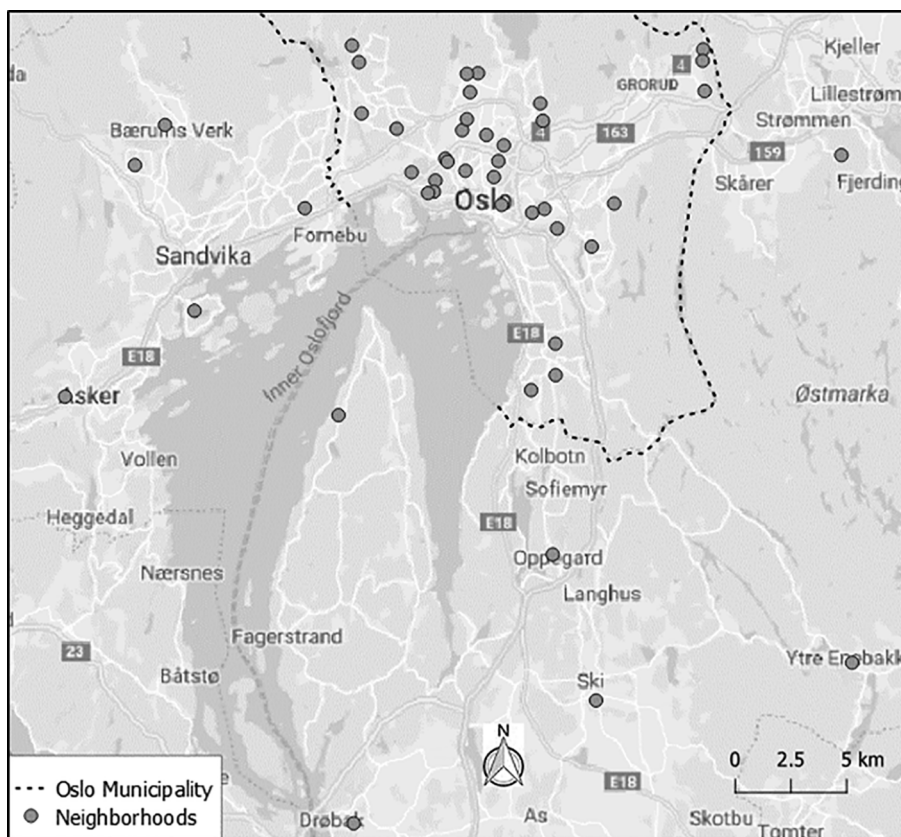

Fig. 3. Oslo metropolitan area and case neighborhoods.

Table 1
Descriptive statistics of all variables.

Variables	N	Min/Max	Mean	s.d.
Subjective well-being				
Life satisfaction	1340	0/10	7.88	(1.71)
Eudaimonia	1329	0/10	7.85	(1.70)
Happiness	1318	1/5	3.67	(0.84)
Anxiety	1324	1/5	2.02	(1.01)
Domain satisfaction				
Housing satisfaction	1335	1/5	4.27	(0.78)
Commute satisfaction	968	1/5	3.78	(0.90)
Neighborhood satisfaction	1339	0/10	8.23	(1.83)
Emotional response to neighborhood	1322	1/5	4.11	(0.75)
Personal relationships satisfaction	1315	0/10	7.57	(1.91)
Leisure satisfaction	1309	0/10	7.15	(2.09)
Health (self-reported)	1338	0/10	7.72	(1.82)
Job satisfaction	973	1/5	4.10	(0.86)
Sociodemographic variables				
Age	1344	19/94	50.16	(15.71)
Living with partner/spouse	1329	0/1	0.61	(0.49)
Non-Norwegian	1342	0/1	0.09	(0.28)
Adjusted household income (1000 s NOK)[1]	1259	35/4330	642.2	(321.08)
Female	1331	0/1	0.53	(0.50)
College degree or higher	1341	0/1	0.79	(0.41)
Household with children	1334	0/1	0.32	(0.47)

Note: [1]Annual household income divided by the square root of household size.

univariate measures of subjective well-being, which, however, have been shown to be stable and reliable (Lucas and Brent Donnellan, 2012). *Life satisfaction* was measured by asking participants "all things considered, how satisfied are you with your life as a whole nowadays?" on a scale from "extremely dissatisfied" (0) to "extremely satisfied" (10). On the same scale, *eudaimonia* was measured by asking "overall, to what extent do you feel that the things you do in your life are worthwhile?" Affect (emotional/hedonic well-being) was measured by asking participants to evaluate the frequency of emotions of *happiness* and *anxiety* over the past week on a scale from "very rarely or never" (1) to "very often or always" (5). Life satisfaction and eudaimonia are cognitive evaluations of subjective well-being, while happiness and anxiety are affective evaluations. Although domain satisfactions represent cognitive evaluations and are theoretically more directly linked to life satisfaction and eudaimonia, previous studies found significant links between satisfaction with life domains and affective evaluations such as happiness and anxiety (Mouratidis, 2019). Hence, assessing both cognitive and affective measures of subjective well-being in relation to satisfaction with life domains could provide useful insights.

Domain satisfactions were evaluated as follows. *Commute satisfaction* (satisfaction with the commute) was measured by asking residents "what are your general feelings about your travel to your main occupation?" on a scale from "very negative" (1) to "very positive" (5). Participants were asked to consider the time spent and mode(s) of travel. *Housing satisfaction* was assessed by asking participants "how satisfied are you with your dwelling?" on a scale from "very dissatisfied" (1) to "very satisfied" (5). They were asked to consider only the interior of their dwelling in order to distinguish between satisfaction with the dwelling and the neighborhood (Canter and Rees, 1982). The role of the neighborhood as a life domain is examined with two variables: neighborhood satisfaction and emotional response to neighborhood. Neighborhood satisfaction aims to capture cognitive evaluations of the neighborhood's role in well-being, while emotional response to neighborhood aims to capture the role of relevant affective reactions in well-being. *Neighborhood satisfaction* was assessed by asking survey participants "how well do you think your local area meets your current needs?" on a scale from "extremely poorly" (0) to "extremely well" (10). They were asked to consider their local area's internal (physical and social) and external (accessibility to other areas) characteristics. Local area was defined in the survey as the area within

15 min walking distance from the respondent's dwelling, to achieve greater consistency among respondents. *Emotional response to neighborhood* was assessed by asking participants "how would you describe your feelings experienced when walking or biking in your local area?" on a scale from "very negative" (1) to "very positive" (5). *Personal relationships satisfaction* was measured by asking residents "how satisfied are you with your personal relationships?" on a scale from "extremely dissatisfied" (0) to "extremely satisfied" (10). On the same scale, *leisure satisfaction* was measured by asking residents to evaluate "how satisfied are you with the time you spend on your favorite leisure activities?". *Health* (self-reported health) was assessed by asking participants to describe their general health on a scale from "extremely poor" (0) to "extremely good" (10). *Job satisfaction* was measured by asking participants "how satisfied are you overall with your work or studies?" on a scale from "very dissatisfied" (1) to "very satisfied" (5).

Sociodemographic variables were also collected via the survey. Individual sociodemographic variables used in the analysis are: age, gender, citizenship, household income, level of education, cohabitation status (living with partner or spouse), and presence of children in the household.

3.3. Statistical analysis

Statistical analysis in the present study includes pairwise correlations and path analysis. The analysis begins with bivariate correlations between all measures of subjective well-being and domain satisfactions. Next, the main results of the study are presented: path analysis with structural equation modeling.

The main analytical technique in the study is path analysis with structural equation modeling (Byrne, 2016). For this purpose, statistical software AMOS (version 26) was used. Structural equation modeling includes path analysis and/or latent variables. In this study, only path analysis is used. Structural equation modeling can handle continuous and binary data. Variables on domain satisfaction and subjective well-being in this study are measured on 0–10 and 1–5 scales. These variables are usually interpreted as either continuous or ordinal, with little difference in the results between the two approaches (Ferrer-i-Carbonell and Frijters, 2004). Therefore, treating variables on domain satisfaction and subjective well-being as continuous in structural equation models is common practice (Cao, 2016; Gao et al., 2017).

The model presented in Fig. 2 was theoretically developed and then tested with structural equation modeling. A multiple mediator analysis with structural equation modeling was performed (Preacher and Hayes, 2008). Four structural equation models were tested, one for each measure of subjective well-being as final endogenous variable: Model 1 (life satisfaction), Model 2 (happiness), Model 3 (anxiety), and Model 4 (eudaimonia). As shown in Fig. 2, the models examine commute satisfaction, emotional response to neighborhood, and health as exogenous variables; neighborhood satisfaction, housing satisfaction, leisure satisfaction, job satisfaction, and personal relationships satisfaction as endogenous mediating variables; and measures of subjective well-being as final endogenous variables. The models also include sociodemographic variables as exogenous variables, as depicted in Fig. 2. For Models 1 and 2 on life satisfaction and happiness respectively, age squared is additionally included to provide more accurate estimates (Blanchflower and Oswald, 2011; Easterlin and Sawangfa, 2007). The residuals of the mediating variables leisure satisfaction, job satisfaction, personal relationships satisfaction, and housing satisfaction are considered to correlate based on the following theoretical rationale: although life domains are conceptually distinct, the evaluation of one life domain may influence another. Hence, these residuals are allowed to correlate in order to model possible irrelevant common variance and correct estimates for systematic errors (Woody, 2011). Nevertheless, the estimates and significance levels remain substantially the same with and without correlating these residuals.

Bootstrapping of 1000 replications was performed to estimate

Table 2
Pairwise correlations for subjective well-being and domain satisfaction.

	1	2	3	4	5	6	7	8	9	10	11	12
Subjective well-being												
1. Life satisfaction	1											
2. Happiness	0.56**	1										
3. Anxiety	−0.38**	−0.31**	1									
4. Eudaimonia	0.74**	0.50**	−0.35**	1								
Domain satisfaction												
5. Housing satisfaction	0.33**	0.19**	−0.17**	0.28**	1							
6. Commute satisfaction	0.11**	0.10**	−0.07*	0.13**	0.12**	1						
7. Neighborhood satisfaction	0.33**	0.19**	−0.11**	0.34**	0.29**	0.21**	1					
8. Emotional response to neighborhood	0.24**	0.18**	−0.12**	0.22**	0.24**	0.18**	0.33**	1				
9. Personal relationships satisfaction	0.61**	0.46**	−0.26**	0.56**	0.25**	0.11**	0.33**	0.21**	1			
10. Leisure satisfaction	0.43**	0.31**	−0.19**	0.41**	0.20**	0.15**	0.26**	0.24**	0.41**	1		
11. Health	0.45**	0.30**	−0.25**	0.40**	0.16**	0.11**	0.16**	0.15**	0.33**	0.35**	1	
12. Job satisfaction	0.37**	0.31**	−0.21**	0.43**	0.14**	0.13**	0.07*	0.08*	0.29**	0.24**	0.19**	1

Notes: *$p < 0.05$, **$p < 0.01$.

significance levels for direct, indirect, and total statistical effects. Bootstrapping is perhaps the most reliable way to estimate significance levels in multiple mediation models and helps counter normality issues in the data (Pek et al., 2018; Preacher and Hayes, 2008). To perform bootstrapping, cases with missing data were excluded. Thus, sample sizes are reduced in modeling results, especially since commute satisfaction and job satisfaction pertain only to the working population within the sample.

4. Results

Table 2 presents a correlation matrix showing bivariate correlations between all variables on subjective well-being and domain satisfaction. Pearson correlation coefficients and significance levels are presented. As expected, all subjective well-being measures and domain satisfactions are significantly correlated. The cognitive components of subjective well-being – life satisfaction and eudaimonia – have the strongest bivariate correlation among subjective well-being measures. Happiness has considerable correlations with life satisfaction and eudaimonia respectively. Anxiety has less strong, negative correlations with life satisfaction, happiness, and eudaimonia. Among all domain satisfactions, personal relationships satisfaction has the strongest correlations with subjective well-being measures, while the correlations between subjective well-being and health, leisure satisfaction, and job satisfaction are also relatively strong. Among life domains on neighborhood, housing, and commute, it is neighborhood satisfaction and housing satisfaction that have the strongest correlations with subjective well-being measures, followed by emotional response to neighborhood, and commute satisfaction.

Based on the theoretical model presented in Fig. 2, four structural equation models are tested, one for each measure of subjective well-being as final endogenous variable: Model 1 (life satisfaction), Model 2 (happiness), Model 3 (anxiety), and Model 4 (eudaimonia). Table 3 presents the full results of the path analysis for Model 1. The results present standardized direct, indirect, and total statistical effects (associations) for the model. The fit indices (CFI = 0.997, RMSEA = 0.034, GFI = 0.996, and X^2/df = 1.978) indicate that the model is a better fit for the data compared to the alternative models presented in the Appendix.

Results in Table 3 show that commute satisfaction, neighborhood satisfaction, and housing satisfaction have positive total effects on life satisfaction. According to the results of the path analysis, the positive effect of commute satisfaction on life satisfaction is exclusively due to indirect pathways. Commute satisfaction is found to have no direct effect on life satisfaction and to contribute to life satisfaction only indirectly via its positive effects on neighborhood satisfaction, job satisfaction, leisure satisfaction, housing satisfaction, and personal

relationships satisfaction. The strongest effects of commute satisfaction on other domain satisfactions are those on neighborhood satisfaction and job satisfaction. Emotional response to neighborhood has positive total effects on life satisfaction. As in the case of commute satisfaction, the positive effect of emotional response to neighborhood on life satisfaction is mostly due to indirect pathways. Emotional response to neighborhood is found to have nonsignificant direct effects on life satisfaction and to significantly contribute to life satisfaction only indirectly via its positive effects on neighborhood satisfaction, housing satisfaction, leisure satisfaction, and personal relationships satisfaction. The strongest effect of emotional response to neighborhood on domain satisfactions is the one on neighborhood satisfaction. The effects of neighborhood satisfaction on life satisfaction are both direct and indirect. The indirect effects are via personal relationships satisfaction, housing satisfaction, and leisure satisfaction. The strongest effect of neighborhood satisfaction on other domain satisfactions is the one on personal relationships satisfaction. Housing satisfaction is found to have a positive total effect on life satisfaction. This effect is only direct according to model specification. Health is found to have positive direct as well as indirect effects on life satisfaction. The indirect effects of health on life satisfaction are via neighborhood satisfaction, leisure satisfaction, job satisfaction, personal relationships satisfaction, and housing satisfaction. Leisure satisfaction, job satisfaction, and personal relationships satisfaction are all found to have positive direct and total effects on life satisfaction.

Table 4 presents results for the four models corresponding to the four different measures of subjective well-being. The statistical effects and significance levels between domain satisfactions for Model 2 (happiness), Model 3 (anxiety), and Model 4 (eudaimonia) are the same as those for Model 1 (life satisfaction) presented in Table 3, so they are not shown here for simplicity. Therefore, Table 4 presents only the results for the final endogenous variable for each model corresponding to each of the four different measures of subjective well-being.

Overall, Table 4 shows that commute satisfaction, neighborhood satisfaction, and housing satisfaction are positively associated with subjective well-being. Among these, the strongest associations were found for neighborhood satisfaction and subjective well-being. According to Table 4, commute satisfaction has significant positive total effects on life satisfaction, happiness (marginally significant), and eudaimonia. These effects are mainly due to the indirect pathways shown in Table 3. Neighborhood satisfaction has significant positive total effects on life satisfaction, happiness, and eudaimonia. The effects on life satisfaction and eudaimonia are both direct and indirect (via other domain satisfactions), while the effect on happiness in only indirect (via other domain satisfactions). Housing satisfaction is found to have a significant positive total effect on life satisfaction, while its associations with other measures of subjective well-being are nonsignificant.

Table 3
Model 1: Full structural equation modeling results on domain satisfaction and life satisfaction (based on Fig. 2).

	Neighborhood satisfaction	Housing satisfaction	Leisure satisfaction	Job satisfaction	Personal relationships satisfaction	Life satisfaction
Direct effects						
Commute satisfaction	0.146**	0.047	0.069[a]	0.116**	0.027	0.001
Emotional response to neighborhood	0.290**	0.137**	0.130**	0.028	0.079*	0.017
Health	0.085*	0.085*	0.297**	0.170**	0.237**	0.178**
Neighborhood satisfaction		0.209**	0.121**	0.026	0.237***	0.121**
Housing satisfaction						0.068*
Leisure satisfaction						0.126**
Job satisfaction						0.173**
Personal relationships satisfaction						0.330**
Indirect effects						
Commute satisfaction		0.031***	0.018***	0.004	0.035***	0.075**
Emotional response to neighborhood		0.061**	0.035***	0.007	0.069***	0.124***
Health		0.018**	0.010**	0.002	0.020*	0.171**
Neighborhood satisfaction						0.112***
Total effects						
Commute satisfaction	0.146**	0.077*	0.087*	0.120**	0.062[a]	0.076*
Emotional response to neighborhood	0.290**	0.197**	0.165***	0.035	0.148**	0.142**
Health	0.085*	0.103**	0.307**	0.173**	0.257**	0.349**
Neighborhood satisfaction		0.209**	0.121**	0.026	0.237***	0.233**
Housing satisfaction						0.068*
Leisure satisfaction						0.126**
Job satisfaction						0.173**
Personal relationships satisfaction						0.330**
Summary statistics						
SMC	0.133	0.184	0.173	0.086	0.194	0.480

Notes: [a]$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. All effects are standardized. Significance levels are calculated with bootstrapping. Bootstrap replications = 1000. N = 854. $X^2/df = 1.978$. GFI = 0.996. CFI = 0.997. RMSEA = 0.034.
The model also includes sociodemographic characteristics as exogenous variables (age, age squared, gender, cohabitation status, citizenship, level of education, household income, presence of children in household).

Emotional response to neighborhood has significant positive total effects on life satisfaction, happiness, and eudaimonia, while it has a marginally significant negative total effect on anxiety. Emotional response to neighborhood has a significant direct effect on happiness and indirect effects via domain satisfactions on life satisfaction, happiness, and eudaimonia. These differences between Models 1, 2, 3, and 4 suggest that the commute, the neighborhood, and the dwelling may influence the different components of subjective well-being in diverse ways. All the other evaluations of life domains – health, leisure satisfaction, job satisfaction, and personal relationships satisfaction – are significantly associated with subjective well-being, as shown in Table 4, in line with previous research (Diener and Seligman, 2002; Hribernik and Mussap, 2010; Rojas, 2006; Sirgy, 2012).

Alternative models and results of path analysis (Figs. B1, B2 and B3, Tables B1, B2 and B3) are presented in Appendix B. These analyses are used as robustness checks. The results confirm that, overall, commute satisfaction, neighborhood satisfaction, and housing satisfaction are associated with subjective well-being. The results of the alternative models also confirm that commute satisfaction is linked to subjective well-being indirectly via other domain satisfactions and that neighborhood satisfaction and housing satisfaction are directly linked to subjective well-being. These results also show that neighborhood satisfaction and housing satisfaction may be additionally linked to subjective well-being indirectly via other domains. The presence and strength of these indirect statistical effects depend on model specification. According to the theoretical considerations and previous knowledge presented in Section 2 leading to the final theoretical model of the study (Fig. 2), it is theoretically more reasonable that neighborhood

satisfaction additionally contributes to subjective well-being via satisfaction with other life domains, while housing satisfaction is mainly linked to subjective well-being in a direct way. Analysis in Appendix C provides additional indications that neighborhood satisfaction is positively linked to subjective well-being.

Sociodemographic characteristics are used in all structural equation models as exogenous control variables linked to domain satisfactions and measures of subjective well-being. These statistical effects are not presented in the tables to reduce complexity. Results confirm that life satisfaction is U-shaped with age (Blanchflower and Oswald, 2011). Income is associated with higher housing satisfaction, job satisfaction, and subjective well-being. Living with a partner or spouse is associated with higher personal relationships satisfaction, housing satisfaction (marginally significant), and subjective well-being. Having children in the household is associated with lower leisure satisfaction and lower personal relationships satisfaction (marginally significant). Immigrant populations appear to have lower housing satisfaction and higher levels of anxiety. Females have higher personal relationships satisfaction and higher levels of eudaimonia. Those with tertiary education have lower personal relationships satisfaction (marginally significant) and higher levels of eudaimonia.

5. Discussion

The potential influence of the urban environment on subjective well-being and quality of life in general can be explained by the mediating role of life domains (Campbell et al., 1976; Marans, 2003; Mouratidis, 2018). Commute satisfaction, neighborhood satisfaction,

Table 4
Structural equation modeling results for the final endogenous variable for each model corresponding to each of the four different measures of subjective well-being (based on Fig. 2).

	Model 1: Life Satisfaction	Model 2: Happiness	Model 3: Anxiety	Model 4: eudaimonia
Direct effects				
Commute satisfaction	0.001	0.002	−0.009	0.025
Emotional response to neighborhood	0.017	0.069*	−0.053	0.003
Health	0.178**	0.075*	−0.181***	0.128**
Neighborhood satisfaction	0.121**	0.022	0.025	0.110**
Housing satisfaction	0.068*	0.051	−0.004	0.014
Leisure satisfaction	0.126**	0.094**	−0.031	0.083**
Job satisfaction	0.173**	0.215**	−0.118**	0.249**
Personal relationships satisfaction	0.330**	0.244***	−0.112**	0.328**
Indirect effects				
Commute satisfaction	0.075**	0.056**	−0.021*	0.075***
Emotional response to neighborhood	0.124***	0.075***	−0.018	0.105**
Health	0.171**	0.131***	−0.057**	0.164***
Neighborhood satisfaction	0.112***	0.086***	−0.035*	0.097**
Total effects				
Commute satisfaction	0.076*	0.058[a]	−0.030	0.100**
Emotional response to neighborhood	0.142**	0.144***	−0.070[a]	0.108**
Health	0.349**	0.207**	−0.238***	0.292**
Neighborhood satisfaction	0.233**	0.107**	−0.010	0.207**
Housing satisfaction	0.068*	0.051	−0.004	0.014
Leisure satisfaction	0.126**	0.094*	−0.031	0.083**
Job satisfaction	0.173**	0.215**	−0.118**	0.249**
Personal relationships satisfaction	0.330**	0.244***	−0.112**	0.328**
Summary statistics				
N	854	844	846	851
SMC	0.480	0.264	0.154	0.458
X²/df	1.978	1.749	0.624	0.713
GFI	0.996	0.996	0.999	0.999
CFI	0.997	0.998	1.000	1.000
RMSEA	0.034	0.030	0.000	0.000

Notes: [a]$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. All effects are standardized. Significance levels are calculated with bootstrapping. Bootstrap replications = 1000.

The models also include sociodemographic characteristics as exogenous variables (age, gender, cohabitation status, citizenship, level of education, household income, presence of children in household). Models 1 and 2 additionally include an age-squared variable.

The effects and significance levels between domain satisfactions for Models 2, 3, and 4 are substantially the same as those for Model 1 presented in Table 3.

and housing satisfaction can be used as urban livability indicators because of their potential mediating role between the urban environment and subjective well-being. However, previous knowledge provides limited evidence on how these three indicators in conjunction with satisfaction with other life domains relate to the three major components of subjective well-being: life satisfaction, affect, and eudaimonia. In this paper, the focus is on whether and how commute satisfaction, neighborhood satisfaction, and housing satisfaction, together with evaluations of other life domains including health, personal relationships, job, and leisure, are linked to subjective well-being.

According to the outcomes of the study, commute satisfaction is significantly associated with subjective well-being. Commute satisfaction was found to be positively associated with life satisfaction, happiness, and eudaimonia. As path analysis showed, commute satisfaction is linked to these measures of subjective well-being indirectly via satisfaction with other life domains – mainly neighborhood satisfaction and job satisfaction. This is reasonable since neighborhood location and neighborhood internal characteristics can influence daily travel and commute satisfaction (Mouratidis et al., 2019), and then this may contribute to the evaluation of how the neighborhood covers one's overall needs (neighborhood satisfaction). The indirect links of travel satisfaction with subjective well-being via satisfaction with other life domains found in the present study are in line with similar suggestions by some other scholars (De Vos, 2019; Gao et al., 2017). However, Gao

et al. (2017) found nonsignificant overall associations between travel satisfaction and life satisfaction, while the present study finds significant associations. The positive indirect links between commute satisfaction and subjective well-being found in the path analysis of the present study highlight the range of different ways in which daily travel can contribute to subjective well-being (Chatterjee et al., 2020; Clark et al., 2019; Ettema et al., 2010).

This study's findings also show that neighborhood satisfaction is significantly associated with subjective well-being. Neighborhood satisfaction was found to be positively associated with life satisfaction, happiness, and eudaimonia. As path analysis showed, neighborhood satisfaction is associated with subjective well-being both directly and indirectly via personal relationships satisfaction, housing satisfaction, and leisure satisfaction. These findings confirm the role of the residential neighborhood in personal relationships and leisure activities (Mazumdar et al., 2018; Mouratidis, 2019) but also the links between neighborhood satisfaction and housing satisfaction (Davis and Fine-Davis, 1991). Moreover, in addition to neighborhood satisfaction which represents a cognitive evaluation of the impact of neighborhood on well-being, the study has examined affective evaluations of the neighborhood. Emotional response to neighborhood was found to be positively associated with life satisfaction, happiness, and eudaimonia, while experiencing negative emotional response to neighborhood is associated with increased anxiety. Finally, the study presented

residents' own assessments on the role of their neighborhood in their well-being (Appendix C), showing that the neighborhood is highly important for most residents. Altogether, these results suggest that cognitive and affective evaluations of the neighborhood constitute significant pathways between the urban environment and subjective well-being, supporting and extending previous theoretical and empirical literature (Campbell et al., 1976; Cao et al., 2018; Cummins, 1996; Davis and Fine-Davis, 1991; Marans, 2003; Rojas, 2006; Sirgy and Cornwell, 2002).

Housing satisfaction was also found to be significantly associated with subjective well-being. In fact, housing satisfaction was found to be positively associated with life satisfaction. This association is primarily direct, since, from a conceptual point of view, housing satisfaction is not expected to substantially influence other domain satisfactions. Overall, this result consolidates housing satisfaction as one of the significant pathways between the urban environment and subjective well-being, supporting and extending previous theoretical and empirical studies (Campbell et al., 1976; Davis and Fine-Davis, 1991; Marans et al., 2011).

The study has some limitations that could be explored in future research studies. First, it uses univariate evaluations of life domains and subjective well-being. Although univariate measures of subjective well-being are stable and reliable (Lucas and Brent Donnellan, 2012), latent constructs for evaluations of both life domains and subjective well-being could have produced even more reliable estimates. Second, differentiating between cognitive and affective evaluations of travel and housing, as done for the neighborhood domain, could have uncovered diverse links with subjective well-being. Third, the study is based on cross-sectional data. Longitudinal research designs could offer stronger empirical evidence and more insights into the direction of the examined relationships. Fourth, the analysis does not account for personality traits. However, personality is expected to influence evaluations of both life domains and subjective well-being; thus, its omission is not expected to have materially affected the results. Fifth, the responses of the survey are geographically clustered in different neighborhoods. Although there is no between-cluster variance for the outcome variables of the study when sociodemographic variables are included (Mouratidis, 2020), a more geographically dispersed sample might have been more reliable. Sixth, the study uses data from a specific urban region which represents a North European context. Future studies should explore this topic further in other socioeconomic and cultural contexts. Seventh, the study examines links between commute, neighborhood, and housing satisfaction and subjective well-being in order to

provide understanding on their use as urban livability indicators. Although such indicators can provide a useful first-level assessment of quality of life in cities, they do present certain limitations. They may not on their own be sufficient to explain the whole influence of urban environments on quality of life, as they may not completely capture other pathways related to life domains such as social relationships, leisure, and health. For in-depth investigations, it might be more helpful to examine how built and social environmental characteristics influence all the diverse life domains and subjective well-being components.

6. Conclusions

This paper has provided insights into the relationships between commute satisfaction, neighborhood satisfaction, and housing satisfaction and subjective well-being. It is one of the first studies to systematically examine how commute satisfaction, neighborhood satisfaction, and housing satisfaction, together with satisfaction with other life domains, relate to the different components of subjective well-being. It has thereby attempted to improve our understanding on how the domains of daily travel, neighborhood, and housing are linked to quality of life. The study's findings also generate new knowledge about the reliability of commute satisfaction, neighborhood satisfaction, and housing satisfaction as indicators of livability and quality of life within cities. Findings indicate that commute satisfaction, neighborhood satisfaction, and housing satisfaction are all significantly associated with subjective well-being. Commute satisfaction was found to be linked to subjective well-being indirectly, mainly via neighborhood satisfaction and job satisfaction. Neighborhood satisfaction was found to relate to subjective well-being both directly and indirectly via personal relationships satisfaction, housing satisfaction, and leisure satisfaction. Housing satisfaction was found to have a significant direct association with subjective well-being. These findings suggest that commute satisfaction, neighborhood satisfaction, and housing satisfaction are reliable indicators of urban livability. Consolidating these indicators provides a platform for future measurements of urban quality of life for research as well as public policy purposes.

CRediT authorship contribution statement

Kostas Mouratidis: Conceptualization, Methodology, Formal analysis, Investigation, Visualization, Writing - original draft, Writing - review & editing.

Appendix A

Table A1
Sociodemographic characteristics of survey respondents.

	Survey respondents (N = 1344)	Population
	Mean	Mean
Age (for aged 18 or older)[1]	50.16	46.30
Unemployed[2]	2.50%	2.50%
Living with partner/spouse[1]	61%	48%
Non-Norwegian[1]	9%	21%
Adjusted household income (1000 s NOK)[1]	642.20	582.98
Household size (persons)[1]	2.22	1.94
Number of children in household[1]	0.54	0.46
Household with children[1]	32%	26%
Respondent is female[1]	53.40%	50.30%
Respondent has college degree or higher[2]	79%	50%

Notes: [1]Population mean refers to the counties of Oslo and Akershus. [2]Population mean refers to Oslo Municipality.
Source: Statistics Norway (2019).
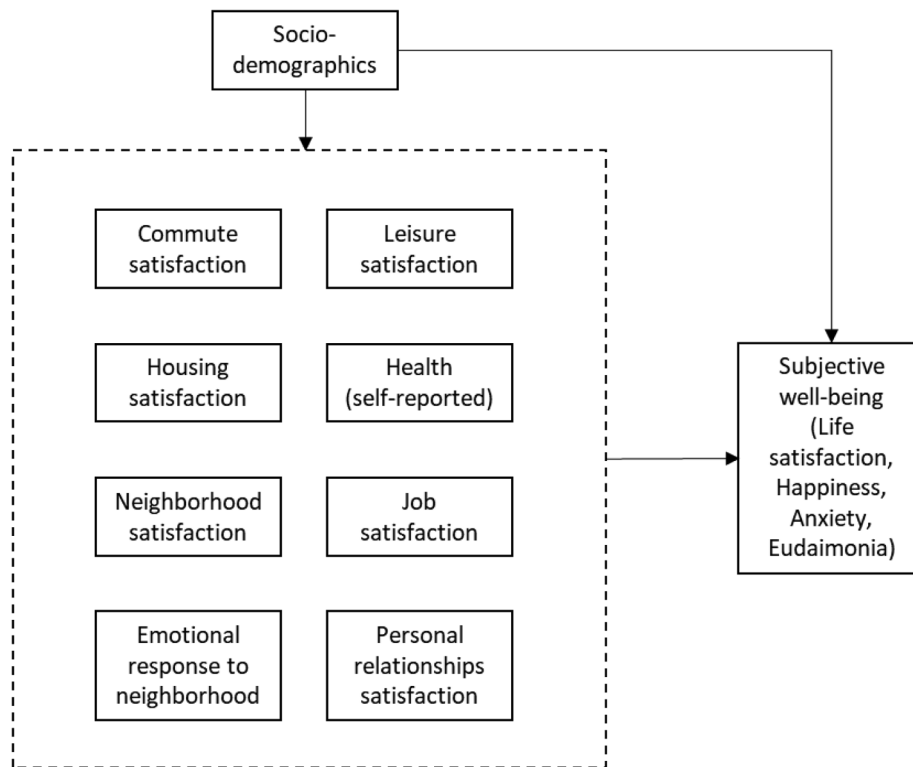
Appendix B

Fig. B1. Theoretical model B1: Domain satisfactions directly linked to subjective well-being without including indirect pathways.

Table B1
Structural equation modeling results for the final endogenous variable for each model corresponding to each of the four different measures of subjective well-being (based on Fig. B1).

	Model 1: Life Satisfaction	Model 2: Happiness	Model 3: Anxiety	Model 4: Eudaimonia
Commute satisfaction	0.001	0.002	−0.009	0.025
Housing satisfaction	0.068*	0.051	−0.004	0.014
Neighborhood satisfaction	0.122**	0.022	0.025	0.110**
Emotional response to neighborhood	0.017	0.069*	−0.053	0.003
Personal relationships satisfaction	0.331**	0.242***	−0.112**	0.328**
Leisure satisfaction	0.126**	0.094**	−0.031	0.083**
Health	0.178**	0.075*	−0.181***	0.128**
Job satisfaction	0.173**	0.214**	−0.118**	0.249**
Summary statistics				
N	854	844	846	851
SMC	0.477	0.272	0.154	0.458
X²/df	4.494	4.266	0.624	0.713
GFI	0.990	0.990	0.999	0.999
CFI	0.989	0.989	1.000	1.000
RMSEA	0.064	0.062	0.000	0.000

Notes: [a]$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. All effects are standardized. Significance levels are calculated with bootstrapping. Bootstrap replications = 1000. There are no indirect effects for this model, so direct and total effects are the same. Exogenous variables are linked to correlate
The models also include sociodemographic characteristics as exogenous variables (age, gender, cohabitation status, citizenship, level of education, household income, presence of children in household). Models 1 and 2 additionally include an age-squared variable.
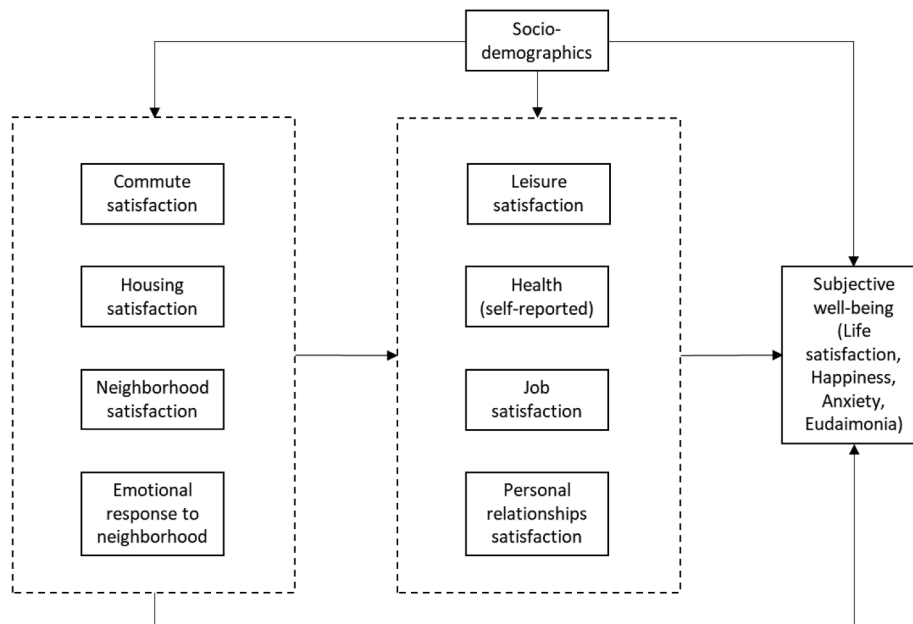
Fig. B2. Theoretical model B2: Satisfaction with the commute, neighborhood, and housing linked to subjective well-being directly as well as indirectly via other domain satisfactions.

Table B2

Structural equation modeling results for the final endogenous variable for each model corresponding to each of the four different measures of subjective well-being (based on Fig. B2).

	Model 1: Life Satisfaction	Model 2: Happiness	Model 3: Anxiety	Model 4: Eudaimonia
Direct effects				
Commute satisfaction	0.001	0.002	−0.009	0.025
Housing satisfaction	0.068*	0.051	−0.004	0.014
Neighborhood satisfaction	0.122**	0.022	0.025	0.110**
Emotional response to neighborhood	0.017	0.069*	−0.053	0.003
Personal relationships satisfaction	0.333**	0.243***	−0.112**	0.328**
Leisure satisfaction	0.127**	0.094**	−0.031	0.083**
Health	0.179**	0.075*	−0.181***	0.128**
Job satisfaction	0.173**	0.214**	−0.118**	0.249**
Indirect effects				
Commute satisfaction	0.058**	0.049**	−0.035**	0.059**
Housing satisfaction	0.090**	0.067***	−0.045**	0.087**
Neighborhood satisfaction	0.109**	0.076***	−0.046**	0.100**
Emotional response to neighborhood	0.046*	0.035*	−0.016	0.041*
Total effects				
Commute satisfaction	0.059[a]	0.051	−0.044	0.084*
Housing satisfaction	0.158***	0.118**	−0.050	0.101*
Neighborhood satisfaction	0.231**	0.098**	−0.020	0.210**
Emotional response to neighborhood	0.064[a]	0.104**	−0.069[a]	0.043
Personal relationships satisfaction	0.333**	0.243***	−0.112**	0.328**
Leisure satisfaction	0.127**	0.094**	−0.031	0.083**
Health	0.179**	0.075*	−0.181***	0.128**
Job satisfaction	0.173**	0.214**	−0.118**	0.249**
Summary statistics				
N	854	844	846	851
SMC	0.475	0.271	0.154	0.458
X^2/df	3.769	3.620	0.624	0.713
GFI	0.991	0.992	0.999	0.999
CFI	0.991	0.991	1.000	1.000
RMSEA	0.057	0.056	0.000	0.000

Notes: [a]$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. All effects are standardized. Significance levels are calculated with bootstrapping. Bootstrap replications = 1000. Exogenous variables are linked to correlate.

The models also include sociodemographic characteristics as exogenous variables (age, gender, cohabitation status, citizenship, level of education, household income, presence of children in household). Models 1 and 2 additionally include an age-squared variable.
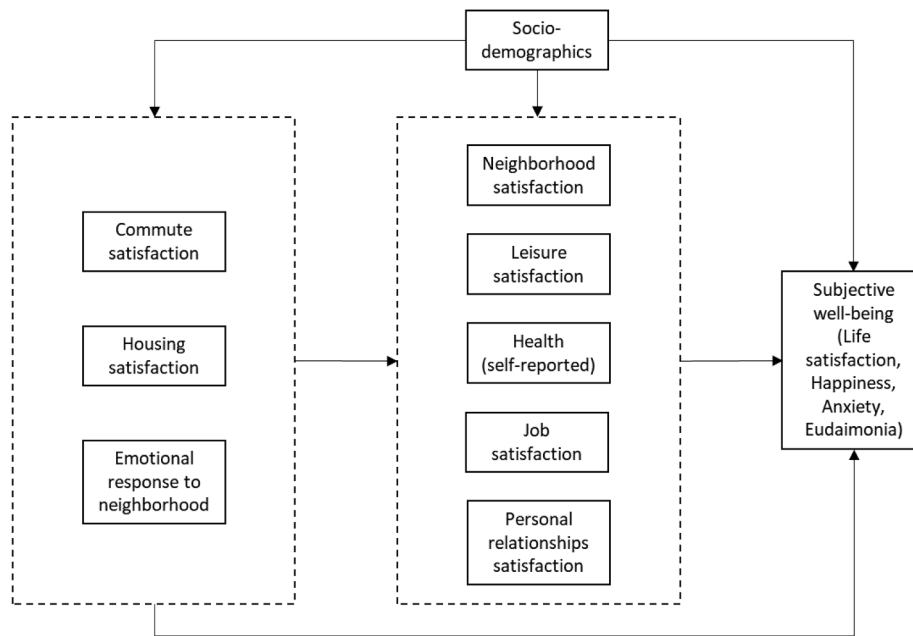
Fig. B3. Theoretical model B3: Commute satisfaction, housing satisfaction, and emotional response to neighborhood linked to subjective well-being directly as well as indirectly via neighborhood satisfaction and other domain satisfactions.

Table B3
Structural equation modeling results for the final endogenous variable for each model corresponding to each of the four different measures of subjective well-being (based on Fig. B3).

	Model 1: Life Satisfaction	Model 2: Happiness	Model 3: Anxiety	Model 4: Eudaimonia
Direct effects				
Commute satisfaction	0.001	0.002	−0.009	0.025
Housing satisfaction	0.068*	0.051	−0.004	0.014
Emotional response to neighborhood	0.017	0.069*	−0.053	0.003
Neighborhood satisfaction	0.122**	0.022	0.025	0.110**
Personal relationships satisfaction	0.333**	0.243***	−0.112**	0.328**
Leisure satisfaction	0.127**	0.094**	−0.031	0.083**
Health	0.179**	0.075*	−0.181***	0.128**
Job satisfaction	0.173**	0.214**	−0.118**	0.249**
Indirect effects				
Commute satisfaction	0.089**	0.062**	−0.038**	0.088**
Housing satisfaction	0.140**	0.088***	−0.050**	0.134**
Emotional response to neighborhood	0.104**	0.060**	−0.021	0.092**
Total effects				
Commute satisfaction	0.090**	0.064*	−0.047	0.113**
Housing satisfaction	0.209**	0.139***	−0.054	0.148**
Emotional response to neighborhood	0.122**	0.129**	−0.074[a]	0.095*
Neighborhood satisfaction	0.122**	0.022	0.025	0.110**
Personal relationships satisfaction	0.333**	0.243***	−0.112**	0.328**
Leisure satisfaction	0.127**	0.094**	−0.031	0.083**
Health	0.179**	0.075*	−0.181***	0.128**
Job satisfaction	0.173**	0.214**	−0.118**	0.249**
Summary statistics				
N	854	844	846	851
SMC	0.474	0.272	0.154	0.458
X^2/df	3.493	3.335	0.624	0.713
GFI	0.992	0.992	0.999	0.999
CFI	0.992	0.992	1.000	1.000
RMSEA	0.054	0.053	0.000	0.000

Notes: [a]$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$. All effects are standardized. Significance levels are calculated with bootstrapping. Bootstrap replications = 1000. Exogenous variables are linked to correlate.
The models also include sociodemographic characteristics as exogenous variables (age, gender, cohabitation status, citizenship, level of education, household income, presence of children in household). Models 1 and 2 additionally include an age-squared variable.

Appendix C

A question aiming to directly assess the *importance of the neighborhood for quality of life* was also asked to participants. The question was "how important is the local area you live in for your life in general? Consider your local area's internal characteristics (physical and social) as well as the accessibility to other areas" and it was measured on a scale from "not at all" (1) to "a great deal" (5). Similar assessments on housing and travel were not available in the dataset of the present study. Fig. C1. presents respondents' evaluations of the importance of their neighborhood for their quality of life. In total, 85% of the respondents think that their neighborhood is highly important for their life in general, giving a score of 4 or 5 on a scale from 1 to 5. This finding provides additional indications that neighborhood satisfaction could be positively linked to subjective well-being.
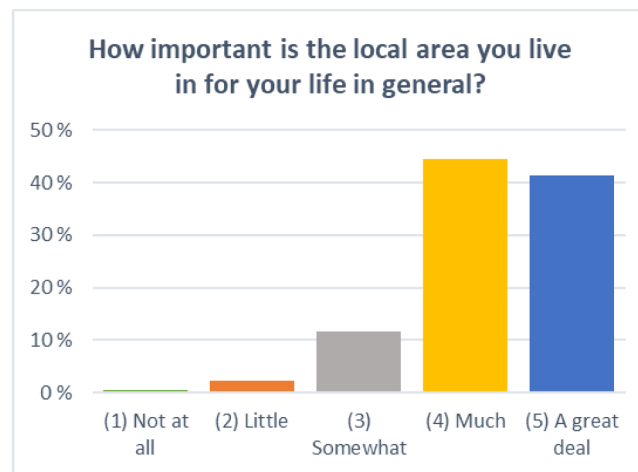

Fig. C1. Importance of neighborhood for quality of life (N = 1340).

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