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Urban Quality of Life: A Rubik cube of *objective and subjective* descriptors

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Abstract

In the field of urban Quality of Life (QOL), objective Geographic Information Science (GIS) data has merged with subjective wellbeing. The scientific discourse shows a diversity of variables, a paucity of organizing theories, and continued efforts to capture the phenomena with mixed methods. An urban QOL project in Salzburg, Austria surveyed 16 city districts via 802 geocoded datasets. Urban stress (e.g. density) and recovery (e.g. green space) were contrasted, and Detroit Area QOL items together with city planning GIS data were used. In a first step, a reliable three-dimensional psychological construct for QOL (Environmental/Social Quality, Social Roots, Subjective Infrastructure) was built. Two factors also had GIS predictors, while Social Roots did not. Significant district differences underlined the importance of sociocultural microsystems. A second step tested whether the psychological descriptors are city-specific or general. Subjective QOL data on Salzburg City were compared with samples from Vienna, Austria (N=150) and Timișoara, Romania (N=90). The replication revealed stable factor and item analytical results supporting the psychological substructure of urban QOL.

Keywords: Quality of life, wellbeing, environmental psychology, mixed methods, replication

Städtische Lebensqualität: Zur Systematik objektiver und subjektiver Deskriptoren

Zusammenfassung

Im Feld Städtische Lebensqualität (QOL) greifen wie im Rubik-Würfel objektive GIS-Daten und subjektives Wohlbefinden ineinander. Die Diskursgeschichte zeigt Variablenvielfalt, Mangel an organisierenden Theorien und fortlaufende Versuche, die Phänomene mit Mixed Methods zu fassen. Ein QOL-Projekt in Salzburg Stadt, Österreich, untersuchte 16 Stadtbezirke mithilfe von 802 geocodierten Datensätzen. Es stellte urbanen Stress (z.B. Dichte) Erholung (z.B. via Grünraum) gegenüber und verwendete QOL-Items der Detroit Area Study zusammen mit GIS-Daten der Stadtplanung. Der erste Schritt lieferte ein zuverlässiges psychologisches QOL-Konstrukt (Umwelt-/Sozialqualität, soziale Verwurzelung, subjektive Infrastruktur). Stadtteilunterschiede zeigten die Bedeutung soziokultureller Mikrosysteme auf. Im zweiten Schritt wurde geprüft, ob die psychologischen Deskriptoren nur stadtspezifisch oder generalisierbar sind. Subjektive QOL-Daten zu Salzburg wurden mit Daten aus Wien, Österreich (N=150) und Timișoara, Rumänien (N=90) verglichen. Die Replikation ergab stabile faktoren- und itemanalytische Ergebnisse und unterstützte damit den psychologischen Unterbau urbaner Lebensqualität.

Schlagwörter: Lebensqualität, Quality of life, Wohlbefinden, Umweltpsychologie, Replikation

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1. Introduction

An on-going discussion exists on the capability of Geographic Information Systems (GIS) and GIScience to encompass qualitative social science variables, particularly in the assessment of Quality of Life (QOL). This should be possible in geographic information science which itself is a multidisciplinary and multiparadigmatic field (Blaschke/Merschdorf 2014). Golledge (2002) invited the social sciences, particularly environmental psychology, to enter "the open door of GIS". Goodchild and Janelle (2004) called specific attention to place-based analysis with its spatially explicit models and theory, i.e. the GIS utility, and the value of space as a base for integrating knowledge. For them, GIS and spatial statistics are appropriate exploratory tools. Like Golledge, they promote spatial thinking in the social sciences. For environmental psychologists with historical knowledge, this comes as no surprise, since Lynchs (1960) phenomenological system of the image of the city had similar importance for building the discipline as Barker (1968) with his activity phenomenology and, later, his behaviorist concept of "behavior settings" in the human environment of a US Midwestern town. With fierce debates about positivism in European social sciences and a gradual "qualitative turn" in psychology, Kwan's (2004) idea to move on from canonical geography to hybrid geographies sounds rather familiar. The intention of the following report is to operationalize the analysis and triangulation of objective and subjective urban QOL with the aid of GIScience (Goodchild 2010) with a practical Austrian example. The wellbeing of city inhabitants – which is an interface between the health sciences, environmental psychology and geosciences – has a multiplicity of possible predictors, thus theoretical concept formation and ethics must guide any content analysis and statistical reduction.

2. Literature review

Looking back 15 years, it is evident that very different philosophical, epistemological, and ideological positions were taken, and that the discourse level remained general and abstract. Mixed methods studies (Greene 2007; Kuckartz 2014 etc.) operationalizing both objective and subjective urban QOL elements are few in number, and have controversial results.

Philip (1998) addressed the mixed methods approach of quantitative versus qualitative, and its epistemological and methodical chances and problems for human geography, and pointed out the communicative aspect of research methods. Americans were pioneers by combining qualitative items of their Detroit Area Study in 2001 with objective GIS data on population density, urban greenery, etc. (Marans 2004). An Australian survey following this scheme was organized in Queensland in 2003 and linked residents' subjective QOL perceptions, evaluations and satisfaction with objective indicators by means of GIS (McCrea et al. 2006). The authors found rather weak relationships and were cautious about quick expectations of subjective change by means of objective QOL improvement. In 2007, the Americans and Australians joined forces to spread GIS QOL studies internationally (Marans/Stimson 2011), which also stimulated the Salzburg authors to cooperate (Keul/Prinz 2011).

Steinmann et al. (2005) reviewed existing public participatory GIS applications aimed to enlarge citizens' involvement and participation in decision-making processes. In their analysis of aspects of interactivity they found that a vast majority of applications only deliver information to the citizen in a one-way process. Few applications were to be classified as two-way communication tools, although technology was available. From spatial economy came ideas for a useful addition of qualitative (unsatisfied) demand data to quantitative travel behavior data to close a methodological gap. Information from focus groups and self-mapping about spatio-temporal networks could be organized and analyzed by GIS (McCray/Brais 2007). Jung and Elwood (2010) described the structures and functions of "computer-aided qualitative GIS" (CAGIS) as a means to store and analyze the geovisual data of mixed methods.

But Leszczynski (2009) remained sceptic about the debate and its call for hybrid qualitative-quantitative GIS practices. She identified a philosophical divide behind the discussion, and questioned a seamless fit of qualitative methods into the architecture of GIS. Pavlovskaya (2009) took a more optimistic position: She expressed that although GIS could be criticized for its weak quantitative functionality, it is well suited for the visualization of qualitative research information that cannot be represented by classical quantitative databases. With its fresh, democratic approach, GIS could help progressive politics. Next came a series of papers from geography and anthropology (Sui/DeLyser 2012; DeLyser/Sui 2012; DeLyser/Sui 2014) reviewing both methodological sides and trying to look beyond the often-quoted divide under the notions of hybrid geography, spatial turn, volunteered geographical information, innovative big and small data handling, mobile methods, the importance of enduring methods like interviewing and mapping as well as including communities in participatory research.

Then, Ballas (2013: 547) contrasted subjective measures such as ”happiness“ data with objective factors on QOL and reviewed relevant studies. He concluded that ”there has been relatively limited urban and regional research in this new emerging interdisciplinary field", but “there is a huge potential for social and behavioural scientists". GIS visualization was promoted as a means of inquiry in the field of qualitative activity space data. A variety of visual variables were used to simultaneously depict multiple spatial urban youth activity patterns (Mennis et al. 2013). In a postal survey on urban QOL in Switzerland, mixed methods data were studied with structural equation models to identify the safety and access of central facilities (von Wirth et al. 2014). The results were ambivalent, as the researchers reported low objective-subjective QOL correlations, but also a strong link between objective access and perceived accessibility.

3. Research model, methods, sample

With its wide variety of possible predictors, urban wellbeing and QOL should be more than a data-mining field. A theory-based analysis has to take into account empirical negative and positive effects identified by environmental psychology and health sciences. Well-known negative aspects include urban stress, which goes together with high population density and a lack of social control, called crowding (Stokols 1972), whereas positive aspects include stress-reducing recovery elements, e.g. urban green spaces that offer relaxation and spontaneous attention by natural phenomena, like trees, water, and animals (Kaplan 1995). Urban green also plays an important role in reducing physical environmental pollution and summer heat.

Health psychology (Sheridan/Radmacher, 1992), after shifting from the pathogenesis model to Antonovsky's model of salutogenesis, uses a continuum of states between wellness and illness. Quality of life, which is basically a political concept probing the economic conditions of social welfare (Pigou 1920), can be measured by social indicators which are either objective or subjective in nature (Noll 2004). Ethics is important, since the non-equal distribution of certain QOL goods and their perception has to be reflected (Brambilla et al. 2013; Salesses et al. 2013). The World Health Organization has developed and tested intercultural QOL instruments (WHO 2014) mostly in clinical research.

To develop a research method for Central Europe, the large descriptive US itempool of the Detroit Area Study 2001 (Marans 2004) was reduced in several steps to 41 core variables plus two meta-items (Quality of life in general and housing satisfaction). In an Austrian mixed methods approach, objective GIS data were linked with subjective wellbeing. At Salzburg University, Austria geoscience and environmental psychology cooperated by using the new instrument. A joint project in the city of Salzburg, Austria, which has a population of 150,000, surveyed 16 districts. Eight hundred and two geocoded datasets were gathered from 2007 to 2012 with the abridged instrument of the Detroit Area Study, which was validated for Austria. The subjective QOL data were matched with GIS data of the city planning department, and then tested for general predictors and interactions.

The city of Salzburg, capital of the Austrian Federal State of Salzburg at the northern edge of the Austrian Alps at 424 m, measures 65.6 square-kilometers. In 2014, it had a residential population of 149,760 (Statistics Austria 2014) and a population density of 2,283 per square kilometer. In 2001, Salzburg City had 68,570 households and an average household size of two people. Salzburg City counted more childless and one-person-households than the rural Federal Province. In early 2011, the foreign population level at Salzburg City was 21.5 percent. Salzburg's unemployment rate was the lowest nationwide in 2013 with 5.6 percent. With its documented existence dating back to 1120 A.D., Salzburg belongs to the oldest cities of Austria. Internationally and among tourists it is known for the native composer Wolfgang Amadeus Mozart, its music festivals and the American cult film classic “Sound of Music”. Salzburg comprises 21 districts. The built area lies around the north-south curve of the river Salzach.

The Spatial Development Concept 2007 is mandatory for Salzburg's city planning. It visualizes all relevant planning aspects on GIS layers. Fig.1 shows Salzburg's population density, and Fig.2 a GIS map of the proportion of green areas. The northern city districts are denser and more compact, whereas southward, the settlement area breaks up gradually into green fields. Salzburg City has been processed intensely by geoinformatics in the last ten years. A main goal was a spatial indicator system to support city planning. Its final residential quality is made up of 31 criteria.

Fig.1 Population density of Salzburg City, Austria (Wolfgang Spitzer, iSPACE).

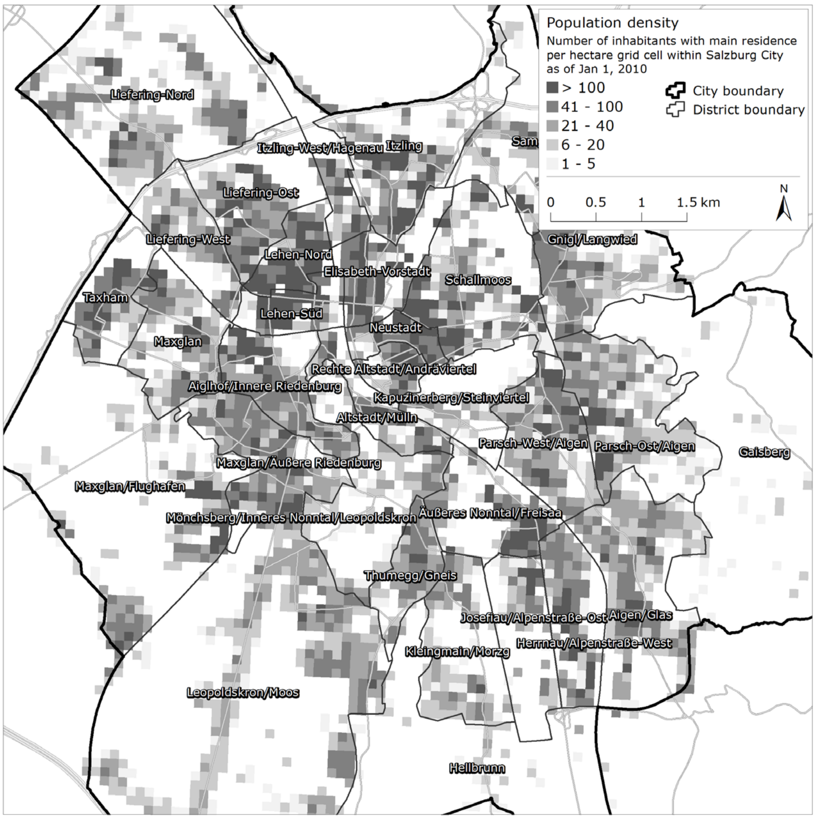
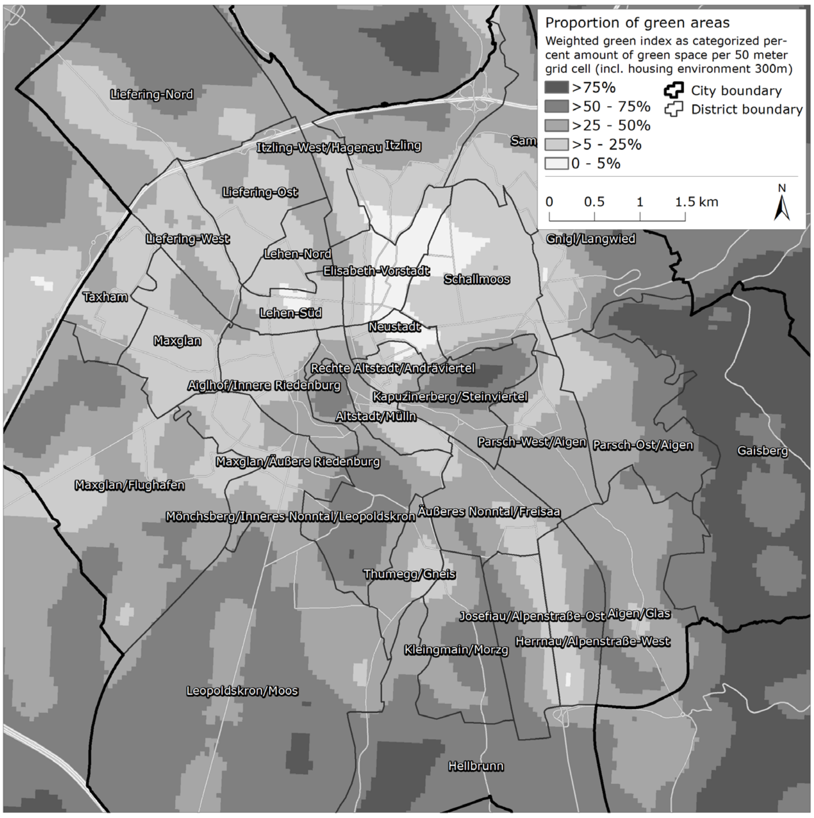


Fig.2 The proportion of green areas in the city of Salzburg (Wolfgang Spitzer, Project EULE, iSPACE).



Tab.1 Comparison of district samples, mean hectar densities and green-values per district (bold) versus sample values of density and green

District	sample size	mean hectar density	STD hectar density	mean sample density	STD sample density	mean hectar green%	STD hectar green%	mean sample green%	STD sample green%
Liefering	75	27.21	43.43	82.3	92.6	31.8	10.9	22.8	12.1
Lehen	70	23.08	127.62	217.2	150.4	16.8	9.0	14.1	5.3
Taxham	30	50.80	78.23	116.7	98.4	23.4	10.1	20.3	6.3
Itzling	47	29.03	69.36	113.8	92.2	31.0	14.2	22.7	9.2
Elisabethvorst.	40	76.39	140.61	191.3	140.4	8.0	8.5	10.2	9.2
Schallmoos	60	44.63	85.83	134.7	103.8	12.2	8.4	12.9	9.6
Gnigl	50	27.34	36.50	64.7	34.8	45.7	20.6	30.5	17.5

Tab.2 Positive and negative categories from seven Salzburg districts (n =444)

Positive categories		Negative categories	
Green, nature, rural	135	Polluted by traffic, noise	104
Central, near city center	130	Bad infrastructure	35
Silent, quiet	100	Low leisure time value	33
Good infrastructure	93	Bad public transport	7
Good public transport	55	Neighbors, high residential density	25
Combination city-rural	48	Industry, air pollution	11
Beautiful	45		
High leisure time value	31		
Near to university/work-place	20		

4. First step of the study – Testing for geoinformatic-psychological interrelations

4.1 Temporal and QOL content validity, districts

The Salzburg project did not utilize spatially randomized and fully representative samples, as this would have gone beyond the limited scope of research organized within university seminars and BA/MA theses. Quota samples were taken from the main districts. As a statistical control, we ran a validity check for the sample. For seven districts, the mean residential density and mean green-density per hectar cell were compared with the respective mean values of the samples taken (Tab.1). The Pearson correlation of district mean hectar densities versus mean sample densities was not significant, but the Pearson correlation of district mean hectar green percentages versus mean sample green percentages was $r=.993$, $p<.001$. Whereas the Pearson correlation of district mean hectar densities with the hectar green percentages was non-significant, the Pearson correlation of mean sample densities versus mean sample green percentages was $r=-.854$, $p<.014$. This indicates that the district sample density means of our study do not correspond to the actual GIS densities, but the sample green percentages are significantly related to the actual GIS green values. For the seven districts, GIS mean hectar densities and mean hectar green percentages are not inversely related, but sample densities and sample green percentages show a significant negative relation. Nine districts in southern Salzburg could not be checked due to matching problems of statistical city areas.

As already mentioned, the large US itempool of the Detroit Area Study 2001 was reduced, so the validity of the final 41 items had to be tested for Austria. Therefore, in the first interview section, we asked an open question to obtain personal (dis)advantages of life in the district. A content analysis of 444 interviews from the first seven districts led to the generic terms listed in Table 2 with frequencies over ten entries each.

Compared with these free response categories, the German-language QOL questionnaire did not lack any content except vicinity to university/workplace and air pollution, the latter only being relevant for one district near an industrial plant. What was also striking was the district dependency of main generic terms: Green varied between eight and 34 per district, central from zero to 34, and good infrastructure from four to 41. Negative categories showed the same effect: Traffic/

Tab. 3 Key values of the three-factor solution for subjective urban QOL

Item	F 1	F 2	F 3	h²	M	SD	r_{it}
... is a beautiful district.	.773			.627	3.28	0.869	.751
... has a good reputation as Salzburg district.	.736			.553	2.96	1.019	.698
For older persons ... is an agreeable district.	.718			.532	3.30	0.782	.689
... is a good place for children.	.710			.527	3.12	0.864	.698
... is a green district.	.698		-.214	.549	3.18	0.915	.665
... is a safe district.	.670	-.212		.527	3.07	0.940	.639
... is a friendly district.	.650			.481	3.34	0.763	.646
... has a good environmental quality.	.622			.421	3.02	0.929	.571
From my apartment, I am out in the green quickly.	.614			.403	3.56	0.752	.586
In ... you can take nice walks.	.609	.228		.439	3.45	0.813	.594
Here I feel safe in the street at night.	.583	-.269	.238	.469	3.08	0.991	.534
... will take a positive development.	.557		.351	.434	3.00	0.849	.538
... has beautiful parks.	.557			.327	3.05	0.951	.541
... is mainly rural.	.542			.349	2.55	1.102	.515
... has good kindergartens and primary schools.	.527	.252		.346	3.29	0.768	.510
... has good playgrounds.	.489			.258	3.00	0.901	.466
I know quite a bit about the history of ...		.724		.534	2.16	1.097	.535
I know people in		.672	.203	.494	3.10	0.972	.492
I am connected with the parish/the religious center.		.635		.428	1.93	1.149	.433
I hear from others quickly what happens in		.601	.215	.439	2.38	1.073	.469
In ... I know what's what quite well.		.564	.215	.379	3.42	0.731	.422
... has nice pubs and entertainment venues.			.760	.608	2.14	0.928	.518
In ... you can go out at night well.			.689	.503	1.94	0.957	.453
... offers great shopping.			.672	.476	3.09	0.967	.502
For my daily needs I usually go shopping in			.466	.241	3.33	0.917	.306
... has good public transport connections.			.418	.178	3.38	0.830	.251

Factor loadings (F), communalities (h²), item means (M), item standard deviations (SD) and part-whole corrected selectivity rit – F1 Environmental/Social Quality, F2 Social Roots, F3 Subjective Infrastructure

noise between zero and 28, bad infrastructure from zero to 14, and bad public transport from zero to seven. These variations indicate very different district images with individual strengths and weaknesses.

District borders: On the city map, seven districts have sharp outlines (Elisabethvorstadt, Lehen, Leopoldskron-Moos, Nonntal, Salzburg-South, Schallmoos, Taxham); the nine remaining have diffuse outlines. Accumulated graphics ("spaghetti" pictures) of subjective borders drawn in the interviews paradoxically showed more diffuse results for districts with sharp map outlines and vice versa. The cognitive-cartographic representation alone cannot be responsible for this.

District center: 48 percent of respondents reported a defined district center (minimum seven percent at Riedenburg, maximum 87 percent at Liefering). The district center was reported by fewer than 40 percent to be at Aigen, Morzg and Leopoldskron-Moos. Nine of the 16 districts were between 40 and under 60 percent. Sixty percent were reached in Itzling, Gnigl, Taxham and Liefering. From ten districts, qualitative data about the center definition were available. Churches marked it in six districts, while business centers marked it in three. Old village squares, schools and social centers are also relevant.

4.2 Results and interpretations

The main goals of the first empirical step (Keul et al. 2014) – which used comprehensive data material from Salzburg city – were to (a) cut the number of variables with a minimal loss of information by using statistical data reduction methods (PCA), (b) create "higher-

Tab.4 Intercorrelation matrix (Pearson's r) of the scores Environmental/Social Quality, Social Roots *and Subjective Infrastructure based on data from the first Salzburg study (N= 802).*

	Social Roots	***Subjective Infrastructure***
Environmental/Social Quality	.269**	.114**
Social Roots		.260**

Notes. ** p < .01

order-constructs" of QOL (factors) by using psychometrical methods, test their reliability and create scores, (c) define these scores as measureable subcomponents of QOL and use them as DVs for further statistical analysis, and (d) find objective and subjective predictors (IV's) for these measured "QOL-scores" via regression models.

A principal component analysis (PCA) was used to compress data material, which had been obtained mainly from 41 questionnaire items. In order to build few reliable concept dimensions from the 41 QOL-items, test-theoretical methods were used. This was not done deductive in the sense of a classical questionnaire construction but inductive (Amelang/Zielinski 2002). Factors extracted by means of factor-analysis and reliability-tested by item-analyses represent the central dependent variables of the present study and are to be interpreted as subjective judgment dimensions of the district inhabitants.

Sociodemographic information about the inhabitants, on one hand, and (Q-)GIS-data for the residential location, on the other hand, formed the independent variables which could be causal for the subjective judgments of the district inhabitants. A neutral handling of the respective independent variables was emphasized in consideration of their origin (sociodemographic vs. GIS), allowing no thematic area to be of higher relevance for the assessment of subjective residential and life satisfaction. Therefore, no hierarchical procedure was chosen under application of relevance blocks (blockwise entry), which would have given preference to a priori suspected more potent predictors (e.g. GIS data > sociodemography). Instead, a procedure was chosen (stepwise method) that admitted a direct relevance-comparison of individual predictors, i.e. an emphasized explorative action without a priori.

For the inferential data analysis, the information of 41 QOL questionnaire items was condensed by means of factor-analysis to three well interpretable dimensions. A principal-component-analysis with orthogonal (Varimax) rotation was used as a data reduction and structure detection method.

According to a Bartlett test ($\chi^2_{(820)} = 8021.81$, $p < .01$), the data were suitable for this procedure. The output solution based on the Kaiser-Guttman-criterion yielded a maximum of ten possible factors. After elimination of 15 items, an interpretable 3-factor-solution was found with 44.31 percent explained variance (Bartlett test: $\chi^2_{(325)} = 5700.19$, $p < .01$). Tab.3 contains the item formulations, factor loadings and communalities of the 3-factor-solution (descending factor-loading sort). Factor loads smaller than .20 were suppressed for better legibility.

The measuring accuracy (consistency) of these factors was examined by a reliability analysis (Cronbach's α). The analysis resulted in a reliable three-factor solution:

- *Environmental/Social Quality* (explained variance: 25.23%; Cronbach's α = .91),
- *Social Roots* (explained variance: 9.69%; Cronbach's α = .71),
- *Subjective Infrastructure* (explained variance: 9.34%; Cronbach's α = .65).

Calculating means over respective items formed factor values (scores). The intercorrelation matrix (Pearson's r) of the three scores showed desirable low correlations (Tab.4).

In the following, the relation of the three DVs *Environmental/Social Quality, Social Roots* and *Subjective Infrastructure* were checked with the two meta-level control items ("Here my quality of life is good" and "I am satisfied with my apartment"). The two control items were not used for the factor-analytic dimension formation. The QOL item referred to the respective district while the residential-satisfaction-item assessed nearby living space. It was expected that the new DVs would rather correlate with the *district-QOL* and less with the living space; the opposite would have signalled problems with the interpretability of the present results (e.g. GIS data as inappropriate predictors of QOL).

Therefore, two control items were correlated with the three DV factors, partializing out the respective other control item. The partial correlations (cleaned from the influence of the respective other item) showed the resolved connections with the three DVs. The two

Tab.5 Partial correlations (Pearson's r) of the three factors with the control-items (N=795)

		Environmental/ Social Quality	***Social Roots***	***Subjective Infrastructure***
Correlations of zero order	Here my quality of life is good	.563**	.288**	.149**
	I am satisfied with my apartment	.365**	.231**	.186**
Control variable: I am satisfied with my apartment	Here my quality of life is good	.468**	.201**	.061**
Control variable: Here my quality of life is good	I am satisfied with my apartment	.097**	.097**	.128**

Note ** p < .01, Pearson's r, N=795.

Tab.6 Predictor variables for the criterion Environmental/Social Quality

Predictor	β	***t***	***VIF***
Inhabitants with head residence 2001 in km² raster cells (1000m*1000m)	-.298**	-7.661	1.489
Categorized share of green space per raster cell (50x50m) with inclusion of the housing surroundings (r=300m), values: 0-100%	.178**	4.559	1.496
My friends live in	.132**	4.066	1.033
Noise burden by road traffic lower or equal 55 dB (daytime)	.117**	3.649	1.012
Age in years	.098**	3.028	1.022
Living space of apartment/house (m²)	.085*	2.552	1.087

Note * p < .05,** p < .01. Beta (= r Pearson), t-values and VIF (collinearity statistics).

control items regarding QOL and apartment correlated with r (793) = .52, p <.01 (Tab. 5).

The comparison of the partial correlation with the correlation results of zero order makes clear that the (medium and weak) connections of the district-QOL-items with the three variables remain relatively unaffected by the residential-quality-variable (with the exception of *Subjective Infrastructure*); but the residential-quality-item behaves differently. Here, connections with the variables *Environmental/Social Quality* and *Social Roots* (with the exception of Subjective infrastructure) clearly show the influence of the control variable *district-QOL*. Therefore, *Environmental/Social Quality* and *Social Roots* are influenced by *district-QOL*, not (or hardly) by residential satisfaction. The weak connections of the control items with the variable *Subjective Infrastructure* suggest a rather autonomous concept.

Next, the scores *Environmental/Social Quality, Social Roots* and *Subjective Infrastructure* were taken as dependent variables (DVs) in a stepwise multiple linear regression analysis. GIS data, sociodemographic data and psychological questionnaire data were used as independent variables (IVs) and possible predictors for each higher-order-construct (score). Main results: The relevant predictors were GIS housing density and occupancy time, social relations, a GIS green factor, and district center perception. No GIS predictors were found for the DV *Social Roots*. Finally, district differences for the DVs were tested by MAN(C)OVA and found to be highly significant.

Environmental/Social Quality

The first and most important criterion for inclusion as a possible predictor into the regression model (after considerations regarding theory-reference and causal direction) was the significant correlation of a variable with the criterion variable *Environmental/Social Quality*. Eighteen variables were used as possible predictors. From the GIS records about local residential attractiveness (Stadt Salzburg, Amt fuür Stadtplanung und Verkehr 2012; Schnuerch et al. 2011), density, noise, and green space were used. The final regression-model was calculated in six steps. It turned out to be highly significant with a corrected R^2 =.26, 25.8 % explained variance, and $F_{(6,723)} = 43.20$, $p < .01$. The statistical key values of the individual predictor variables of the final regression model are displayed in Tab.6.

Tab.7 Predictor variables for the criterion Social Roots

Predictor	β	t	VIF
How long have you lived in…? (years)	.275**	7.727	1.737
My friends live in … .	.282**	9.889	1.117
I am a member of a social club in … .	.162**	5.779	1.073
Members of my family live in … .	.177**	5.880	1.242
Profession: Pensioner (Dummy)	.138**	3.975	1.643
Housing form: Apartment building over three floors (Dummy)	-.083**	-2.989	1.057
Marital status: Partnership (Dummy)	-.116**	-3.872	1.227
Marital status: Single (Dummy)	-.107**	-3.478	1.288
Has … a district center?	.063*	2.282	1.035
Hightest finished education: Academic (Dummy)	-.057*	-2.063	1.038

Note * p < .05,** p < .01. Beta (= r Pearson), t-values and VIF (collinearity statistics).

Tab.8 Predictor variables for the criterion Social infrastructure

Predictor	β	t	VIF
Inhabitants with head residence 2001 in km² raster cells (1000m*1000m)	.208**	5.983	1.085
Profession: Pensioner (Dummy)	.161**	3.965	1.490
Categorized share of green space per raster cell (50x50m) with inclusion of the housing surroundings (r=300m), values: 0-100%	-.206**	-5.945	1.085
My friends live in … .	.158**	4.660	1.033
Has … a district center?	.108**	3.193	1.037
How long have you lived in…? (years)	.086*	2.096	1.528
I am a member of a social club in … .	.069*	2.025	1.060

Note * p < .05,** p < .01. Beta (= r Pearson), t-values and VIF (collinearity statistics), GIS predictors printed bold.

VIF values close to one show no relevant multicollinearity, which would impair the validity of the model through a distorted estimate of the regression coefficients. A higher expression of the criterion variable *Environmental/Social Quality* is accompagnied by more friends, less street noise, higher age and higher apartment size with less residential density and a higher green share. Of the six relevant predictors, three are objective GIS variables (density, green, noise) and one an objective housing item (living space). Age and friends in the district are sociodemographic items.

Social Roots

Twenty-three variables were used as possible predictors. The final regression model was calculated in 12 steps. It turned out to be highly significant with a corrected R^2 =.48, 47.7 % explained variance, and $F_{(10,706)} = 66.35$, $p < .01$. The statistical key values of the predictor variables of the final regression model are shown in Tab.7.

Relevant multicollinearity is not present. A higher expression of the criterion variable *Social Rootedness* goes together with social club-affiliation, family-members in the district, retirement, existence of a district-center, occupancy time, and friends in the district, but not with living in a high-rise, partnership, a marital status of single or having a university education. Of the ten relevant predictors, eight are sociodemographic (housing form, occupancy time, friends/family in district, retirement, marital stage, education), and two are more qualitative (club member, district center).

Subjective Infrastructure

Seventeen variables were used as possible predictors. The final regression model was calculated in seven steps. It was highly significant with a corrected R^2 =.20, 19.9 % explained variance, and $F_{(7,715)} = 26.57$, $p < .01$. The statistical key values of the individual predictor variables of the final regression model can be seen in Tab.8. VIF values close to one show no relevant multicollinearity. A higher expression of the criterion variable *Subjective Infrastructure* goes together with less housing-near green-areas, higher residential density, retirement, friends in the district, an experienced district-center, higher residential occupancy time and a club-membership in the district. Of the seven relevant predictors, two are objective GIS variables (density, green), three are sociodemographic (occupancy time, retirement, friends in district), and two are more qualitative (club member, district center).

4.3 District specific results (MANOVA/ MANCOVA)

As the dependent variables *Environmental/Social Quality, Social Roots* and *Subjective Infrastructure* correlate (weakly positive) with high significance (see Tab.6), and interdependence cannot be excluded (Bortz 1999), the following examination of possible district-specific differences was done as a multivariate MANOVA. Finally, to set the variance-analytic results in relation with the regression results, the predictors reported above were used as covariates, and a covariance-analytic model (MANCOVA) was computed. Results are reported with the main focus on changes of the effect strengths (cleared up variance). Here, the factor level Lehen district could not be entered into the model. As a variance-analytic model, a single-factorial multivariate analysis of variance was used with the independent variable *district* (16 factor levels), and the dependent variables *Environmental/Social Quality, Social Roots* and *Subjective Infrastructure*.

For post-hoc-comparisons, pairwise tests as well as multiple Scheffé test procedures were carried out. Because of the pure scope of the executed post-hoc-pairwise tests – altogether 768, with 280 being significant (*Environmental/Social Quality*: 130 significant comparisons, *Social Roots* 56, and *Subjective Infrastructure* 94) – they cannot be presented here but may be sent to interested readers on demand. Instead, the results of the multiple test-procedures are described shortly:

Upon multivariate calculation, the main-effect *district* was highly significant with $F_{(45,2358)} = 21.92$, $p < .01$ and 29.5% explained variance ($\eta^2 = .30$).

With univariate calculations for the dependent variable *Environmental/Social Quality*, the main-effect *district* was highly significant with $F_{(15,786)} = 40.30$, $p < .01$ and 43.5% explained variance ($\eta^2 = .44$). The multiple test-procedure of Scheffé (post hoc) showed six homogeneous subgroups on ($\alpha = .05$) for the dependent variable.

With univariate calculations for the dependent variable *Social Roots*, the main-effect *district* was highly significant with $F_{(15,786)} = 9.14$, $p < .01$ and 14.9% explained variance ($\eta^2 = .15$). The multiple test-procedure of Scheffé (post hoc) showed two homogeneous subgroups ($\alpha = .05$) for the dependent variable.

With univariate calculations for the dependent variable *Subjective Infrastructure*, the main-effect *district* was highly significant with $F_{(15,786)} = 15.88$, $p < .01$ and 23.3% explained variance ($\eta^2 = .23$). The multiple test-procedure of Scheffé (post hoc) showed six homogeneous subgroups ($\alpha = .05$) for the dependent variable.

In summary, we found both multivariate and univariate highly significant differences between the Salzburg districts with respect to *Environment/Social Quality, Social Roots* and *Subjective Infrastructure*.

The following MANCOVA showed multivariate highly significant differences $F_{(42,1941)} = 8.07$, $p < .01$ with 15.0% explained variance of the districts regarding DVs. Univariate, the main-effect *district* also proved to be highly significant for all three dependent variables: For *Environment/ Social-quality* $F_{(14,647)} = 12.71$, $p < .01$ with 21.6% explained variance, for *Social Roots* $F_{(14,647)} = 2.53$, $p < .01$with 5.2% explained variance, and for *Subjective Infrastructure* $F_{(14,647)} = 6.69$, $p < .01$with 12.6% explained variance.

If one compares the covariance-analytic results with those of variance-analysis, about half of the explained variance can be attributed to the regression-analytically obtained predictors (with exception – two thirds – of the dependent variable *Social Roots*). In other words, approximately half of explained variance through the factor *district* cannot be cleared up through covariate effects (with unconsidered possible interactions) of the obtained, generalizable predictors.

Looking back to the qualitative items of the free responses from seven districts tested against US categories, it was already noticed that the main generic terms – positive and negative – were highly district dependent, indicating very different district images with individual strengths and weaknesses. Here we are at the borderline of our survey technique with a limited number of free responses and a limited number of key quality items. The important sociocultural microsystems giving rise to further district-specific differences would need a qualitative approach leading into further ideographic details and away from the nomothetic view of the districts.

5. Second step of the study – Psychological replication

The main task of the second step was a replication test of the findings of the first step with focus on inter-city-

Tab. 9 Salzburg sample (N=802): Factor loadings, communalities, item means, item standard deviations and part-whole corrected selectivity of the 3-factor solution: F1 Environmental/Social Quality, *F2* Social Roots, *F3* Subjective Infrastructure.

Item	F 1	F 2	F 3	h^2	M	SD	r_{it}
... is a nice district.	.760			.380	3.06	.931	.529
... is a green district.	.748			.590	3.18	.905	.650
... is a good place for children.	.733			.548	3.12	.847	.659
... has a good environmental quality.	.660			.458	3.02	.912	.534
... is a safe district.	.655	.238	-.272	.559	3.08	.922	.566
In ... you can take nice walks.	.645			.461	3.46	.799	.559
... has beautiful parks.	.608			.380	3.06	.931	.529
... is mainly rural.	.592			.363	2.57	1.095	.480
Here I feel safe at night in the street.	.548	.298	-.341	.505	3.09	.982	.454
... has good playgrounds.	.504			.602	3.00	.897	.415
... has nice restaurants and entertainment venues.		.833		.707	2.14	.929	.583
In ... you can go out at night well.		.765		.599	1.93	.957	.490
... offers great shopping.		.613		.413	3.09	.966	.402
... has good public transport connections.		.411		.196	3.37	.833	.249
I know quite a bit about the history of			.736	.566	2.14	1.090	.465
I know people in ...			.703	.533	3.07	.985	.447
In ... I know what's what quite well.		.217	.644	.478	3.41	.733	.427

Factor loadings (F), communalities (h^2), item means (M), item standard deviations (SD) and part-whole corrected selectivity r_{it}. Factor loadings smaller .20 were suppressed for better legibility.

Tab.10 Intercorrelation matrix (Pearson's r) of the original and new scores for Environmental/Social Quality, Social Roots *and* Subjective Infrastructure *based on data from Salzburg City (N= 802).*

	Environmental/ Social Quality (original)	Social Roots (original)	Subjective Infrastructure (original)
Environmental/social quality (new)	.973**		
Social roots (new)		.897**	
Subjective infrastructure (new)			.956**

Notes. ** p < .01

stability of the QOL-constructs *Environmental/Social Quality, Social Roots* and *Subjective Infrastructure*. One significant difference between randomly obtained variable correlations and stable psychological/psychometric construct dimensions is that the latter is found in independently tested samples. So the factor analytical and item analytical results of QOL survey data of the Salzburg city districts (N=802) were compared with replication samples drawn in two districts of Vienna, Austria (Meidling and Donaustadt; N=150; in a 2014 Vienna University of Technology seminar), and in two districts of Timişoara, Romania (Soarelui and Circumvalatiunii; N=90; Stancu et al. 2014; Stancu et al. 2016). This amounted to a total replication sample of N=240. After the elimination of several items, very similar factor analytical results were found in the two samples drawn in Salzburg and Vienna/Timişoara (Tab. 9 and Tab. 11).

The analysis of the reduced itempool drawn in Salzburg (N= 802) resulted in a reliable three-factor solution with 48.43% explained total variance:

- *Environmental/Social Quality* (explained variance: 25.94%; Cronbach's α = .85),
- *Social Roots* (explained variance: 13.29%; Cronbach's α = .64),
- *Subjective Infrastructure* (explained variance: 9.20%; Cronbach's α = .64).

The Pearson correlations of the initial scores gained by the factor analytical results of the first step of the study and the scores created in the actual study based on the reduced itempool of the Salzburg sample (N=802) proved to be very strong (Tab. 10). This indi-

Tab. 11 Vienna/Timisoara sample (N=240): Factor loadings, communalities, item means, item standard deviations and part-whole corrected selectivity of the 3-factor solution: F1 Environmental/Social Quality, *F2* Social Roots, *F3* Subjective Infrastructure.

Item	F 1	F 2	F 3	h²	M	SD	r_{it}
... has beautiful parks.	.745			.602	3.32	.821	.676
In ... you can walk well.	.690	.286		.598	3.28	.791	.684
Here I feel safe at night on the street.	.656			.469	2.99	.861	.527
... is a nice district.	.655	.364		.575	3.30	.742	.608
... has good playgrounds.	.646	.224		.496	3.10	.793	.602
... is a green district.	.643		.317	.537	3.19	.863	.603
... is primarily rural.	.592	-.287	.210	.477	2.28	.928	.503
... is a safe district.	.577		-.230	.402	2.93	.760	.392
... is a good place for children.	.572	.282	.239	.464	3.17	.813	.554
... has a good environmental quality.	.561		.251	.381	3.02	.714	.490
In ... you can go out at night well.	.259	.738		.613	2.45	.955	.526
... has nice restaurants and entertainment venues.		.738		.610	2.70	.874	.595
... offers great shopping.		.710		.516	3.37	.786	.478
... has good public transport connections.		.562		.341	3.45	.746	.297
In ... I know what's what well.			.804	.668	3.04	.854	.566
I know quite a bit about the history of			.693	.498	2.50	.974	.433
I know people in ...			.656	.457	3.29	.852	.400

Factor loadings (F), communalities (h^2), item means (M), item standard deviations (SD) and part-whole corrected selectivity r_{it}. Factor loadings smaller than .20 were suppressed for better legibility.

cates that despite the use of slightly different itempools, the same psychological constructs were measured.

The analysis of the reduced itempool drawn in Vienna and Timişoara (N= 240) also resulted in a reliable three-factor solution with 51.20% explained total variance:

- *Environmental/Social Quality* (explained variance: 29.85%; Cronbach's α = .86),
- *Social Roots* (explained variance: 11.93%; Cronbach's α = .68),
- *Subjective Infrastructure* (explained variance: 9.42%; Cronbach's α = .66).

When comparing the content of Table 9 and Table 11, it can be seen that the factor and item analytic results are very similar and the item assignment is identical.

The comparative stability of the results obtained by replication data from other cities – two districts each from Vienna, Austria, and Timişoara, Romania – is a strong argument for sample-independent dimensional QOL-constructs of *Environmental/Social Quality, Social Roots* and *Subjective Infrastructure.* These findings can be interpreted as an indication for a general and stable psychological substructure of urban QOL.

6. Conclusions – Outlook

Working with the translated QOL itempool of the Detroit Area Study, the first author recognized that urban QOL by its polyvalence of needs (Boesch 1980) causes a confusing variety of possible predictors. The Detroit items were therefore gradually reduced to a manageable number, which proved to be relevant for a qualitative validation, as for the surveyed Salzburg population.

Factor analytically, a reliable 3-factor solution – named as Environmental/Social Quality, Social Roots, and Subjective Infrastructure – emerged.

Multiple linear regressions used these three variables as DVs, sociodemographic and GIS variables as IVs. Relevant predictors here were the objective residential density, GIS proportion, social relations, experienced district center and time of occupancy. The variable Social Roots did not have GIS predictors and was mainly influenced by sociodemographic variables. MANOVA was used to examine urban-specific differences between multi- and univariate with regard to Environmental/Social Quality, Social Roots and Subjective Infrastructure. MANCOVA results indicated that only about half of the explained variance can be attributed to the prevailing predictors in the case of district differences. The question of which other factors or IVs could influence the wellbeing in the city must remain partly unanswered in spite of a wide range of data collection and analysis. Also, the partial low effect intensities of the regression-analytic general predictors are unsatisfactory.

In order to keep the already high complexity still manageable, the present analysis exempted psychological parameters such as personality variables. Nevertheless, findings such as those of Ballas and Tranmer (2012) – balanced psychological variables allow local wellbeing differences to disappear – suggest a closer examination of the interaction between psychological parameters and location-specific wellbeing. For example, Tokuda et al. (2008), using the WHO QOL questionnaire in Japan, noticed a significant link between interpersonal trust and the QOL facet of the environment. The aggregation level also appears to be sensitive: Schneider (2008) observed that the MANOVA aggregation of different life satisfaction scales for three Austrian cities to total values made city differences disappear, whereas sector-specific scales differed significantly.

Urban forms are neither natural phenomena, like coral reefs, nor purely random products, but are shaped by long-time interactions of physical geography, economy and local government (political power). Thus, the visible Salzburg "North-South conflict" is one of housing segregation and density, even if the gap is not as great as in Boston or New York (Salesses et al. 2013). On the social level, results indicated discrepant Salzburg housing preferences (Weichhart 1987).

Empirical findings about social conditions of urban QOL should lead to political city-planning with moral obligations to realize environmental justice (Mueller et al. 2012). For politicians and city officials interested in social wellbeing beyond the status quo, the possibility of universally applicable psychological instruments to measure experience and perception of residents of urban areas should be promising. The applications of these instruments can be diverse: Residents' evaluations, participative city planing, detection of local infrastructural necessities, and so on. Objectivity and standardization of such instruments are a must for reasons of comparability and quality assurance. Here, environmental psychology can bridge the gap between city planning and residents' needs with appropriate scientific methods. The results of the current study show opportunities and can be seen as one more step towards scientifically based measurability of the term "quality of life".

The authors consider the replication of their examination on city and QOL/wellbeing in other cities as necessary intermediate steps towards a mixed methods systematization of research.

Maderthaner (1995) presented diverse interactions between urban QOL and socio-spatial factors (social networks, contact density, segregation, telecommunications, participation). In his model, city is a multidimensional relationship of real and stable, but also optional, imaginary and transient contacts. For Kwan (2004: 758), exactly these processes are the content of "hybrid geography": "geographical practices that forge creative connections between social-cultural and spatial-analytical geographies". And for Pavlovskaya (2006), the GIS-procedure widens quantitative-objective relations through the spatial localization and analysis of qualitative research data. The nomothetic value of the objective-subjective interrelations needs further tests. One further step is taken in an analysis of Vienna, Austria regarding distribution of green spaces, use of public transportation modes, satisfaction with proximity to green areas and public transport connection, and travel time within the city (Haslauer et al. 2015).

References

Amelang, A. & Zielinski, W. (2002). *Psychologische Diagnostik und Intervention.* Berlin: Springer.

Ballas, D. (2013): What makes a "happy city"? *Cities*, 32, 539-550.

Ballas, D./Tranmer, M. (2012): Happy people or happy places? A multilevel modeling approach to the analysis of happiness and well-being. *International Regional Science Review*, 35 (1), 70-102.

Barker, R. (1968): *Ecological psychology: Concepts and methods for studying the environment of human behavior.* Stanford: Stanford University Press.

Blaschke, T./Merschdorf, E. (2014): Geographic information science as a multidisciplinary and multiparadigmatic field. *Cartography and Geographic Information Science,* 41 (3), 196–213.

Boesch, E.E. (1980): *Kultur und Handlung. Einführung in die Kulturpsychologie* [German, Culture and Action. Introduction to Cultural Psychology]. Bern: Huber.

Bortz, J. (1999): *Statistik für Sozialwissenschaftler* [German, Statistics for Social Scientists] 5th ed. Berlin: Springer.

Brambilla, M./Michelangeli, A./Peluso, E. (2013): Equity in the city: On measuring (ine)quality of life. *Urban Studies*, 50 (16), 3205-3224.

DeLyser, D./Sui, D. (2012): Crossing the qualitative-quantitative divide II: Inventive approaches to big data, mobile methods, and rhytmanalysis. *Progress in Human Geography*, 37 (2), 293-305.

DeLyser, D./Sui, D. (2014): Crossing the qualitative-quantitative chasm III: Enduring methods, open geography, participatory research, and the fourth paradigm. *Progress in Human Geography,* 38, 294-307.

Golledge, R. G. (2002): The open door of GIS. In: Bechtel, R.B./Churchman, A. (Eds.): *Handbook of Environmental psychology.* New York: Wiley, 244–255

Goodchild, M.F./Janelle, D.G. (2004): *Spatially integrated social science.* New York: Oxford University Press.

Goodchild, M.F. (2010): Twenty years of progress: GIScience in 2010. *Journal of Spatial Information Science,* 1, 3-20.

Greene, J.C. (2007): *Mixed methods in social inquiry.* San Francisco, CA: Jossey-Bass.

Haslauer, E., Delmelle, E.C., Keul, A., Blaschke, T. & Prinz, T. (2015). Comparing subjective and objective quality of life criteria: A case study of green space and public transport in Vienna, Austria. *Social Indicators Research* 124, 911–927.

Jung, J.K./Elwood, S. (2010): Extending the qualitative capabilities of GIS: Computer-aided qualitative GIS. *Transactions in GIS*, 14 (1), 63-87.

Kaplan, S. (1995): The restorative benefits of nature: Toward an integrative framework. J*ournal of Environmental Psychology*, 15, 169-182.

Keul, A.G. (Hrsg.). (1995): *Wohlbefinden in der Stadt: Umwelt- und gesundheitspsychologische Perspektiven* [German, Wellbeing in the city: Environmental and health psychological perspectives]. Weinheim: Beltz, Psychologie Verlags Union.

Keul, A.G./Brunner, B./Spitzer, W. (2014): Wohlbefinden in einer Stadt. Geoinformatik und Prädiktoren subjektiver Lebensqualität in Salzburg. [German, Wellbeing in a city. Geoinformatics and predictors of subjective quality of life in Salzburg]. *Umweltpsychologie,* 18 (2), 31-52.

Keul, A.G./Prinz, T. (2011): The Salzburg quality of urban life study with GIS support. In: Marans, R.W./Stimson, R. (Eds.): *Investigating quality of urban life: Theory, methods, and empirical research.* Dordrecht: Springer, 273-293

Kuckartz, U. (2014): *Mixed Methods. Methodologie, Forschungsdesigns und Analyseverfahren.* Wiesbaden: Springer VS.

Kwan, M.P. (2004): Beyond differences: From canonical geography to hybrid geographies. *Annals of the Association of American Geographers,* 94 (4), 756-763.

Leszczynski, A. (2009): Quantitative limits to qualitative engagements: GIS, its critics, and the philosophical divide. *The Professional Geographer,* 61 (3), 350-365.

Lynch, K. A. (1960): *The image of the city.* Cambridge: MIT Press.

Maderthaner, R. (1995): Soziale Faktoren urbaner Lebensqualität [German, Social factors of urban QOL]. In: Keul, A.G. (Hrsg.), *Wohlbefinden in der Stadt: Umwelt- und gesundheitspsychologische Perspektiven.* Weinheim: Beltz PVU, 172-197

Marans, R.W. (2004): *The 2001 Detroit Area Study (DAS) on the Quality of Community Life.* Presentation, Board Session, 18th IAPS Conference, Vienna, Austria, July 7-10.

Marans, R.W. & Stimson, R. (Eds.). (2011): *Investigating quality of urban life: Theory, methods, and empirical research.* Social Indicators Research Series Vol. 45. Dordrecht: Springer.

McCray, T./Brais, N. (2007): Exploring the role of transportation in fostering social exclusion: The use of GIS to support qualitative data. *Networks and Spatial Economy,* 7, 397-412.

McCrea, R./Shyy, T.K./Stimson, R. (2006): What is the strength of the link between objective and subjective indicators of urban quality of life? *Applied Research in Quality of Life,* 1, 79-96.

Mennis, J./Mason, M.J./Cao, Y. (2013): Qualitative GIS and the visualization of narrative activity space data. *International Journal of Geographical Information Science,* 27 (2), 267-291.

Mueller, M.M./Ittner, H./Becker, R. (2012): Umweltgerechtigkeit – Einführung in das Schwerpunktthema [German, Environmental justice – Introduction to the focus topic]. *Umweltpsychologie,* 16 (2), 3-7.

Noll, H.H. (2004): Social indicators and quality of life research: Background, achievement and current trends. In: N. Genov (Ed.): *Advances in sociological knowledge over half a century* (pp.151-180). Wiesbaden: VS Verlag für Sozialwissenschaften.

Pavlovskaya, M. (2009): Non-quantitative GIS. In: Elwood, S./Cope, M. (Eds.): Qualitative GIS: *A mixed methods approach to integrating qualitative research and Geographic Information Systems.* London: Sage, 13-37

Philip, L.J. (1998): Combining quantitative and qualitative approaches to social research in human geography – an impossible mixture? *Environment and Planning,* 30 (2), 261-276.

Pigou, A.C. (1920): *The economics of welfare.* London: Macmillan and Co.

Salesses, P./Schechtner, K./Hidalgo, C.A. (2013): The collaborative image of the city: Mapping the inequality of urban perception. *PLOS One* 8, 7, 1-12.

Schneider, B. (2008): *Vergleich von subjektiver Lebenszufriedenheit in drei österreichischen Städten unter Berücksichtigung psychologischer Aspekte.* [German, Comparison of subjective life satisfaction in three Austrian cities with special attention to psychological aspects]. Diplomarbeit. Graz: Naturwissenschaftliche Fakultät der Karl-Franzens-Universitaet Graz.

Schnürch, D./Prinz, T./Herbst, S. (2011): *Karte 5-08. Wohnstandortbewertung: Gewichtete Durchgrünung im Wohnumfeld.* [German, Map 5-08. Evaluation of places of residence: Weighted green in the residential area]. EuRegionale Raumanalyse, Projekt Interreg IV A. Salzburg: iSpace und Z_GIS.

Sheridan, C.L./Radmacher, S.A. (1992): *Health psychology. Challenging the biomedical model.* New York: Wiley.

Stancu, A./Lupsa, D./Keul, A.G./Ilin, C.M./Alexandrescu, L./Anghel, M./Ardelean, M./Crainic, D./Crisan, S./Preoteasa, C./Tulvan, N. (2014): Quality of life at Timişoara, Romania – a comparative field study. Presentation at IAPS 23, Timişoara. Romania, 23-27 June.

Stancu, A./Ilin, C./Gruicin, A. (2016): Perceived urban quality of life in Timişoara's districts. *Romanian Journal of Applied Psychology,* 18, 13-17.

Stadt Salzburg, Amt für Stadtplanung und Verkehr. (2012): *Checkliste zur Nachhaltigkeitsbewertung Wohnbau Stadt Salzburg.* Bericht Version 2.0.[German, Checklist for the sustainability assessment of Salzburg City housing construction] http://www.stadt-salzburg.at/internet/wirtschaft_umwelt/stadtplanung/nachhaltigkeit/zukunftsweisendes_bauen/checkliste/checkliste_konkret_232787.htm [Accessed July 15, 2013].

Statistics Austria. (2014): Statistisches Jahrbuch Österreich 2014 [German, Statistical Yearbook Austria 2014]. Vienna: Statistik Austria. http://www.statistik.at/web_de/services/stat_jahrbuch/index.html [Accessed September 2, 2014].

Steinmann, R./Krek, A./Blaschke, T. (2005): Can online map-based applications improve citizen participation? In Boehlen, M./Gamper, J./Polasek, W./Wimmer, M.A. (Eds.), *E-government: Towards electronic democracy.* Berlin: Springer, 25-35

Stokols, D. (1972): A social-psychological model of human crowding phenomena. *Journal of the American Planning Association,* 38 (2), 72-83.

Sui, D./DeLyser, D. (2012): Crossing the qualitative-quantitative chasm I: Hybrid geographies, the spatial turn, and volunteered geographical information (VGI). *Progress in Human Geography,* 36 (1), 111-124.

Tokuda, Y./Jimba, M./Yanai, H./Fujii, S./Inoguchi, T. (2008): Interpersonal trust and Quality-of-Life: A cross-sectional study in Japan. *PLOS One* 3, 12, 1-10.

von Wirth, T./Grêt-Regamey, A./Stauffacher, M. (2014): Mediating effects between objective and subjective indicators of Quality of life: Testing specific models for safety and access. *Social Indicators Research* online 25 June.

Weichhart, P. (1987): *Wohnsitzpräferenzen im Raum Salzburg. Subjektive Dimensionen der Wohnqualität und die Topographie der Standortbewertung. Ein mikroanalytischer Beitrag zur Propädeutik der Wanderungstheorie.* [German, Housing preferences in the Salzburg area. Subjective dimensions of the residential quality and the topography of location assessment. A microanalytic contribution to the propaedeutics of migration theory]. Salzburger Geographische Arbeiten Band 15. Salzburg: Institut für Geographie.

WHO. (2014): The World Health Organization Quality of Life. Instruments obtainable online: http://www.who.int/mental_health/publications/whoqol/en/