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THE RELATIONSHIP BETWEEN LEISURE RESOURCE INFORMATION AND REGIONAL WELL-BEING: A GIS APPROACH

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ABSTRACT: There is a positive link between leisure activities and quality of life. Measurement approaches are divided into person- vs. place-centered and subjective vs. objective dimensions. The contribution of person-centered attributes is beyond controversy. This article offers a novel operationalization to fill the gap in the less investigated objective place-centered dimension. Eating and drinking points of interest used for mobile devices are projected onto a map, making use of geographical information systems. The resulting densities in the surroundings of ten different regions are interlinked with subjective evaluations based on questionnaires completed by inhabitants of these regions. This relationship validates the usability of the objective service density metric and identifies the geographical size of the inhabitants' surroundings considered relevant for eating and drinking purposes. **Keywords**: food service infrastructure, geographic information systems, well-being, quality of life.

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INTRODUCTION

This study is motivated by the increasing importance of well-being and quality of life from the point of view of the individual, instead of taking country aggregates such as GDP (gross domestic product) as a proxy of the well-being of societies. The influential Stiglitz-Sen-Fitoussi report (Stiglitz, Sen, & Fitoussi, 2009) recommends paying attention to subjective indicators, such as individual happiness or sat-

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isfaction with life, since the individual is the only instance that is able to comment on personal emotions in an authentic way. On an international level, the OECD – Organization for Economic Co-operation and Development (How's life, 2013) and the European Union (GDP and beyond, 2013) recently launched initiatives for the implementation of these proposals, but subjective ratings of happiness and life satisfaction have also become standard in several large-scale official questionnaires, such as the World Values Survey, the European Social Survey (ESS) or the European Survey on Income and Living Conditions (EU-SILC). National initiatives have been launched in Canada, the United Kingdom, and Australia (cf. Forgeard, Jayawickreme, Kern, & Seligman, 2011; Diener, 2009), among others. But it is unclear to which extent subjective measures should be considered as drivers for political measures. Frey and Stutzer (2007) argue that subjective measures should not be set as goals to be optimized directly, because of the risk of strategic responses by citizens, possible manipulative actions by governments, etc. Large-scale reviews confirm that the common measures of subjective well-being (SWB) show sufficient validity to justify their interpretation as indicators for citizens' subjective quality of life--related emotions and evaluations (e.g. Frey & Stutzer, 2002; Diener, Suh, Lucas, & Smith, 1999). In the meantime, the relevance of SWB assessment, in addition to merely economic indicators, has been widely acknowledged in recent years (e.g. Stiglitz et al., 2009).

The importance of knowing more about SWB drivers has an effect on service research streams and the service industry, as well as vice versa. Leisure activities bring people together for the purpose of social interaction and promote the collective well-being of communities and individual well-being by means of physical and mental activities. Increasing consumption patterns during leisure time and how this changed what we do with our disposable time have been addressed (Mayo, 1972). More recently, the increase in real incomes and money spent on services related to leisure activities was empirically demonstrated. Services related to leisure activities in particular experience income elasticities higher than normally observable for luxury goods (Beyers, 2002). This relationship, called 'Engel's law', depicts a rising share of income spent on leisure purposes over time. This is also due to a long-term increase in time spent on leisure activities during the Twentieth Century. The demand of American households derived from annual input-output accounts of the US Bureau of Economic Analysis, broken down by revenue sources, lists revenues to the amusements sector through eating and drinking establishments, being an important leisure activity, in the year 1996 at a value of $ 3.541 billion out of $108.225 billion (Beyers, 2002). It was argued, however, that the number of restaurants and bars remains more or less consistent, but the

supply side had diminished (Shelley, 2005). Both transitions strengthen the urgency of matching supply and demand now and in the future. Leisure services managed by public institutions and private organizations are part of the transformative service, as they help to improve societal welfare by offering the necessary infrastructure. They are part of the transformative service industry creating advantages, provided they are managed in a proper way, provided ability to access is given (Ostrom et al., 2010), and provided resources are continuously developed to match changing needs. Offering a system of well-distributed service facilities is the basic module for well-experienced leisure time that is necessary for well-being. This is only possible if regional differences capture heterogeneity at collective level. The purpose of this study is to connect the infrastructure variability of whole communities from a macro-level perspective with well-being evaluations of their inhabitants to finally reach a win-win situation for leisure participants and the underlying industry.

LITERATURE REVIEW

The majority of respondents are happier during leisure time compared to working time (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004). The amount of leisure activity is found to correspond to overall SWB as an important determinant of general well-being (Lloyd & Auld, 2002), but the way in which spare time is consumed is more important (McAuley et al., 2000). Other authors show that the quantity of leisure time does not increase happiness, but support the crucial role of the leisure activity itself. Leisure activities that strengthen relationships with others and those used to develop skills or establish contacts lead to higher happiness levels, but thinking about work during leisure time leads to lower ratings. This underlines the relevance of how people spend their time, the satisfaction gained from leisure activities, and the meaning of leisure (Wang & Wong, 2011). Also, differences across age groups, gender, and ethnicity are shown (Brajša-Žganec, Merkaš, & Šverko, 2011; Spiers & Walker, 2009). Even spatial differences were detected by using multi-level hierarchical logit models to include the natural geographical clustering of respondents in countries (Wang & Wong, 2014). They suggest similar conclusions: Leisure quantity is less important than its quality measured by subjective satisfaction evaluations, its role to self-fulfillment and social interaction, and its relationship with work and other spheres of life. Cross-country heterogeneities were detected even when corrected for individual demographic and individual as well as national economic variables (Wang

& Wong, 2014). Consequentially, the spatial aspect is worth considering and will be tackled here at sub-national level.

SWB is a complex concept used differently by different authors, but usually relates to the presence of positive and the absence of negative emotions, as well as cognitive evaluations of life or living domains (Diener, Sandvik, & Pavot, 2007). "Participation in and opportunities for recreation/leisure" is seen as an environmental facet which is one of the four domains contributing to quality of life in the WHOQOL measurement instrument (WHOQOL, 1997). Approaches to measure the enjoyment level of leisure activities divide them into wellness, sedentary leisure, intellectual leisure, social leisure, routine activities, self--realization, and inner peace (Ábrahám, Velenczei, & Szabo, 2012). Sedentary leisure consists of eating and laziness experiences and includes gastronomy as one of the most commonly reported leisure activities. Sedentary leisure, social leisure, and routine activities were regressed on a relatedness and health component and routine activities, inner peace and sedentary leisure were regressed on an autonomy component of well-being derived from Self-Determination Theory and explain significant proportions of variance (18% and 12%). Hribernik and Mussap (2010) add leisure as a separate domain to the seven life domains of the Personal Wellbeing Index (PWI) developed by the International Wellbeing Group and regress it on SWB. An additional variance prediction of 7% supports the proposal of leisure as a separate life domain. Leisure was proposed to be included in the PWI. The Hierarchy Model assumes that overall satisfaction with life is determined by major life domains (Dolnicar, Lazarevski, & Yanamandram, 2013). Vacations are used as a separate domain in 7% of the studies, 42% include items related to vacations within the broader leisure domain, and almost two thirds use leisure and recreational experiences (Dolnicar, Yanamandram, & Cliff, 2012). 40% of respondents mention that vacations/holidays contribute to their QoL without being prompted, 50% list vacations/holidays when asked to list domains that may enhance their QoL and, when asked directly, 90% add vacations. Additionally, it can be shown that leisure at home versus away from home contribute independently to QoL and vacations should be viewed as a separate quality of life domain. Leisure is seen as contributing to QoL, but vacations are more or less included within the leisure domain. To disentangle this situation, eight domains were suggested, two of them named leisure and vacation (Dolnicar et al., 2013).

Leisure contributes to QoL in numerous ways. Apart from other leisure behavior styles, attention has to be given to the eating and drinking leisure activity to fulfill upcoming trends such as the growing habit of eating out due to the pace of urban life, environmental influences like family structure and household changes, the impact of economic fac-

tors, individual differences such as demography or attitudes, and trends like the increased importance of slow food or traditional dishes. Several studies have addressed the eating and drinking activity and one of them detected a gourmet leisure style by running a factor analysis on 24 different monetary and non-monetary leisure activities (Sakkthivel, 2012). The monetary leisure activity, such as visiting a favorite restaurant, has the highest loading on the gourmet leisure style factor. Gastronomic and culinary tourism plays an important role for the development of a destination in terms of preservation of traditional products and sustainable landscape usage (Montanari, & Staniscia, 2009) as well as tourist attractiveness (Lopez-Guzman, Hernandez-Mogollon, & Di--Clemente, 2014). The latter study identified two main factors as key drivers for tourists to visit a city: culture and gastronomy. In a review paper, factors related to tourist food consumption were classified into five dimensions: culture and religion, socio-demographics, personality traits, exposure effect and past experience, and motivation (Mak, Lumbers, Eves, & Chang, 2012). But it should be mentioned that negative tourism also impacts on built, human, social, and natural capital. The latest attempts to overcome these problematic issues, even for mass tourism, in a fruitful way are in the form of sustainable development paths (Weaver, 2012).

On the individual level, the connection between people's formal involvement and their informal recreational practices and *homophily* beyond the confines of their organization was analyzed by making use of a social network analysis (Warde, Tampubolon, & Savage, 2005). Dining out and going for a drink in public and commercial premises show that the larger the network size and the greater the proportion of ties, the more often one meets for eating and drinking purposes. Affective qualities of ties such as longevity, frequency, closeness, and multiplexity do matter intermittently. Out-of-work practices such as this create social capital because they involve interpersonal contact which is a prerequisite, and the basis for social interaction, engagement, participation, and support. Another strong leisure motive for eating out in night markets is self-identity (Chang & Hsieh, 2006). According to Herzberg's two-factor theory, consumption is seen as a hygiene factor and self-identity as a motivator, whereby the motivating effect of the latter is stronger. Night markets address consumption needs through a variety of local food choices, but primarily enable public meetings and social gatherings for seeing and being seen and entertained by others in order to fulfill psychosocial needs in the form of social contact in companionships dominated by friends or colleagues. Several studies support the socializing aspect of consuming food away from home of specific population groups such as African-Americans (Tegegne, Ekanem, Singh, & Speller-Henderson, 2009). The leisure and social-

izing aspect is ranked second after lack of time to cook at home. The importance of the socializing aspect is additionally supported by research tackling the multidimensionality of the restaurant experience (Andersson & Mossberg, 2004). This research used Scitovsky's categorization consisting of physiological needs (e.g. food), social needs (e.g. belonging to groups), and intellectual needs (e.g. entertainment and excitement). By making use of the contingent valuation method, they found that various aspects are of different importance depending on whether a dinner or luncheon is studied. From five different aspects, the social and intellectual needs (restaurant interior, service, other guests, and good company) dominate the dining experience, whereby the physiological need (relieve hunger) dominates at lunch restaurants. Warde and Martens (2001) conducted interviews where people were asked to agree or disagree that eating events were connected with the term "eating out". Nearly all interviewees agreed to 'restaurant meals' and 'bar meals in pubs'. Half of the respondents agreed to 'snack in a café with friends', whereas 'tea, coffee, and cake at a neighbour's home', 'sandwich in the workplace', or 'Sunday lunch at family's home' were not considered as "eating out" events. In a quantitative study of a Brazilian sample whose eating out habits were dominated by standardized dishes of self-service restaurants or fast food, two different reasons why people eat outside the home arose (de Rezende & de Avelar, 2012): one is convenience, i.e. saving time and money, on weekdays and the other is variety at weekends. Addressing the socializing aspect from another leisure activity perspective, watching TV is rated positively for the moment, but extensive watching corresponds with lower life satisfaction, probably driven by confounding factors such as lack of socializing (Bruni & Stanca, 2008; Frey, Benesch, & Stutzer, 2007).

As leisure experiences such as eating outside the home fulfill needs influencing consumption behaviors and those, in turn, well-being, the restaurant landscape has to offer a broad variety satisfying versatile consumer needs. Nonetheless, comparably few authors focus on the triangle between SWB, leisure time, and public infrastructure, as do Jenkins and Young (2008), Iwasaki (2007) or Johnson and Glover (2013). In many cases, the focus lies on particular target groups such as children (Ziviani et al., 2008), students (Yang, Xiao, & Tse, 2011) or elderly people (Vine, Buys, & Aird, 2012). Trivially, a systematic evaluation of the consequences of local infrastructure requires geographical variation among the respondents as there is also variation in infrastructural conditions between different regions within a country. Not only educational and health care support but also possible ways of spending leisure time, determined by the landscape's suitability for outdoor activities, the cultural supply, or the quality of the restaurants in the area, may vary. Indeed, within-country differences regarding SWB have already been

observed by Plaut, Markus, and Lachman (2002), who note different well-being profiles in different macro-regions within the United States, or by Luger (1996), regarding political infrastructural conditions. Only some of these regional aspects cannot be influenced by policy measures, but some can, either as a direct consequence of infrastructural investments by policy makers or as an indirect consequence due to social climate and social capital. Studies analyzing city competitiveness by means of quality of life measures mention the construction of the physical environment such as urban amenities and public transport, as factors relevant for the livability of a place and leisure activities as important items of people's current lives (Rogerson, 1999). Small-scale studies identify the relationship between leisure time spending with the attractiveness of a city, whereby bars, cafes, and restaurants are included as well (Kotāne, 2012). Kemperman and Timmermans (2008) conducted an activity diary study to analyze the diversity of leisure activity types and the relationship between leisure activity participation and the residential environment using a discrete choice utility function. Categorization of the seven most commonly mentioned out-of-home activities based on their average frequency and duration per day revealed 'visiting restaurant/café/disco' ranked fourth after 'in-home time-out activities', and 'in-home and out-of-home social activities'. The results of a subsequent latent class model detected an urban cultural participants group with high visiting rates for restaurants, cafés, and discos. Others also capture the heterogeneity of personal needs concerning the allocation of leisure resources. The leisure experience is dependent on one's tastes, skills, and demographic and socio-economic indicators contributing to the maximization of an individual's utility (Ateca-Amestoy, Serrano-del-Rosal, & Vera-Toscano, 2008). Environmental factors included were green, public and commercial areas, cultural and social equipment, and other amenities. Services were modeled by the type of habitat as residence in small towns is assumed to decrease satisfaction due to the distance to service delivery locations. Semi-urban residents were less satisfied.

One strong known obstacle to life satisfaction is commuting (Stutzer & Frey, 2008) which may be mitigated by local policy measures. Mobility by means of public transportation is shown to be relevant in Vine et al. (2012). On a less tangible level, Stutzer and Frey (2006) conclude the positive effects of political participation on SWB by comparing different Swiss cantons. The relevance of SWB assessment in addition to merely using economic indicators has been widely acknowledged in recent years (e.g. Stiglitz et al., 2009). In the particular context of this article, it may be strongly supported by arguments such as those given by Stutzer and Frey (2008): Although people should only accept a commuting distance which compensates daily travel efforts with economic

or other advantages (as according to standard economic approaches), commuting is found to correspond to lower life satisfaction as a consistent dissatisfaction driver. An evaluation of regional policy should involve subjective statements, as they are a more direct expression of people's actual personal experiences. As an example, Ettema, Gärling, Olsson, and Friman (2010) explicitly focus on the potential impact of local transport policy on outdoor activities, the quality of leisure time, and on the well-being of the citizens. Consequently, linking subjective evaluations of infrastructure and surroundings can provide relatively immediate insight into policy demand and serve as a basis for concrete policy recommendations.

Not only subjective evaluations of infrastructure were found to be useful. Leisure satisfaction measures were divided into expressive attributes (e.g. social dimension) and instrumental attributes (e.g. conditions of facilities), where the latter were measured by means of the following statement: "Tourist services at the vacation site (e.g. regarding activities, tourist attractions, restaurants and hotels) were comprehensive and of high quality" (Neal, Sirgy, & Uysal, 1999). Results show that satisfaction with travel/tourism experiences can be predicted by the level of satisfaction expressed with travel/tourism services. Consequently, as satisfaction with travel/tourism experiences has a direct positive impact on satisfaction with life in general, satisfaction with travel/tourism services at a destination indirectly influences overall life satisfaction through satisfaction with travel/tourism experiences. Studies should not be limited to studying customer satisfaction, but should extend the satisfaction-with-life framework by tackling leisure services too. Although it was mentioned that the subjective evaluation of leisure is more relevant to SWB than an objective measure (Hribernik & Mussap, 2010), the objective approach cannot be fully neglected. If objectively measured at all, leisure is predominantly operationalized as the number of parks, playgrounds, etc., and it is proposed that the number of facilities and services directly increases QoL (Lloyd & Auld, 2002). Others further differentiate between person-centered leisure attributes (attitudes and satisfaction) and place-centered leisure attributes (leisure resources and environments). The former focus on subjective criteria representing the experience and the latter focus on objective criteria such as content. For example, leisure resources and the environment represent place-centered leisure items (Brajša-Žganec et al., 2011). Finally, Lloyd and Auld (2002) interrelate both above-mentioned aspects, person vs. place-centered as well as objective vs. subjective, and come up with four combinations, presented in a single study: an objective place-centered dimension, a subjective place-centered dimension, an objective person-centered dimension and a subjective person-centered dimension. The aim is to determine whether place-centered attributes,

including facilities and services, and/or person-centered factors such as social interaction dominate QoL. Not only the single components, but also the interaction between satisfaction with leisure resources and the use of leisure resources are significant and have an impact on QoL. QoL only increases marginally as satisfaction with leisure resources increases. Notwithstanding this, QoL increases with an increasing number of leisure resources even if the satisfaction levels are low (Lloyd & Auld, 2002). Attention must be paid to the fact that this increase is greater the higher the satisfaction with leisure resources and the higher the leisure participation. Therefore, there is evidence that the contribution of place-centered leisure attributes lies in the interactive relationship with person-centered leisure variables. Consequently, if leisure resources fail to meet the needs of the people, this will result in lower levels of QoL – formalized as "salience of the near environment".

This paper concentrates on the place-centered dimension of leisure components as well as on the operationalization and usability of an objective place-centered variable. Such an item containing geo-referenced locations allows for the use of geographical information systems (GIS) and opens the way for an additional dimension, namely space. There are numerous QoL/SWB studies making use of the power of GIS for visualization purposes (Petrucci & Schifini D'Andrea, 2002), overall rankings (Moro, Brereton, Ferreira, & Clinch, 2008), and for the evaluation of different satisfaction sources (Brereton, Clinch, & Ferreira, 2008), such as amenities (Ambrey & Fleming, 2011; Deller, Tsai, Marcouiller, & English, 2001), regions (Clinch, Ferreira, Brereton, Moro, & Bullock, 2006), various environmental issues (Welsch, 2007; Ferreira, Moro, & Clinch, 2006), air quality (MacKerron & Mourato, 2008), natural environment and climate (Barrington-Leigh, 2008), or ecosystem diversity (Ambrey & Fleming, 2013). Some of these selected articles directly or indirectly cover leisure services. If so, most of them use questionnaire data for this purpose. Nonetheless, the usability of the number of facilities and services in the surroundings of the residents is low. This study makes use of GIS, including a dataset frequently used in connection with interactive new media communication facilities and technologies such as car navigation systems or smartphone applets, offered under the open data commons open database license (ODbL) by the CloudMade downloads of the OpenStreetMap community (Cloudmade, 2013). This data source lists points of interest (POI) information. POIs are offered in various categories such as lodging, leisure, sports, eating and drinking, government and public services, nightlife and business, tourism, automotive, and healthcare. On the one hand, these datasets covering many different kinds of service facilities can never be overarching due to the constantly changing number of facilities available. On the other hand, this source of sec-

ondary data covers an impressive number of entries and one exclusive subtopic, namely "eating and drinking", which will be discussed here in detail and connected with primary data to provide an answer to the following hypothesis:

H1: The more eating and drinking facilities available, the higher the benefit from the surroundings.

METHODS

Rogerson's (1999) conceptualization of quality of life differentiates two main approaches concerning the way in which quality of life is measured. One measures the features of the urban environment and characteristics in terms of availability, accessibility, and efficiency of provision. The second includes weightings derived from opinion surveys and personal traits too. This study connects both approaches. Data from OpenStreetMaps focus on the former, described in the section on environmental characteristics. The latter shrinks the influence of confounding variables as participants are directly asked to evaluate the influence of the infrastructure and is based on primary data gathered in the course of a research project described in the section on personal characteristics.

Personal characteristics

A publicly financed research project was conducted in ten different towns in Austria, ranging from large cities such as the capital, Vienna, to small villages, rural as well as urban areas, economically better and poorly performing regions. A broad mix of characteristics is intended to capture the wide range of impacts on well-being. The quantitative data collection work was conducted in the years 2011 and 2012. In one of the ten communities, every inhabitant was contacted by mail from an address list provided by the mayor. In two of the communities, every household who subscribes to the local newspaper received the necessary documents attached to it. The remaining seven communities were contacted based on randomly selected addresses from the telephone book or purchased from a commercial enterprise. All participants selected according to the above mentioned procedure were contacted just once, with them receiving a printed version of the questionnaire, a response envelope and a letter with introductory words on the study including a link to the website of the online survey with a request to distribute it. All in all, 908 inhabitants completed the printed questionnaire and the online questionnaire yielded 546 filled-out forms. Out of the total 1,454 respondents who completed either the printed or the

online questionnaire, 1,020 inhabitants were assigned to one of the ten communities and used for the purpose of this paper. People from other communities were excluded.

The first question asked for relevant location-dependent factors influencing QoL. One item from the whole set was called "possibilities for going out", for which the possible answers range between "1 – negatively", "2 – neither nor", and "3 – positively" on the 3-point Likert--type scale. Here the term "going out" captures leisure activities related to socializing aspects like meeting others in cafes, going for dinner to a restaurant, having a drink in a bar, dancing in clubs, and so forth.

Disparity in access to equity caused by individuals' financial situation is of relevance for the transformative service impact (Ostrom et al., 2010). Differences between people who are experiencing financial difficulties and those who aren't were detected while studying the contribution of leisure and vacations to QoL by asking about financial problems (Dolnicar et al., 2012). People under financial pressure attach less importance to leisure and vacations, while results differ according to the Domain Importance Heterogeneity. To capture this aspect, a second question asks respondents to name areas where they perceived financial problems. "Going-out" was one of the multiple choice options. Differences are expected to exist between people who are confronted with financial concerns while going out and those who are not. The resulting group membership of this dichotomous question is used to validate results based on the abovementioned relationship between the subjective evaluation and the objective service surroundings metric. The following section describes the latter.

Environmental characteristics

To evaluate the place-centered leisure facilities, one can ask about the use of and satisfaction with leisure resources, and perceptions of environmental quality (Lloyd & Auld, 2002). Unfortunately, this introduces a subjective component into the data and entails a huge data collection effort. Therefore, this study focuses on the number of eating and drinking possibilities to see whether the density is related to the perceived satisfaction with the surroundings concerning these facilities. The information source contains 24,477 POIs within the study country, which is quite an extensive pool of data just on eating and drinking service facilities. The retrieval date of the .gpx-file is December 13, 2011, which falls into the timeframe of the abovementioned project. The content of each POI includes longitude and latitude degrees, determined by a global spheroidal reference surface, namely the WGS84 (World Geodetic System). Subtopics under the main title eating and drinking ranked by their frequency of POIs in brack-

ets are restaurants (#14,264), cafés (#3,891), drinking water sources (#2,174), pubs (#1,986), fast food restaurants (#1,874), beer gardens (#269), and service stations (#19). Figure 1 provides an impression of the density of eating and drinking facilities, which is shaded grey, depending on the estimated number of POIs in the respective areas. The density is determined by a two-dimensional kernel density estimation. Every black point illustrates a single POI. The capital city, located in the East of Austria, shows the highest density and its close surrounding area is white. White circles give an idea of the different number of POIs captured, depending on the range of the diameter and the region of the ten communities. The circles of the two Viennese districts are more or less invisible, as they disappear behind the densely located POIs in this area.

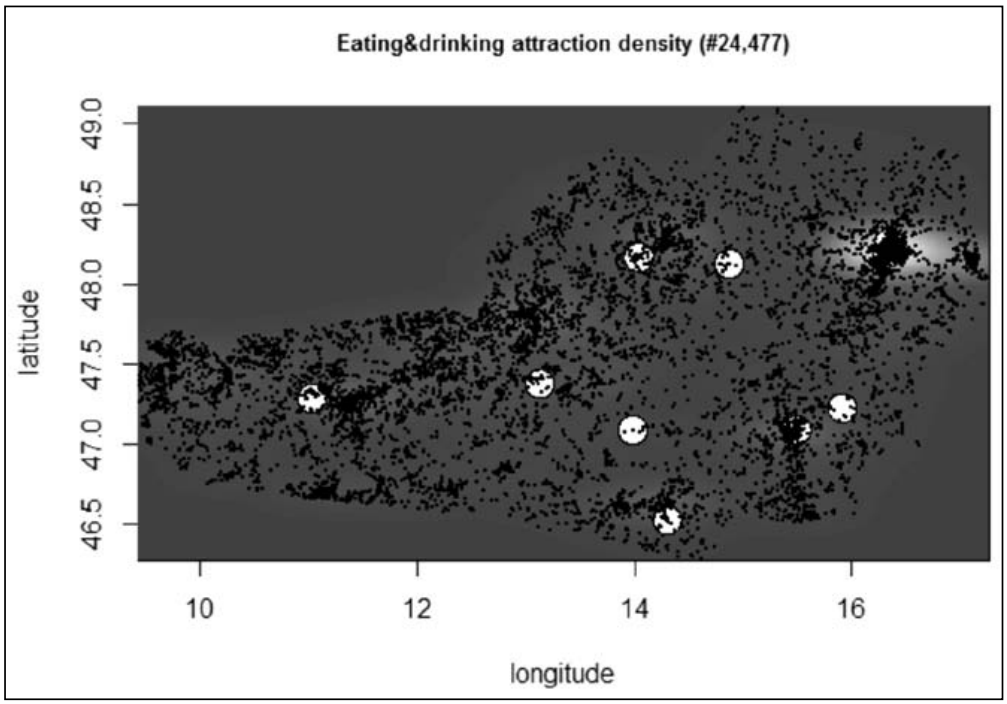

Figure 1. Objective place-centered measurement

Depending on the diameter and region, more or fewer eating and drinking service facilities are included within its borders. Diameters are later defined in single kilometer steps between 1 and 100 kilometers, resulting in 100 different circles multiplied by 10 communities. The question to be answered is whether a diameter increase of one kilometer and the accompanying increase in POIs corresponds more closely to the subjective evaluation of the surroundings. Tests on every specification of the 100 different diameters will identify the most relevant surroundings that best match the subjective evaluations.

Results

The absolute numbers of respondents per community are as follows: 353, 94, 93, 89, 88, 87, 66, 63, 59, and 28. The following percentage values are based on valid responses including missing values. 60% are female and 39% are male. The average age is 49.83, with a standard deviation of 17.12 years. 90% have always lived in Austria. 8% migrated to the country at a later point in their lives. 90% typically speak German at home, 3% a different language. 20% are single, 49% are married, 11% live in cohabitation, 13% are divorced, and 8% are widowed. 65% have children, 33% don't have children. 7% care for somebody else, 88% do not. The distribution of the level of education is as follows: none (1%), compulsory school (48%), vocational school (35%), apprenticeship (30%), foreman/craftsman's certificate (6%), qualification for university entrance (33%), bachelor (4%), master (10%), and PhD (6%). The employment situation presents itself as follows: full--time employed (31%), part-time employed (12%), self-employed (9%), partly self-employed/employed (3%), compulsory military service/community service (<1%), housewife/houseman (6%), maternity leave (3%), retirement (32%), school child (2%), student (5%), and seeking work (3%). Apart from the willingness to contribute to the study, no other influences should distort the results.

Figure 2 provides a distributional overview of the subjective evaluations of the surroundings of the respondents: "Please mark how your various hometown characteristics influenced your well-being during the last month: possibilities for going out". More positive evaluations of the communities' surroundings are expected to go hand-in-hand with an increasing number of residents in the respective communities, implying a higher number of service facilities. Mosaic plot column headings give the number of inhabitants of every community on January 1, 2012. There are only nine columns as two communities are in different districts of one city. The width of the bars illustrates the number of respondents from every community (from left to right: 87, 59, 177, 28, 353, 93, 94, 66, and 63 respondents).

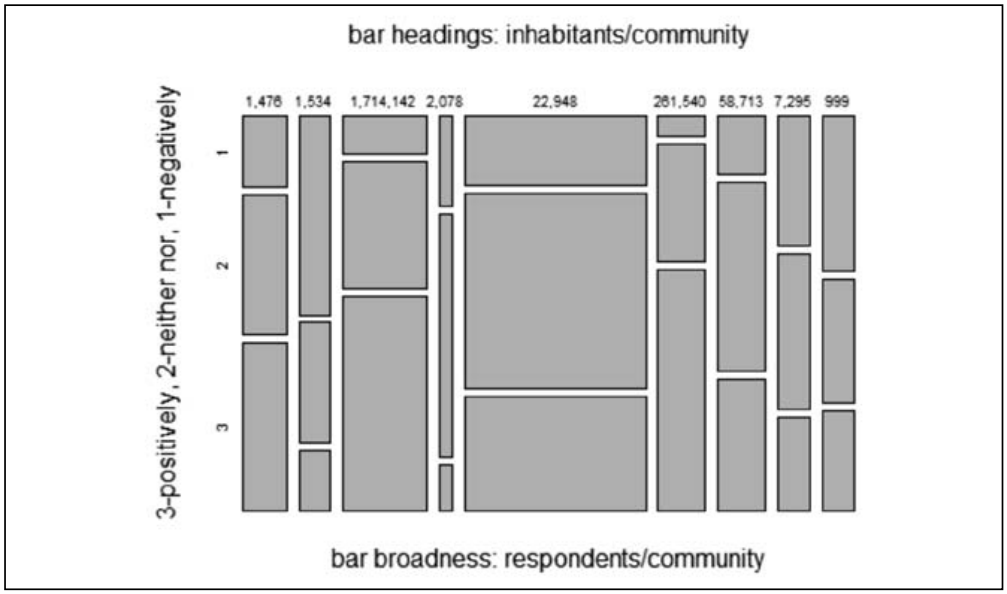

Figure 2. Subjective place-centered measurement approach

Variability within the community differs per community. Some of these are skewed positively, some negative, and some of them are located in between the two poles. From a visual inspection, more positive evaluations simply due to the population size of the communities are difficult to detect. One reason for this may be grounded in the relevance of the surroundings of each inhabitant. Living close to a large city in the sprawling suburbs that include many kinds of facilities for going out might make the respondents happy, even if their own community offers more or less no leisure facilities. By picking just those POIs that are located within the boundaries of one's community, the impact of the physical service surroundings on their evaluation cannot be revealed. This might be dependent on the radius of the relevant leisure service surrounding area. The problem is that no reference point exists that tells us which size is most relevant for eating and drinking purposes. So, first of all, the relevant size of the surroundings has to be determined. It is expected that the highest correlations and most significant values will be covered by small radiuses close to the center of the community and a rather small area is of relevance. The farther away, the lower the correlation coefficients and the less significant they should be, because services related to eating and drinking that are too far away are not visited by the inhabitants of a specific community.

By running correlations on 100 different diameters ranging between 1 and 100 kilometers, it is evaluated which diameter of the surroundings leads to the most significant and highest correlation coefficients. One problem to be solved beforehand is to decide which correlation coefficient has to be used. Pearson's *r* will stress the exact number of

POIs, which of course is an advantage, but it is prone to outliers. If extreme POI representations are present in one of the 10 community surroundings, coefficients as well as significance values will be distorted. Spearman's *rho* copes with the outlier problem by ranking both variables in advance. Additionally, Spearman's *rho* copes with the fact that overcrowded areas will not necessarily lead to better evaluations. It is difficult to define a preferred correlation method simply based on theoretically driven arguments; numerical arguments have to be taken into account as well. Pearson will be preferred if none of the communities show an extremely higher or lower number of POIs compared to the rest. Otherwise, Spearman will be used. Figure 3 provides the development of the number of POIs depending on the size of the circle's diameter. The horizontal axis specifies the size of the diameter spanned around the center of each community. The vertical axis depicts the number of POIs included in the respective circle. The dashed vertical line on the left-hand side defines the 5-kilometer diameter, as the radius below 2.5 kilometers does not contain any eating and drinking POIs for two out of the ten communities. With a radius greater than 2.5 kilometers, the number of POIs steadily increases for every community and no community with zero POI is included in the calculations, producing stable results. Otherwise, at least one community has no entries and the correlation coefficients and significance values might be distorted by equal numbers of POIs of two different communities in the form of ties applying Spearman's *rho*.

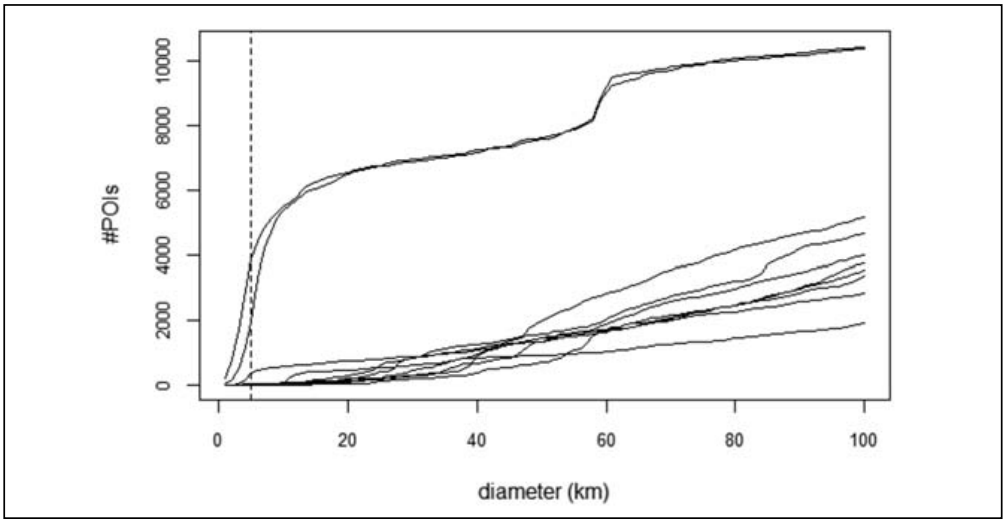

Figure 3. Community surroundings

What is more crucial here is the fact that two communities show an extremely high number of POIs. As the study was conducted in locations including two different districts of Vienna, the two outliers close

to each other capture diameters between 1 and 100 kilometers around Vienna. As Vienna is the capital city and the largest city of Austria, it also captures most of the eating and drinking facilities. Hence, Spearman's *rho* with ranked values based on original observations will be used for all calculations.

Before the relevant service surroundings can be determined, another special characteristic of the dataset has to be discussed. One variable contains raw data of subjective evaluations of the surroundings concerning eating and drinking facilities. The second variable is the number of POIs contained within the respective diameters of one, two, three…, up to 100 kilometers. Apart from the three-dimensional structure due to the geo-referencing of POIs, a multilevel effect is also inherent. Variability between communities, the level-two effect, exists for both variables. There are, however, just ten values for every community's number of POIs for each certain diameter. This number is the same for all inhabitants of a single community and has to be duplicated by the number of subjective evaluations gained from each community. Consequentially, within-community variability only exists for the subjective evaluation. There is no variability concerning the objective measure. To see whether there is a group-level effect, which will lead to the direct conclusion of a relationship between the subjective and objective approach on community level, correlation decomposition making use of the covariance theorem is applied (Bliese, 2012).

First of all, the correlation coefficient between the subjective and objective measurement is divided into its raw components: the raw correlation, the within-community correlation and the between-community correlation. The important question here is whether the between--community correlation is simply due to coincidence or whether it is strong enough to assume that some higher-level effect is present. This would support the service surroundings' effect on community level. 1,000 randomly selected permutations of the community membership variable are generated. This random group re-sampling leads to 1,000 randomly assigned community membership variables. Afterwards, 1,000 correlation coefficients are calculated based on these random community memberships. Finally, the upper and lower 95%-confidence intervals of the resulting distribution are determined. This analytical sequence is conducted for 100 different circles resulting from 1-kilometer steps between 1 and 100 kilometers. Figure 4 visualizes the 95%-confidence interval boundaries with dashed horizontal lines, and the between--community correlation coefficient based on the original community membership with a solid line. The dotted vertical line on the left-hand side of the graph cuts off the abovementioned unstable 2.5 kilometer radius. The zigzag pattern of the 95%-confidence intervals is due to the finite number of 1,000 permutations. Apart from a huge increase

in computation time, a higher number of permutations will never fully clear out this zigzag pattern.

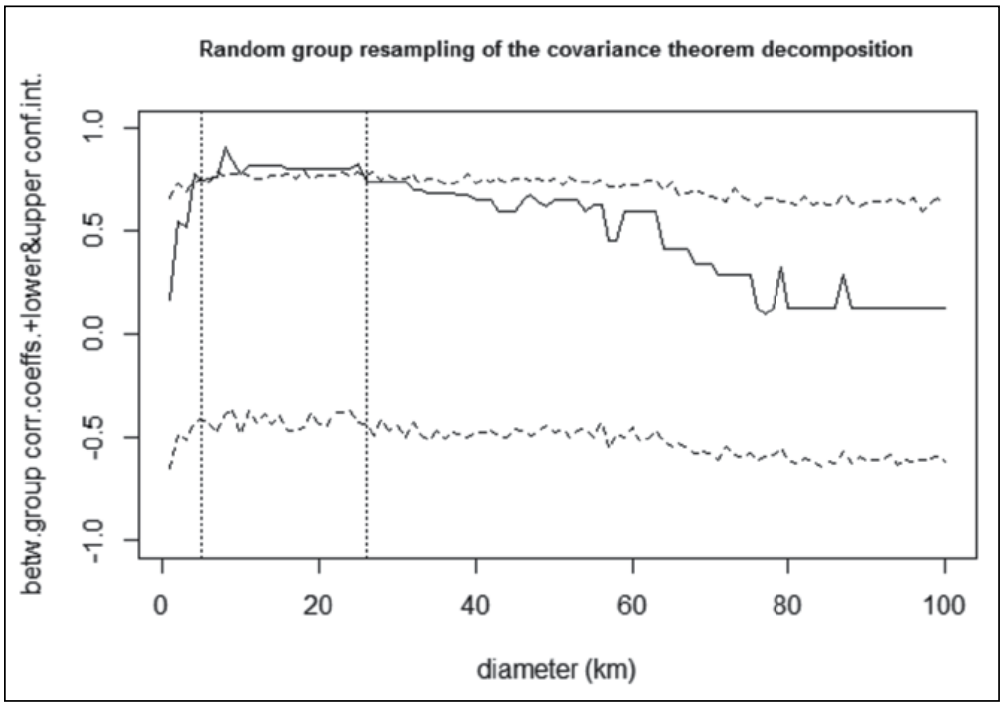

Figure 4. Between-community correlations

On the left-hand side, at narrower surrounding areas, the raw correlations exceed the upper 95%-confidence interval. The diameter span for which the coefficient exceeds the areas surrounded by the confidence interval borders is the relevant span of inhabitants for eating and drinking purposes. This insight into the between-community effect indicates the relevant diameter span for which a higher community level effect is detected. The eating and drinking service surroundings are relevant until 26 kilometers, marked with a second vertical dotted line. Its effect on the communities' inhabitants decreases from this point until it levels out at a value close to zero, nearly midway between the two confidence interval borders.

To foster these results, another situational component derived from the literature that is posited to have an effect on the evaluation of the inhabitants' service surroundings is whether a person is faced with financial problems when going out. It is assumed that smaller areas, and hence smaller diameters, are taken into account by people with financial problems, as compared with people who are not forced to save money when going out. The dataset is divided up into two groups. 896 people are not faced with financial problems, while 102 are. 22 people did not disclose details of their financial situation. Raw Spearman correlations between the number of POIs and the subjective evaluations are deter-

mined. Figure 5 and 6 reveal differences between the two groups. The dotted vertical line on the left-hand side of each graph cuts off the unstable 2.5 kilometer radius. The horizontal dotted line marks the 5% significance level. The solid line highlights raw Spearman correlation coefficients and the dashed line the corresponding significance level.

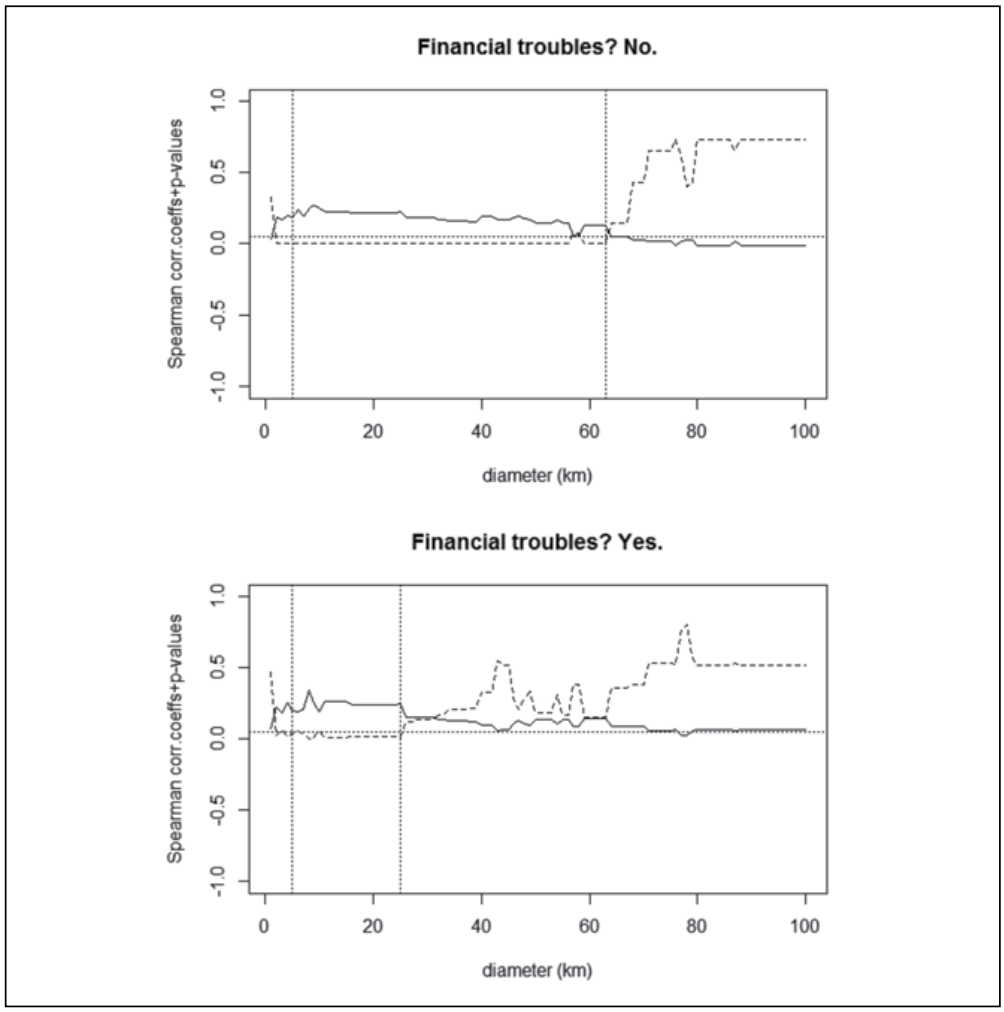

Figure 5 and 6. The effect of financial constraints

The relevant surroundings that show significant relationships between the subjective and objective place-centered evaluation are more than twice as far for inhabitants who are not confronted with financial problems as compared with inhabitants who are. The two exact significance cut off values at diameters of 63 and 25 kilometers are inserted using vertical dotted lines. At an exact diameter of 63 kilometers, the p-value increases dramatically for people who do not feel financial pressure when going out. A circle of around 60 kilometers in diameter is taken to be of relevance for those inhabitants. In contrast, a circle with a diameter of just 25 kilometers is relevant for people who feel financial

pressure as, exactly within this area, the p-value starts increasing for the financially constrained group. It is shown that financial pressure limits the relevant surroundings, as travel costs might reduce the possible options for eating and drinking service facilities farther away. The significant relationship between the subjective and the objective place-centered evaluation of the service surroundings is 38 kilometers shorter for the financially constrained group. This result additionally strengthens the validity of prior interpretations made, as the grouping effect actually goes in the expected direction. A justified one-tailed treatment of significance values is not worthy of mention, as it will not markedly change results.

The abovementioned results are based on raw Spearman correlations. In the next analysis step, between-group correlations are determined by decomposing the raw correlation into its subparts, making use of the covariance theorem. Firstly, the between-group correlations are determined for both financial pressure groups. Additionally, significance tests for the differences between the two between-group correlation coefficients based on independent groups are performed (Fisher, 1921). This test accounts for the number of observations of both groups, as they might distort results. The dotted vertical line on the left-hand side of Figure 7 cuts off the unstable 2.5 kilometer radius. The dotted horizontal line gives the 5% significance level. The solid line gives the between-group correlation coefficients of the group not faced with financial problems. The long-dashed line shows the between-group correlation coefficients of the financial pressure group. The short-dashed line gives the significance value, indicating statistical differences between the two between--group correlation coefficients of the two financial groups.

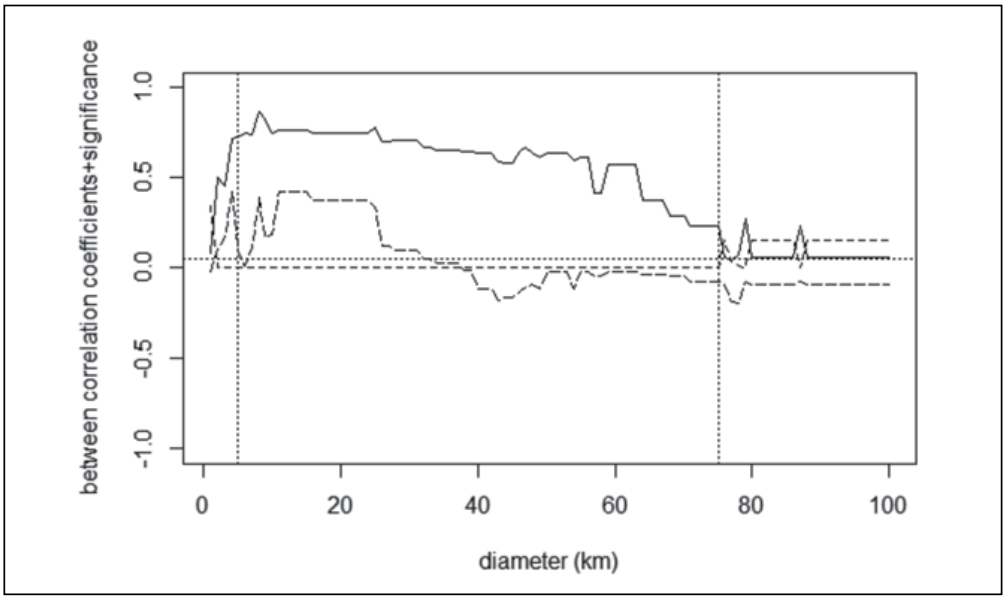

Figure 7. Between-group correlation coefficient comparison

A significant difference of the two between-group correlation coefficients is present within a diameter of 75 kilometers. This cut-off point is marked by a second dotted vertical line at the 75-kilometer range. This result has to be considered with care, as the random group re-sampling test procedure did not reveal between-group correlation coefficients for the financially constrained group exceeding the 95% confidence limits. This is not proof that a between-group correlation does not exist for the financially constrained group. However, the p-value development highlighted above indicates differences between the correlation coefficients of the two groups throughout the left-hand section of the 100-kilometer diameter span and supports previous results. The between-group correlation coefficients of the financially pressured group are significantly lower compared to the between-group correlation coefficients of the group not confronted by financial problems. Financial pressure has an effect on the evaluation of the surroundings or their availability and accessibility in the broader sense.

DISCUSSION

The indirect relationship between leisure service facility surroundings and their benefits is beyond question. It is demonstrated that the size of this area, most relevant in terms of eating and drinking facilities, is the surrounding area with a diameter of around 25 kilometers on average. The closer they are, the higher the relationship with these service facilities when evaluating the benefit to the hometown. This relationship is observed due to decreasing correlation coefficients when increasing the diameter around the center of each hometown. The diameter is not the same for all inhabitants of a community. People who are under financial pressure consider a closer range when evaluating the scope of the eating and drinking service industry. Hence, reduced access has an effect on the size of the relevant surroundings. People who are not under financial pressure highlight a larger area of potential possibilities for going out. This fact is shown by correlation coefficients starting to decrease at a much broader diameter range. All participants taken together as well as in separate groups differentiated by their financial situation show significant relationships between the service surroundings and their evaluation within a diameter of 25 kilometers, equal to a radius of 12.5 kilometers. This can be seen as a validity criterion for the newly proposed metric that helps to determine the impact of leisure service access on well-being. In summary, the relationship between the subjectively evaluated surroundings and the newly proposed objectively measured density indicates that the latter is a useful indicator for the eating and drinking leisure service supply.

CONCLUSION

Satisfying leisure service surroundings close to the hometown, exemplified here by eating and drinking facilities, have the power to enhance the well-being of communities, independent of the financial situation of its inhabitants, at least in the near surroundings. Well-balanced access to an eating and drinking infrastructure in terms of different kinds of services and their inherent characteristics in an area close to the center of the hometown has to be ensured. It has to meet the needs of all inhabitants: those who decide upon their eating and drinking habits with no or more or less consideration of their financial situation, as well as those who struggle with their disposable income. Local authorities and leisure service planners have to make sure that enough possibilities are provided. A lack of options represents business opportunities for private companies. Overall, a destination is thought to develop the quantity and quality of eating and drinking service facilities, which creates a competitive advantage compared to other regions. As migration from rural to urban areas is currently a popular topic, this might be a chance to preserve the population levels of small towns.

Localization of leisure in the QoL domain context has been addressed by many authors. Several proposals are listed in the literature part. Results at hand exemplify the bridging gap between the existence of physical amenities and their power to stimulate satisfaction with leisure time usage and in the broader sense destination attractiveness for tourists and their satisfaction with the services offered, already proposed by Neal, Sirgy, & Uysal (1999). A well-developed service landscape capable of fulfilling leisure needs as one of the main QoL domains will have the power to enhance the overall QoL of residents and tourists experiences as well during their trips.

This new metric and its application to other datasets offered by the Open Street Map community allow both public as well as private organizations to gain rapid insight into the service density of various topics without huge investments. By realizing that the costs of data collection efforts might discourage single companies from locating to the right site or even searching for potential markets, the new proposed metric offers a free option for everyone to take the first step.

Limitations and opportunities for future research

The geographical information used to determine the number of POIs is neither a perfect measure of the entire leisure service industry density, nor a reliable measure of its quality or variety. Additionally, it will never be comprehensive due to the constantly changing quantity and quality of eating and drinking facilities. Despite this, the advantages are manifold. The data are freely available and contain a huge

amount of service infrastructure information. Furthermore, it is continuously updated and there are no additional data collection costs associated with keeping the dataset up-to-date. The rise in information available online in recent decades, the use of mobile devices, and the openness of the younger generation *vis-à-vis* electronic applications will contribute to making this metric an even better source of information in the future. Due to the sampling strategy applied to the selection of the ten communities and the residents within the ten communities, results are neither representative for Austria from an inter-community perspective nor are they representative for a single community on an intra-community perspective. Nevertheless, the usability of the Open Street Map data pool was exemplified using eating and drinking facilities. This helps to form an idea as to whether resources of this specific leisure inventory are allocated properly for the inhabitants of different regions and to explore the infrastructure situation of communities with regard to improvements. Datasets on other issues are also available: lodging, leisure, sports, government and public services, night-life and business, tourism, automotive, and health care, all of them containing an even larger number of subcategories to be analyzed separately. Studies in other domains might be able to validate the usefulness of the data source or explore diverging ideas in order to increase awareness of such datasets for scientific purposes. Datasets such as this can also be used in other research fields. For example, market positioning ideas or measurement attempts of attractiveness will benefit from additional information such as this. They allow one to connect the density of different areas with additional data in order to gain an insight into regional differences and an understanding of its impact on families or other societal collective levels such as that of minorities.

ABBREVIATIONS

ESS - European Social Survey
EU-SILC - European Survey on Income and Living Conditions
GIS - Geographical Information System
GDP - Gross Domestic Product
ODbL - Open Database License
OECD - Organisation for Economic Co-operation and Development
POI - Point of Interest
PWI - Personal Well-Being Index
QoL - Quality of Life
SWB - Subjective Well-Being
WGS - World Geodetic System
WHOQOL - World Health Organization Quality Of Life

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