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Spatial nature of urban well-being

Sanna Ala-Mantila[a], Jukka Heinonen[b], Seppo Junnila[c] and Perttu Saarsalmi[d]

ABSTRACT
The evidence for connections between subjective well-being and spatial factors remains inconclusive, especially with respect to the immediate living environment. To fill this gap, this paper explores the relationship between individual-level subjective well-being and spatial variables in urban areas. This resolution is achieved by utilizing finely divided geographical information system (GIS)-based neighbourhood data, and controlling for objective and subjective spatial characteristics, as well as socio-spatial factors. The results suggest that subjective well-being has some spatial nature, but the direction of these relationships is highly dependent on the subjective well-being measure used. For example, central pedestrian zones flourish in terms of quality of life, whereas the highest happiness is reported in car-oriented zones. Overall, subjective spatial characteristics are more important for well-being than objective ones.

KEYWORDS
subjective well-being; cities; happiness; quality of life; inequality; urbanization

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INTRODUCTION

Subjective well-being (SWB) has aroused interest in many disciplines, including psychology, economics, sociology and geography (Clark, Frijters, & Shields, 2008; Diener, 2000, p. 34; Schwanen & Atkinson, 2015), as well as being a goal in policy-making (Stiglitz, Sen, & Fitoussi, 2009). A plethora of studies report relationships between several SWB and socio-economic measures, with the conclusion that the factors of a good life are relatively similar for everyone (Blanchflower, 2009).

Recently, interest has moved from the macro-level to smaller scales, such as the happiness of cities (Florida, Mellander, & Rentfrow, 2013) and states (Oswald & Wu, 2010). Moreover, adding a spatial dimension to models explaining SWB has been found to enhance their explanatory power (Brereton, Clinch, & Ferreira, 2008; Oswald & Wu, 2010). In affluent countries, those living in rural areas tend to report higher levels of well-being than those living in urban areas (Easterlin, Angelescu, & Zweig, 2011), which has been referred to as an urban–rural happiness gradient (Berry & Okulicz-Kozaryn, 2011). However, there are also contradictory results (Peterson, Park, & Seligman, 2005; Rehdanz & Maddison, 2005). In some cases, social and spatial intertwine, and numerous studies argue that social–spatial position, e.g., inequality (Alesina, Di Tella, & MacCulloch, 2004) and relative position in the neighbourhood (Brodeur & Flèche, 2012), also affect individual well-being. This is reminiscent of Karl Marx's notion: 'A house may be large or small; as long as the neighbouring houses are likewise small, it satisfies all social requirements for a residence' (Marx, 1847).

The contribution of this paper is to shed a light on the spatial nature of SWB by studying the relationship between spatial variables and two measures of SWB: happiness and quality of life (QoL) in urban areas of Finland. SWB differences within urban areas are less studied than the urban–rural gradient. Nevertheless, the ongoing urbanization and urban sprawl make comparisons within urban areas more relevant than comparing urban with rural areas. Accordingly, in this study, micro-scale geographical information system (GIS)-based data that describe the actual

CONTACT
[a] **(Corresponding author)** salamantila@gmail.com
Department of Built Environment, Aalto University School of Engineering, Espoo, Finland.
[b] heinonen@hi.is
Faculty of Civil and Environmental Engineering, University of Iceland, Reykjavík, Iceland.
[c] seppo.junnila@aalto.fi
Department of Built Environment, Aalto University School of Engineering, Espoo, Finland.
[d] perttu.saarsalmi@gmail.com
The Welfare and Health Promotion Unit, National Institute for Health and Welfare (THL), Helsinki, Finland.

living environment are used to bring new insights, whereas most previous studies have used data at a much more aggregated level. Secondly, socio-spatial position is controlled for, as earlier results on the relationship between neighbourhood inequality and SWB have been mixed.

The relationships between the studied SWB measures and urban form are far from straightforward. Results indicate that living in less dense car-oriented zones is related to slightly higher happiness. However, QoL seems to be higher in the most urban central pedestrian zones and on their fringes. Further, when controlling for density instead of urban zone, the relationship between QoL and spatial structure disappears. Other startling differences are also found: it seems that neighbourhood inequality has a negative relationship with happiness, but at the same time inequality is related to higher reported levels of QoL. Overall, subjective spatial characteristics seem to be more important for well-being than objective characteristics such as density. This suggests that various types of urban structures can enhance well-being if the essential issues, such as perceived safety, are taken care of.

SPATIAL FACTORS EXPLAINING SUBJECTIVE WELL-BEING

Spatial factors and SWB

Most earlier literature on the spatial nature of SWB has studied the relationship between larger administrative units and their aggregate SWB (Lawless & Lucas, 2011, Oswald & Wu, 2010) or have concentrated on differences between urban and rural areas (Cummins, Eckersley, Pallant, Van Vugt, & Misajon, 2003; Davern & Chen, 2010; Knight & Gunatilaka, 2010; Millward & Spinney, 2013; Shucksmith, Cameron, Merridew, & Pichler, 2009). However, some studies have examined more localized scales. For example, Arifwidodo (2012) assessed the effect of urban density within the city of Bandung, Indonesia, finding that gross district density had no statistically significant relationship with life satisfaction. Likewise, Ferreira et al. (2013) found no significant relation with life satisfaction and density. However, Li and Kanazawa (2016) found population density at the level of the census block group to decrease self-reported life satisfaction, and a similar finding was made by Cramer, Torgersen, and Kringlen (2004). Similarly, Schwanen and Wang (2014) suggest that there is an inverse relationship between overall life satisfaction and level of urbanization at the intra-urban scale in Hong Kong, China. On the contrary, MacKerron and Mourato (2009) found that in London, UK, people living in or closer to the city centre tend to be more satisfied with their lives. Also, Wang and Wang (2016) found that in Beijing, China, residents in the outer suburb have a significantly lower level of life satisfaction than those in the central and inner suburbs. Millward and Spinney's (2013) analysis of life satisfaction across four nuanced urban–rural zones of a Halifax region in Canada found that lower SWBs are found from the outer commuter belt and that the highest ones are from inner-city areas, with inner commuter zones and suburbs falling in the middle.

Thus, the evidence for the effect of urbanization is mixed, and many of the differences between the results of spatial SWB studies are likely related to differences in study designs (Schwanen & Wang, 2014). Drawing conclusions is challenging as the utilized classifications and categorizations differ, and furthermore, descriptions of within-urban differences tend to be rather unrefined. It can be concluded that SWB studies describing intra-urban differences in a detailed manner, grasping the effects of immediate living environment, are relatively few in number and unanimous in their conclusions.

The effect of density dominates the discussion about the spatial nature of SWB, even though it is only one aspect of urban life. Also, accessibility, safety, commuting time, climatic variables and air pollution have been found to explain SWB and, in some cases, including these controls hinders the significance of density, or even changes the sign of its estimate (Bramley & Power, 2009; Brereton et al., 2008; Ferrer-i-Carbonell & Gowdy, 2007; Stutzer & Frey, 2008). In addition to variables that describe the objective characteristics of an area, such as density, evidence suggests that subjective evaluations of the area explain well-being (Mccrea, Stimson, & Western, 2005; Sirgy & Cornwell, 2002). Subjective characteristics, such as perceived accessibility or safety, can have an even a greater impact on well-being than objective spatial characteristics (Ettema & Schekkerman, 2016). For urban living, Mccrea et al. (2005) argue that concerns about the cost of living and service provisions are the most import for overall satisfaction.

Socio-spatial position and SWB

Inequality is a theme linking the social and spatial aspects of SWB. It has been argued that it is not inequality in itself but the visibility of inequality that drives lower trust and cooperation in social networks (Nishi, Shirado, Rand, & Christakis, 2015). This can be hypothesized to materialize in urban areas, which, on the one hand, are hubs of innovation, attracting skilled and well-paid households (Florida, 2005), but, on the other, also absorb low-wage workers due to the increasing importance of the service sector (David & Dorn, 2013). Indeed, increasing inequality seems to be one of the companions of agglomeration and bigger cities (Baum-Snow & Pavan, 2013; Baum-Snow, Freedman, & Pavan, 2014). The UN-Habitat (2016) reports that 75% of cities have higher levels of income inequalities than two decades ago.

Previous results on the relationship between inequality and SWB are mixed. Alesina et al. (2004) concluded using state- and country-level data that income inequality is associated with lower life satisfaction in Europe, and lower happiness in the United States. Also, Glaeser, Resseger, and Tobio (2009) found that those living in unequal US metropolitan areas are more likely to report lower levels of happiness. Similarly, Oishi, Kesebir, and Diener (2011) found an inverse relation between national income inequality and happiness in the United States, but only for lower-income respondents. They argue that the result is explained by perceived unfairness and lack of trust. Nguyen, Fleming, and Su (2015) used Australian statistical division data and found a similar relationship between the Gini coefficient and life satisfaction, also for higher-income households. In contrast, Glaeser, Gottlieb, and Ziv (2016) used state-level data and found a slight positive relationship between happiness and inequality across metropolitan areas. Florida et al. (2013) found no association between metropolitan-level happiness and income inequality.

In addition to inequality, people's evaluations of their position relative to others have been identified to be a component of SWB (Hou, 2014; Luttmer, 2005). People in the same region or neighbourhood are among the reference groups that people can compare themselves with (Clark et al., 2008). Well-being can be negatively related to a reference group's incomes due to wanting to keep up with the neighbours. Opposed channels of neighbourhood influence are assumed in local public good theory, which states that living in a wealthy neighbourhood is positively related to well-being because neighbourhoods with better taxpayers provide better amenities, and in tunnel effect theory, where an area's median income is seen to signal a person's future prospects (Brodeur & Flèche, 2012).

Results on the importance of relative position are mixed, and challenging to compare, as the sizes of reference neighbourhoods vary from 47 to 150,000 inhabitants all the way to county and state levels (Blanchflower & Oswald, 2004; Brereton et al., 2008; Brodeur & Flèche, 2013; Luttmer, 2005). Blanchflower and Oswald (2004), Luttmer (2005), Helliwell and Huang (2011) and Brodeur and Flèche (2012) report that SWB is positively associated with own income and negatively correlated with a region's income. However, opposite results have also been reported (Clark, Westergård-Nielsen, and Kristensen, 2009; Dittmann & Goebel, 2010).

Other factors of SWB

In addition to the factors discussed above, the literature agrees that socio-economic factors and social capital, i.e., social networks and norms of reciprocity and trust (Helliwell & Putnam, 2004), matter for SWB. It has been also argued that there is a strong positive relationship between social capital and well-being (Lyubomirsky, King, & Diener, 2005). Sometimes, adding a dimension of social capital has been found to explain differences between spatial aspects, i.e., Puntscher, Hauser, Walde, and Tappeiner (2015) found that in both urban and rural regions, the explanatory power of SWB disappeared when trust, associational activity and social ties were controlled for. Other studies have confirmed the importance of frequency of social contacts (Gilbert, Colley, & Roberts, 2016), social trust, (Helliwell & Putnam, 2004; Puntscher et al., 2015), and community involvement (Helliwell, 2003). In addition, there is strong established empirical evidence on the socio-economic and personal characteristics affecting SWB, including health, income, employment, age and marital status (Blanchflower, 2009; Dolan, Peasgood, & White, 2008; Layard, 2010).

MATERIALS AND METHODS

Data

Data came from the Regional Health and Well-being study, collected by the National Institute for Health and Welfare (THL), Finland, using stratified random sampling. The purpose of collecting such data is to help municipalities to predict, follow and prioritize actions to support residents' welfare and municipal vitality. Data from 2013, 2014 and 2015 were utilized, the total sample being 59,471 urban residents. The data include information on various aspects of self-reported health, well-being and experiences, along with socio-economic information.

As is usual with a questionnaire survey data, non-response bias is a problem that was corrected by weighting. Here, inverse probability weighting (IPW) corrects the effects of non-response (Härkänen, Kaikkonen, Virtala, & Koskinen, 2014). Besides weights, finite population correction (FPC) (Lehtonen & Pahkinen, 2004) was applied in all analyses. All non-spatial analyses were performed using Stata's (13.1) survey commands.

Open data were also utilized, including data from Statistics Finland's postal code area service Paavo, as well as from the open-data web services of Aluesarjat – Helsinki Region Statistics, HSY Regional Information, and Finnish Environment Institute (SYKE). Data processing took place on the premises of the National Institute for Health and Welfare. Thus, the coordinates of the respondent's home address were available for data combinations.

Dependent variables: happiness and QoL

The two SWB variables – happiness and QoL – were analysed separately. The happiness measure was based on the question: 'Over the past 4 weeks, for how much of the time have you felt happy.' The possible answers were: not at all, a little of the time, some of the time, a good bit of the time, most of the time and all of the time. QoL (WHOOQL-BREF; Skevington, Lotfy, & O'Connell, 2004) was measured by asking: 'We ask you to think about your life in the past two weeks, how would you rate your quality of life.' The respondents can select from five options: very poor, poor, neither poor nor good, good and very good. The first two categories were combined due to the small number of answers. In both variables, the higher the well-being, the higher the value (see Table A1 in Appendix A in the supplemental data online). The reference period of the past four weeks is argued to provide an adequate sample of feelings and experiences, rather than focusing on a short time that might be non-representative (Bradburn, 1969; Diener et al., 2009). The format relates to global well-being, as overall well-being depends more on frequently feeling positive moods than on experiencing them intensely (Diener, Sandvik, & Pavot, 1991).

Self-reported happiness and life satisfaction are primary SWB indicators (Puntscher et al., 2015), QoL is less common in the recent happiness economics literature. Sometimes subjective QoL is seen as a separate measure from

SWB, and sometimes the two are seen as synonyms (Camfield & Skevington, 2008). The measures were analysed separately, as it provides additional information on the nature of SWB. In the data, the Spearman's rank correlation between happiness and QoL was moderate (0.47), even if significant. Cronbach's alpha (0.61) was lower than the cut-off value (0.7) (Nunnally, 1967), further suggesting that different underlying concepts are measured.

Independent variables

- *Travel-related urban zones*: this classification by the Finnish Environment Institute is primarily used to describe the respondent's living area. This GIS-based classification divides urban regions into zones according to their location in the urban form, and also information about population, public transport supply, building and jobs are utilized in the classification based on a 250 × 250 m grid of cells (Söderström, Schulman, & Ristimäki, 2015). The categories were aggregated into the central pedestrian zones, the pedestrian zones of the sub-centres, the pedestrian zone fringe, the intensive public transport zone, the basic public transport zone and the car zone due to the small number of respondents in some zones. Comparing the classification with the United States, the central zones do not correspond to the typical city centres, which tend to have concentrations of poverty, limited access to jobs and public services, crime, and welfare dependency (Crump, 2002). In the Finnish context, both the pedestrian as well as the car-oriented zones tend to be inhabited by the wealthy, but car-oriented zones are more weighted towards owner-occupied detached housing. Typical Finnish suburbs are where the majority live in apartment buildings from the 1960s and 1970s and which are more often associated with societal problems (Kemppainen & Saarsalmi, 2015), but are not directly distinguishable from the categorization. However, as they are reachable via public transportation, a majority of them are located in transit zones.
- *Density* is the secondary objective spatial variable controlled for in this study. Two measures of density were utilized: gross floor space of residential buildings in relation to the land area in the postal code areas (Official Statistics of Finland (OSF), 2016b, 2016c); and a more detailed measure of gross floor space in relation to the land area from the HSY's 250 × 250 m building information grid in the capital region (HSY Helsinki Region Environmental Services Authority, 2016). As Finland is quite sparsely populated, the densest areas are few and far between, making the distributions right-skewed, and thus natural logarithms were taken.

  The primary analysis includes all residents in urban areas in Finland, but also a subset including only the residents of four city municipalities (the capital Helsinki, and Espoo, Vantaa and Kauniainen, and hereafter the *capital* region) is analysed. The capital region with its 20% share of the population (OSF, 2016a) has a unique role in the urbanization of Finland. Figure 1 depicts how the urban areas are located and zooms in to the capital region to demonstrate how the urban fabric is divided into the travel-related urban zones.
- *Perceived spatial* variables include a respondent's perceptions about several spatially tied issues. Long distances to services, noise and traffic, and poor public transport are dummy variables that take the value 1 if the respondent was not bothered by those issues, based on the answer to the question: 'Do any of the following occur near your home, and if so, to what extent do they bother you.' Satisfaction with the safety of the neighbourhood and housing costs were also controlled for, based on a respondent's answer to the question: 'How satisfied are you with the following characteristics of your present dwelling.' The safety and housing cost dummies take the value 1 when the answer was either very or fairly dissatisfied or neither satisfied or dissatisfied.
- *Inequality* is controlled with two measures. First, the postal code level[1] share of low- and high-income population in 2013 describing the areal distribution of income was controlled for (OSF, 2016b, 2016d). Low income was defined as the share of households in the two poorest income deciles, and respectively high income as the share of households in the two highest deciles, relying on Florida and Mellander (2016), who note that poverty is partly a proxy for the lower part of the Lorenz curve and high-income share a proxy for the top of the curve that determines the slope of the Gini coefficient. Second, the actual Gini coefficients from 2013 were used in the capital region (Aluesarjat, 2016). Coefficients are at the level of statistical areas, hereafter called neighbourhoods. The average area of such a neighbourhood was 3.1 km^2 and the average population was 4097 inhabitants, ranging from 102 to 15,880.
- *Relative position* is a dummy taking a value of 1 if the respondent's education is higher than the average education of her or his 100 closest neighbours. Education is known to lead to wage and employment benefits (reviewed by Oreopoulos & Petronijevic, 2013) and lacking the actual income data, education is used as a proxy. Education is a more objective measure than perceived level of income, which likely has a two-way relationship with the respondent's neighbourhood. The value of 100 neighbours was chosen due to the survey nature of the data, as distance-based, varying-sized neighbourhoods could have produced unreliable results. Neighbourhoods were defined using R's spdep package (Bivand & Piras, 2015). Using geographic proximity as a proxy for social distance is a well-established tradition (Topa & Zenou, 2015).
- *Social capital* variables that were controlled for included social trust, third-sector participation and frequency of face-to-face contacts. Social trust is trust in people in general (Helliwell & Wang, 2011), with a five-point scale where the two highest and two lowest options were combined. The face-to-face contacts variable was based on a question about meeting in person: 'How often are you in contact in the following ways with your friends and relatives who do not live in the same household with you.'

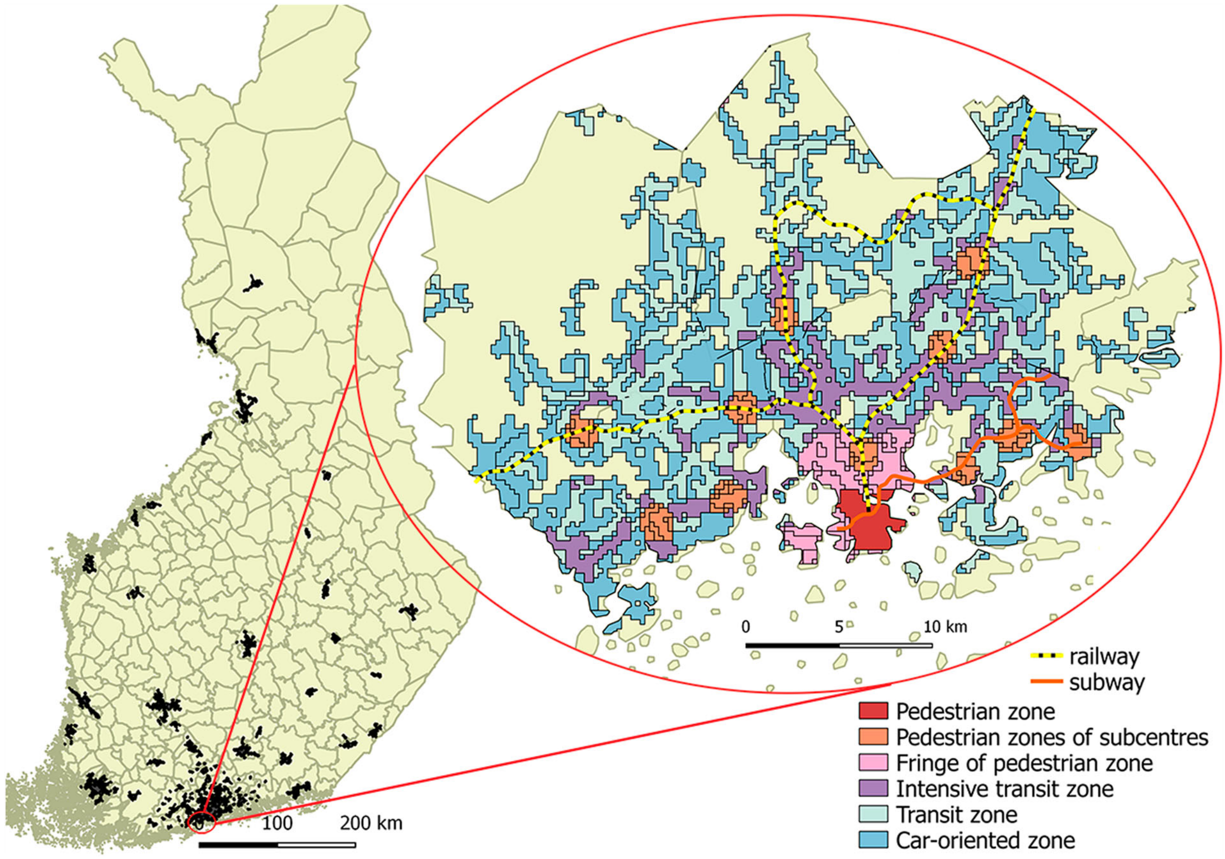


Figure 1. (left) Locations of urban areas (marked in black) and (right) an example of a recoded urban zone classification at a detailed scale in the capital region. Yellow–beige regions are non-urban areas excluded from the analyses.
Source: Author based on data from the Finnish Environment Institute (SYKE) (2016).

Guided by the categorization of Gilbert et al. (2016), the responses were grouped into three categories: daily or one to two times a week, one to three times a month, or less than once a month or never.

- *Socio-economic* variables included were subjective health, marriage status, gender and age. In the absence of actual income information, the perceived level of adequacy of income was controlled for: 'Considering the total income of your household, how difficult or easy is it to cover your costs.' The respondent could choose from six levels, varying from very difficult to very easy. The variable was recoded into four levels. Lacking the income data is likely not a major problem, as studies have found that subjective perception of financial situation is more significant a predictor of SWB than actual income (Haller & Hadler, 2006; Johnson & Krueger, 2006 Wildman & Jones, 2002).

Descriptive statistics and correlation coefficients of dependent and independent variables are reported in Tables A1 and A2 in Appendix A in the supplemental data online.

Statistical models

Ordinal regression techniques allow for the estimation of the effects of the explanatory variables on the underlying SWB*, based on a given number of options from which the respondent can choose.

Ordered-logit models are of the form:

$$\begin{aligned}\mathrm{SWB}_i^* = {} & \beta_0\mathrm{OBJECTIVESPATIAL}_i \\ & + \beta_1\mathrm{SUBJECTIVESPATIAL} \\ & + \beta_2\mathrm{SOCIOSPATIAL}_i + \beta_3\mathrm{SOCIOECON}_i \\ & + \beta_4\mathrm{SOCIALCAPITAL}_i + \varepsilon_i\end{aligned}$$

where SWB_i^* is a SWB indicator, either happiness or QoL, that receives a value from 1 to 6 (happiness) or from 1 to 4 (QoL). For both variables, the reduced specifications of the models were also tested, but not supported by Wald tests. Variable names refer to the groups of variables within that theme; and ε_i is the error term. To check for robustness, partial proportional models were also run, due to the violation of proportional odds assumption. The conclusions regarding the role of spatial variables remained unchanged, as the socio-economic and social capital variables violated the assumption more frequently.

RESULTS

Multiple analyses were conducted, the first being a descriptive analysis of SWB measures in different urban zones.

Second, results from ordered-logit models explaining the SWB were presented classified into to the following themes: the objective spatial variables, the subjective spatial variables and the socio-spatial variables.

Descriptive analysis of SWB

On average, values of both happiness and QoL are the highest in the car-oriented zone and second highest in the transit zone. However, the differences are rather small, even if in both cases statistically significant. The lowest values in both SWB measures are reported in the pedestrian zones of sub-centres. For further details, see Figure A3 in Appendix A in the supplemental data online.

The spatial distributions of happiness and QoL in the capital region are shown in Figure 2. The average of the selected SWB indicator within the respondent's 100 closest neighbours is plotted using inverse distance weighted interpolation (IDW) in ArcGIS (Watson & Philip, 1985). The method creates a raster where values of unknown points are distance-weighted averages of the values at the known spatial points. The number of input points was 12 and a grid size of 100 × 100 m was used. The results are less reliable on the outer edges of the region, where input points are sparsely and unevenly distributed.

Figure 2 suggest that happiness and QoL have some spatial nature, as there are clusters of lower happiness along the railway and subway lines, i.e., in the intensive transit zones. However, in the densest part, Helsinki's central pedestrian zone, the results depend on the SWB measure used – there is a concentration of lower-than-average happiness but higher-than-average QoL. Overall, higher values seem to be concentrated to the west and lower values to the east, largely following the spatial distribution of education and income levels.

Ordered-logit models explaining SWB

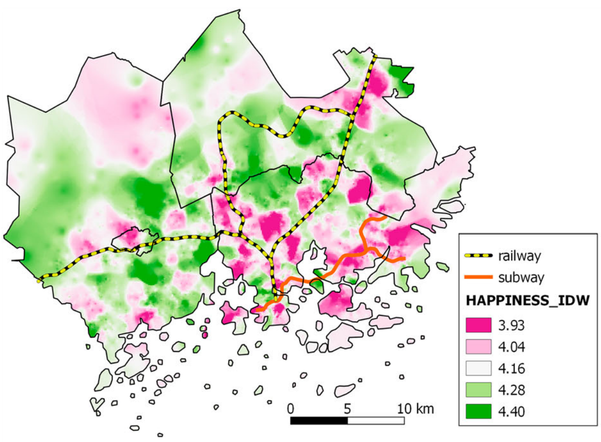
The following section reports the key findings relevant for the focus of the study. The controlled variables include socio-economic and social capital variables, as well other spatial variables. In Tables 1–4, the first-reported models use the whole sample of urban residents and the latter models use the sample of the capital region. Between the model sets, inequality is controlled differently: in the whole sample, postal code-level shares of low- and high-income residents are controlled, and in the capital region, the neighbourhood Gini coefficient is controlled. To check for robustness, the income shares instead of the Gini coefficients were controlled also in the capital region, and the conclusions remained.

Objective spatial variables: travel-related urban zone and density

Table 1 reports the relationship between urban zone and SWB. First, it can be concluded that the effect of urban zone is stronger when explaining QoL than happiness. At the level of the whole sample of urban areas, it seems that living in a car-oriented zone is related to higher happiness, even if the relationship weakens when sets of controls are added. In the capital region, there is no statistically significant evidence of higher happiness in the car-oriented zone.

Compared with models explaining happiness, the differences between urban zones in terms of QoL are more striking, and opposite in direction. The majority of urban zones' estimates are negative and mostly significant, indicating that those living in the central pedestrian zone, especially in the capital region, are more likely to report higher QoL. However, the differences are mostly insignificant at the level of whole sample.

Table 2 reports the effects of urban density, which is used as an alternative measure to the more granular urban zone classification. It seems that living in more dense postal code areas is related to lower happiness. The relationship is stronger when looking at the whole sample, but also holds for the capital region. However, there is no relationship with postal code-level density and QoL. When controlling for grid-level instead of postal code-level density in the capital region, there is no statistically significant relationship between density and happiness. However, QoL seems to have a weak negative relationship with the density of the immediate surroundings, even though the effect is non-significant in all but one specification.



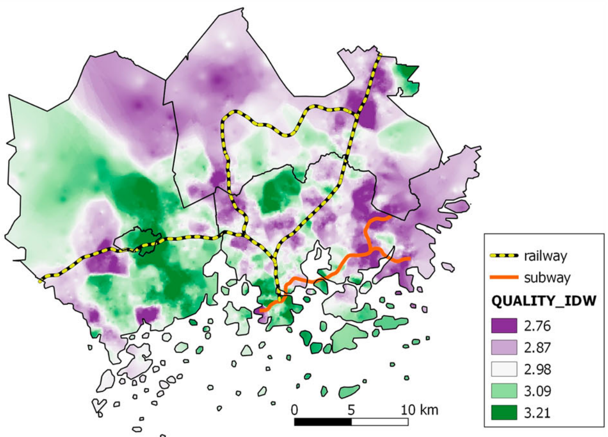


Figure 2. Spatial distribution of happiness (left) and quality of life (right) in the capital region.

Table 1. Estimates of urban zone variables from ordered-logit models explaining subjective well-being (SWB).

		Dependent variable: *HAPPINESS*			Dependent variable: *QUALITY OF LIFE*		
		Controls			Controls		
	Independent variables	**Socio-economic**	**Socio-economic Social Capital Perceived Spatial**	**Socio-economic Social Capital Perceived Spatial Socio-spatial**	**Socio-economic**	**Socio-economic Social Capital Perceived Spatial**	**Socio-economic Social Capital Perceived Spatial Relative Position**
WHOLE SAMPLE (reference = central pedestrian zone)	Pedestrian zone of sub-centre	–0.015	0.028	–0.039	–0.148**	–0.066	–0.067
	Fringe of pedestrian zone	0.033	0.021	–0.010	–0.030	–0.026	–0.019
	Intensive transit zone	–0.030	0.005	–0.035	–0.147**	–0.099*	–0.101*
	Transit zone	0.057	0.077*	0.026	–0.047	0.004	–0.026
	Car-oriented zone	0.132**	0.147**	0.080*	0.004	0.067	0.048
CAPITAL REGION (reference = central pedestrian zone)	Pedestrian zone of sub-centre	0.134	0.194*	0.076	–0.413**	–0.284**	–0.157
	Fringe of pedestrian zone	–0.014	0.008	–0.057	–0.266**	–0.240*	–0.173
	Intensive transit zone	0.057	0.100	–0.013	–0.405**	–0.307**	–0.187
	Transit zone	0.057	0.095	–0.014	–0.384**	–0.275**	–0.156
	Car-oriented zone	0.089	0.118	0.027	–0.247**	–0.111	–0.001

Note: In the first box, the dependent variable is happiness, and in the second, quality of life. Sets of control variables are reported in columns; samples on the left-hand side in rows. For the results of the complete models, see Tables B1 and B2 in Appendix B in the supplemental data online.
Statistical significance: **1% and *5%.

Table 2. Estimates of postal code- and grid-level density variables from ordered-logit models explaining subjective well-being (SWB).

		Dependent variable: *HAPPINESS*			Dependent variable: *QUALITY OF LIFE*		
		Controls			Controls		
	Independent variables	**Socio-economic**	**Socio-economic Social Capital Perceived Spatial**	**Socio-economic Social Capital Perceived Spatial Socio-spatial**	**Socio-economic**	**Socio-economic Social Capital Perceived Spatial**	**Socio-economic Social Capital Perceived Spatial Relative Position**
WHOLE SAMPLE	ln *DENSITY* (postal code)	−0.056**	−0.061**	−0.044**	0.012	0.008	−0.002
CAPITAL REGION	ln *DENSITY* (postal code)	−0.043*	−0.061**	−0.042	0.046	0.000	−0.035
	ln *DENSITY* (250 × 250 m)	−0.006	−0.009	0.009	−0.002	−0.033	−0.058**

Note: In the first box, the dependent variable is happiness, and in the second, quality of life. Sets of control variables are reported in the columns; samples on the left-hand side in rows. Statistical significance: **1% and *5%. For the results of the complete models, see Tables C1–C3 in Appendix C in the supplemental data online.

Thus, both objective spatial measures tell a somewhat similar story: the outer urban areas are related to higher happiness, but, in contrast, the inner urban areas are related to higher QoL. In the following models, where the effects of subjective spatial characteristics and socio-spatial variables are investigated, more detailed urban zone instead of density is used as a control. However, the results were very similar when either postal code- or grid-level density was used as an alternative control.

Subjective spatial variables: perceived characteristics

Table 3 reports the relationship between perceived spatial variables and SWB. As expected, the signs of the estimates are negative across the board. The most important issue related to lower well-being, in terms of both happiness and QoL, is the perceived safety of the area, especially in the capital region. The second most important issue leading to lower SWB is dissatisfaction with high housing costs, the relationship being, again, pronounced in the capital region. Overall, comparisons of the estimates of the whole sample and those of the capital region reveal that perceived noise and traffic lead to lower well-being only at the level of whole sample, but not in the capital region. Another interesting notion is that poor public transport seems to hinder well-being in a statistically significant manner only in the capital region.

Socio-spatial variables: neighbourhood inequality and relative position in the neighbourhood

Table 4 reports the effects of socio-spatial variables, i.e., inequality and relative position in the neighbourhood. Overall, estimates are mostly significant, suggesting that relative spatial position indeed has a relationship with SWB.

When explaining happiness, the estimates are negative, and mostly statistically significant. In the capital region, the negative estimate of the Gini coefficient is significant only in the model specification where socio-economic, social capital, urban zone and perceived spatial characteristics are controlled for.

In conclusion, it seems people living in unequal areas are less happy. The QoL tells a different story: the estimates of the share of high-income households as well that of the Gini coefficient are positive and statistically significant, suggesting that living in more unequal areas is related to higher QoL. Likewise, the effects of relative position in the neighbourhood are, somewhat surprisingly, contradictory.

Other control variables: socio-economic characteristics and social capital

The full models including the results regarding the socio-economic and social capital variables are reported in the Appendices in the supplemental data online. The results were rather as expected: good health and adequate income are two strongest predictors of higher happiness and QoL. Moreover, being married and being female were related to higher levels of SWB. Age is found to have a 'U'-shaped

Table 3. Estimates of perceived spatial dummy variables from ordered-logit models explaining subjective well-being (SWB).

		Dependent variable: *HAPPINESS*			Dependent variable: *QUALITY OF LIFE*		
		Controls			Controls		
	Independent variables	**Socio-economic**	**Socio-economic Social Capital Urban Zone**	**Socio-economic Social Capital Urban Zone Socio-spatial**	**Socio-economic**	**Socio-economic Social Capital Urban Zone**	**Socio-economic Social Capital Urban Zone Socio-spatial**
WHOLE SAMPLE	Unsafe neighbourhood	–0.348**	–0.248**	–0.254**	–0.518**	–0.401**	–0.383**
	Long distances to services	–0.056*	–0.064**	–0.053*	–0.167**	–0.150**	–0.172**
	Noise and traffic	–0.135**	–0.113**	–0.100**	–0.031	–0.025	–0.031
	Poor public transport	–0.020	–0.032	–0.045**	–0.053*	–0.080**	–0.083**
	High housing costs	–0.213**	–0.173**	–0.168**	–0.320**	–0.277**	–0.278**
CAPITAL REGION	Unsafe neighbourhood	–0.278**	–0.184**	–0.183**	–0.470**	–0.371**	–0.364**
	Long distances to services	–0.081	–0.065	–0.048	–0.178**	–0.142**	–0.142**
	Noise and traffic	–0.157**	–0.145**	–0.147**	–0.021	–0.044	–0.045
	Poor public transport	–0.014	–0.026	–0.032	–0.167**	–0.189**	–0.222**
	High housing costs	–0.172**	–0.138**	–0.133**	–0.261**	–0.219**	–0.218**

Note: In the first box, the dependent variable is happiness, and in the second, quality of life. Sets of control variables are reported in the columns; samples on the left-hand side in rows. Statistical significance: **1% and *5%. For the results of the complete models, see Tables B1, B2 and D1 in Appendices B and D in the supplemental data online.

Table 4. Estimates of socio-spatial variables from ordered-logit models explaining subjective well-being (SWB).

	Independent variables	Dependent variable: *HAPPINESS*			Dependent variable: *QUALITY OF LIFE*		
			Controls			Controls	
		Socio-economic	Socio-economic Social Capital Urban Zone	Socio-economic Social Capital Urban Zone Perceived Spatial	Socio-economic	Socio-economic Social Capital Urban Zone	Socio-economic Social Capital Urban Zone Perceived Spatial
WHOLE SAMPLE	Share of high-income households	−1.249**	−1.314**	−1.325**	1.094**	0.896**	0.865**
	Share of low-income households	−1.287**	−1.239**	−1.262**	0.298	0.115	0.021
	Relative position	−0.144**	−0.186**	−0.183**	0.159**	0.098**	0.103**
CAPITAL REGION	Gini coefficient	−0.441	−0.518	−0.628*	1.652**	1.003**	0.905**
	Relative position	−0.143**	−0.204**	−0.202**	0.147**	0.072	0.075

Note: In the first box, the dependent variable is happiness, and in the second, quality of life. Sets of control variables are reported in the columns; samples on the left-hand side in rows. Statistical significance: **1% and *5%. For the results of the complete models, see Tables B1, B2, E1 and E2 in Appendices B and E in the supplemental data online.

relation to happiness, but not with QoL, which drops with age.

Social capital is also important for SWB, and there are no major differences in the effects of social capital variables depending on the measure of SWB used. Social trust is the strongest predictor of SWB. Third-sector participation, and to a smaller extent weekly face-to-face contacts, seem to have a stronger positive relationship with QoL than with happiness.

DISCUSSION

Taken together, the relationship between objective spatial characteristics and SWB is complicated, and the results are dependent on the SWB measure used.

It seems urban zone and density are somewhat related to subjective happiness, and some evidence of a 'suburban–central urban happiness gradient' exists, similar to what is sometimes reported as a rural–urban happiness gradient (Berry & Okulicz-Kozaryn, 2011; Easterlin et al., 2011). Respondents living in car-oriented zones tend to report higher levels of happiness, even if the difference dilutes when controlling for social capital, perceived spatial variables, and inequality and relative position. The conclusions are similar when controlling for postal code density instead of urban zone, as the estimates of postal code density are negative. However, the density of the immediate surroundings does not have a relationship with happiness in any of the model specifications.

While the car-oriented zone appears to be the haven of happiness, the central pedestrian zone flourishes in terms of QoL. Indeed, some support for a reversed relationship in urban QoL gradient was found. The results are especially pronounced in the capital region, where those living in the central pedestrian zone tend to report having a better QoL than those living in other zones.

Comparing the results with the earlier literature is challenging for multiple reasons. First, the results of MacKerron and Mourato (2009), Millward and Spinney (2013) and Wang and Wang (2016) indicate life satisfaction to be higher in inner-city areas, which is in line with our result about higher life satisfaction in the inner zones in the capital region, but in contrast with our results when happiness instead of QoL was used as the dependent variable. Indeed, our study seems to the first of its kind at analysing happiness and QoL separately in an intra-urban scale, and the previous intra-urban studies mostly utilize life satisfaction as a proxy of SWB. Second, comparisons are difficult as the units of analyses differ, and often, with the exception of Millward and Spinney (2013), the crude density alone is used to control for the spatial context. The smallest unit used by Li and Kanazawa (2016) was the census block group, which comprised on average between 600 and 3000 people, whereas Ferreira et al. (2013) used density at the level of NUTS-2 region. Thus, the variables used in the study are detailed in describing the immediate living environment. Furthermore, a larger set of background variables was controlled for than in the majority of the earlier literature, especially with regards to the inclusion of socio-spatial variables. This proves to be important, as it seems that the effect of spatial variables dilutes when, for example, neighbourhood inequality is controlled for.

Overall, even if the results are somewhat counteracting, and the magnitude and direction of the relationships depends on the measure of SWB analysed, it can be concluded that urban well-being has some spatial nature. This contrasts with, for example, the results of Ballas and Tranmer (2012), who found no statistically significant geographical variations in happiness. However, it seems that the density of the immediate surroundings does not have a relationship between well-being in any of the specifications, which contrasts with the result of Li and Kanazawa (2016) on the negative relationship between census-block group density and global life satisfaction. Thus, the results suggest that densifying infill construction does not necessarily lead to lower SWB, at least not in the long run, even if the disturbances related to the construction phase can probably be accompanied with short-term fluctuations and discontent.

Another conclusion is that the subjective spatial characteristics are at least as important to SWB as objective characteristics. However, this is partly evidenced, as subjective factors are, by definition, biased towards one's preferences, and therefore more likely to better predict SWB (Ettema & Schekkerman, 2016). Of the perceived spatial variables, safety is the most important. Furthermore, the differences in, for example, the effects of noise and traffic, between the whole sample and the capital region suggests that the effects are non-universal, as earlier literature suggests. For example, Kyttä, Broberg, Haybatollahi, and Schmidt-Thomé (2016) argue that the easiness of service access and the availability of public transport can lead to varied well-being outcomes depending on the urbanity of the setting.

Finally, the results regarding the effects of socio-spatial variables, i.e., inequality and relative position, are highly sensitive to the SWB indicator used. People living in more unequal areas and neighbourhoods report being less happy, but, at the same time, have a higher QoL. Likewise, those in a lower relative position report being less happy, but seem to have a higher QoL. Regarding happiness and inequality, the results are in line with Glaeser et al. (2009), Oishi et al. (2011) and Nguyen et al. (2015) who all report a negative relationship between inequality and some measure of SWB. Controlling for inequality and relative position weakens the positive estimate of living in a car-oriented zone on happiness. Thus, this suggests a mediating effect, and it can be speculated as to whether the urban–rural gradient in happiness (Berry & Okulicz-Kozaryn, 2011) could also be related to the higher inequality of cities compared with rural areas and smaller cities. However, it remains unclear whether any true neighbourhood effects were found. Some neighbourhood effects on well-being have been found previously. For example, convincing evidence from a randomized housing mobility experiment from the United States showed that moving to a less segregated neighbourhood has a positive effect on SWB, and this effect arises mainly because of the negative effect of residential income, rather than racial segregation (Ludwig et al., 2012).

The fact that results are in many cases opposing indicate that the two questions are interpreted differently. The consistency of different SWB measurements of well-being remains an issue of debate also in the literature (Kahneman & Deaton, 2010; Peiro, 2006). However, QoL and happiness were asked using different response scales, and they use different reference time periods, which causes some uncertainties (e.g., Sachs, Becchetti, & Annett, 2016) and may explain some of the differences. For example, Schwanen and Wang (2014) argue that geographical context affects overall life satisfaction more than it affects short-term momentary well-being. In addition, it can be speculated whether respondents anchor to material conditions and objective measures when asked about QoL, and to affective measures when asked about happiness, as has been suggested already by Andrews and McKennell (1980). Moreover, it is argued that certain psychological and personality factors (Ferrer-i-Carbonell & Gowdy, 2007) are important for happiness.

Overall, the estimates of urban zone as well as those of perceived spatial variables, although mostly significant, are relatively small. Social capital, and social trust in particular, seems to be more important for SWB than spatial variables. The role of trust to people is pronounced when explaining QoL. Thus, we join authors who have found a positive relationship between community involvement and SWB (Helliwell, 2003), challenging the opposing results of, for example, Li, Pickles, and Savage (2005). The results regarding the effects of socio-economic variables are in line with the earlier literature, the only exception that should be noted being the non-'U'-shaped relationship with age and QoL.

There are also limits to the generalization of the findings. The study focuses on a single country and having data from a cross-section of countries as well as follow-up answers from the respondents would be beneficial and allow for the use of panel-data techniques. As always with survey datasets, there are factors that cannot be controlled. The riskiest are those unobserved individual- or family-level characteristics that influence both neighbourhood selection and life outcomes (e.g., Ludwig et al., 2012). Thus, neighbourhood effects, such as the effect of inequality on SWB, are demanding to research, since the possible causalities are hard to verify, as similar people tend to agglomerate to similar areas. Finally, Finland is by international comparison an equal country, and the differences between neighbourhoods are relatively modest, which makes the results about the relationship of inequality and SWB context specific.

Finally, the presented results are descriptive in nature, and the root causes and causalities behind them can be only speculated. In addition, the importance that should be given to SWB measures is subject to an ongoing debate. Already Fernandez and Kulik (1981) found that life satisfaction decreases with the cost of living in the neighbourhood. However, the prices are highest in the densest city centres, and thus people are willing to live there, even if our results also confirm that discontent with high housing costs is related to lower well-being. Thus, when studying surveys instead of actual choices, it is good to keep in mind this discrepancy. People seem to be prepared to sacrifice happiness for another objective, such as higher income (Benjamin, Heffetz, Kimball, & Rees-Jones, 2012; Glaeser et al., 2016).

Policy recommendations

Policy-wise, the complex and even controversial relationships between density and well-being, as a measure of social sustainability, is important due to the widely held association in planning thinking between sustainability and the density of urban development (Bramley & Power, 2009). Even though it is evident that urban planning is a balancing act between different views and objectives, the possible different policy conclusions reached, depending on the selection of measure, require further attention. Policy-makers should be aware of the even drastic differences between the SWB measures, and using single indicators as a basis of policies ignores the multifaceted nature of well-being and leads to misinformed decisions. We join Frey and Stutzer (2012) in warning that the well-being research results should not be regarded as straightforward inputs into policy-making, but rather as inputs into political and citizen discussions.

Second, another conclusion can be drawn from the juxtaposition of travel-related urban zone and density as a measure of objective spatial characteristics. The results demonstrate that the level of detail in distinguishing different types of environments is essential. For example, when using density instead of a more nuanced zone classification, the high QoL in the pedestrian zone remains hidden.

CONCLUSIONS

The paper looked at the factors explaining happiness and QoL. No straightforward evidence about the relationship between urban structure and SWB was found, and in some cases the results were contradictory. For example, central pedestrian zones flourish in terms of QoL, whereas happiness is highest in car-oriented zones. In addition, neighbourhood inequality seems to be related to lower happiness, but higher self-reported QoL. It seems that subjective spatial factors are more important for SWB than objective ones, in the same manner as socio-economic and social capital factors are more important than spatial factors overall.

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SUPPLEMENTAL DATA

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NOTE

1. Postal code areas in the sample have an average size of 112.7 km^2 with 1781 inhabitants. In the capital region, the average area is 4.9 km^2 and average population 6421 inhabitants.

ORCiD

Jukka Heinonen http://orcid.org/0000-0002-7298-4999

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