



Neighbourhood Conditions and Quality of Life Among Local and Immigrant Population in Norway

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Abstract

This paper explores the relationship between the quality of life and neighbourhood characteristics among immigrant and local population in Storhaug (Stavanger) and Grünerløkka (Oslo), two Norwegian neighbourhoods. The neighbourhood conditions have been analysed and inhabitants have been interviewed to collect objective and subjective data. Several dimensions have been considered, e.g., physical, environmental, mobility and psychological, with different indicators defining them. Objective data related to the physical layout, green spaces, transport system or environmental aspects are studied and complemented with the subjective information such as the satisfaction of the participants with these aspects. The data collection thus includes geographic, personal and qualitative data, and is analysed with the help of geographic and statistical analysis. Differences between the population groups and between the case study neighbourhoods are determined, being possible to conclude that specific neighbourhood conditions influence participants' quality of life in these Norwegian minor settings. The local participants in this study are the ones taking more advantage of the physical, environmental and mobility dimensions at their residential area and reporting higher perceived quality of life. The results presented can provide relevant information for the effective and efficient planning and development of residential environments.

Keywords Quality of life · Subjective mapping · Neighbourhood conditions · Spatial analysis · Migration

Introduction

Quality of life, or QoL, is a concept often used to describe citizen's satisfactions with different residential locations (Myers, 1988). The concept lies close to the heart of planning, which main purpose is the promotion of the general welfare,

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the public well-being or the public interest. The planning profession has embraced the concept of QoL by interventions within physical aspects such as transportation, housing or green areas. Parameters, such as availability of services and facilities in an area, transport system, environmental and social aspects, define the concept of neighbourhood conditions (Badland et al., 2012; Sampson, 2004; Westaway, 2009). These conditions are considered adequate when a dwelling is located in an urban area that allows access to employment, public urban areas and facilities, access to public transportation as well as public health and educational services. It is thus particularly interesting to study the relationship between the physical conditions, environmental aspects and individual perception. This study can help planners and designers to explore possible weaknesses and strengths of an urban area and propose corresponding interventions.

Norway performs very well in many measures of well-being in comparison to other European countries. Norway ranks at the top in indexes related to living standard, such as the Human Development Index (HDI), Eurostat or OECD (Eurostat, 2019; HDR, 2019; OECD, 2019). Numerous studies focus their attention on the Norwegian building environment domain at a country level (Aarland & Nordvik, 2009; Hjorthol & Bjørnskau, 2005; Høyer & Holden, 2001; Nordvik, 2015; Søholt, 1994) or a city level (Andersson et al., 2010; Mastekaasa & Moum, 1984; Thomsen & Eikemo, 2010; Vassenden, 2014). However, this study considers the neighbourhood level as the optimum scale to carry out this research. Two Norwegian neighbourhoods have been selected as case studies due to their high percentage of immigrant population as well as their relevant situation on economic and urban development. These are Grünerløkka and Storhaug. These neighbourhoods belong to Oslo (Grünerløkka), the capital of the country, and Stavanger (Storhaug), the fourth largest city in terms of population but with a crucial economic performance.

Native and immigrant population are included in this study due to the high relevance of migration in Norway. Immigration can transform the structure of urban areas, leading to irreversible changes of territorial and social concentrations of ethnic diversification, changing social and cultural composition and generating new social needs, with the consequent challenges of coexistence and urban segregation (Llovera & Cabral, 2009; Martori & Apparicio, 2011; Reardon & O'Sullivan, 2004; Van Kempen & Şule Özüekren, 1998; White, 1983). This study allows identifying whether there are differences between locals and immigrants and their actual neighbourhood conditions as well as their perceived QoL. This particular focus on the urban and environmental dimensions and the concept of QoL among local and immigrant groups leads to these research questions: 1) How do neighbourhood conditions relate to an individual' QoL? 2) Do immigrants and locals who live under the same neighbourhood conditions are equally satisfied with their QoL?

Certain researchers report that neighbourhood satisfaction is a significant predictor of life satisfaction (Campbell et al., 1976; Lee & Park, 2010; Rogerson et al., 1989; Sirgy & Cornwell, 2002). Findings suggest that the satisfaction effects of the neighbourhood physical, economic and social features tend to play a role in the neighbourhood satisfaction, which in turn influences life satisfaction. Other researchers also point out that immigrant status is not directly associated with worse neighbourhood conditions; however, higher concentrations of immigrants

are strongly associated with relatively worse neighbourhood conditions (Basolo & Nguyen, 2009).

This study explores both the research questions as well as existing hypotheses as the above-stated.

Background

The concept of QoL can be understood as an organising principle that can be applied in the improvement of society through social, political, technological and economic transformations (Baumol et al., 1988; Kahn & Juster, 2002; Sirgy, 2012). Benavidez Oballos (1998) defines QoL as “the degree of satisfaction with the possibility to fulfil needs and aspirations by individual’s occupying an urban space” [translated]. Eurostat, together with representatives from the EU Member States, has designed an overarching framework to analyse the concept of *QoL* through dimensions such as material living conditions (financial situation and housing conditions), natural and living environment, social relationships and leisure activities, economic and physical safety, governance and basic rights, health, education and employment (Eurostat, 2019).

The quality of the living environment has a direct impact on our health and well-being (Marans, 1976). A proper environment is a source of satisfaction, improves mental well-being, allows people to recover from the stress of everyday life and to perform physical activity.

This paper specifically explores the physical, environmental, mobility and physiological dimensions. Several indicators have been identified as determinant when referring to each of the dimensions. The *physical dimension* covers land use, services, facilities, infrastructure, housing and buildings characteristics, as well as the urban layout. The connection between the built environment and QoL are commonly the primary concerns of urban planners, architects and policymakers (Badland et al., 2012; Feng et al., 2018). Well-designed urban layouts can influence the liveability, the use of space and thus the *quality of urban life*. An accessible network of interconnected streets that define blocks of housing, open spaces and other uses should characterise a successful layout. The urban built environment contributes to the way people feel about where they live and benefits strongly on the sustainability of the natural environment (Elariane, 2012; Sirgy & Cornwell, 2002). Neighbourhood services and facilities such as accessibility to outdoor spaces, access to daily amenities, social services or access to recreational activities are considered one of the main components of urban community, and their quantity and quality can have an impact on people’s QoL (Masnavi, 1999). Therefore, indicators such as visited areas and services in the neighbourhood or the assiduity when using these services have been considered in this research.

The *environmental dimension* refers to the natural aspects of the neighbourhood, i.e. quality of air, water and the local environment in general. Rapid urbanisation generates challenges, such as loss of green space and natural habitats, an increase of air, water and noise pollution, traffic congestion and high energy consumption (Hörnsten & Fredman, 2000; Lindhagen & Hörnsten, 2000; Organization, 2010).

Green areas in a city, such as parks and gardens, help to protect and enhance urban ecology and promote physical and mental health (Ambrey & Fleming, 2014; Cao et al., 2016; Colwell et al., 2002; Rudlin & Falk, 2009). Indicators such as the use of green spaces have been considered, as well as participants' satisfaction with the maintenance of the research areas.

The *mobility dimension* includes travel, traffic safety, traffic noise, accessibility and public transportation infrastructure. Transportation is necessary for today's urban society as it enables people to access employment, education, food, health and social services, and meet with family and friends (Ambrey & Fleming, 2014; Badland et al., 2014; Shafer et al., 2000). The characteristics of a specific urban area are defined by several aspects, as the connectivity to the rest of the city through private or public transport, access to public spaces and services (meeting places, health facilities, day-care, schools) and daily amenities (grocery shops, pharmacy). A good transportation system contributes to facilitate the access to different services, including the capacity to support mixed-use developments and accessibility to local services (Apparicio & Séguin, 2006; Bramley & Power, 2009) or other purposes as food and recreation (Burton & Matson, 1996; Sarmiento et al., 2010). Indicators such as public transportation, parking system and physical integration have been covered. Participants have been asked about which modes of transport they use, as well as their satisfaction with the public transport and parking system. Numerous studies (Bolt et al., 2010; Cervero, 2013; Hull, 2008; Musterd & Deurloo, 2002) include the concept of physical integration in the mobility dimension. This refers to the perception and satisfaction of the participants about how connected they feel to the rest of the city in terms of transportation. The current study also includes this indicator as relevant for individuals' QoL.

The *psychological dimension* is subjective. In this study, it refers to the personal assessment and perception and satisfaction with the physical, environmental and mobility dimensions. It is an individual dimension and therefore, depending on time and place, the perception and satisfaction of the person concerning the area where the person resides can vary (Campbell, 1976; Corraliza, 2014; Cummins, 2000b). It is of importance to understand the way people react to places and understand which spaces can generate happiness, satisfaction, dissatisfaction or unhappiness. In this study, participants have been asked about their satisfaction with certain indicators that define the physical, environmental and mobility dimensions. These indicators have been selected based on existing literature, considered necessary for evaluating neighbourhood conditions. As a concluding indicator, participants have been asked about their satisfaction with QoL in their neighbourhoods.

Method

Data Collection

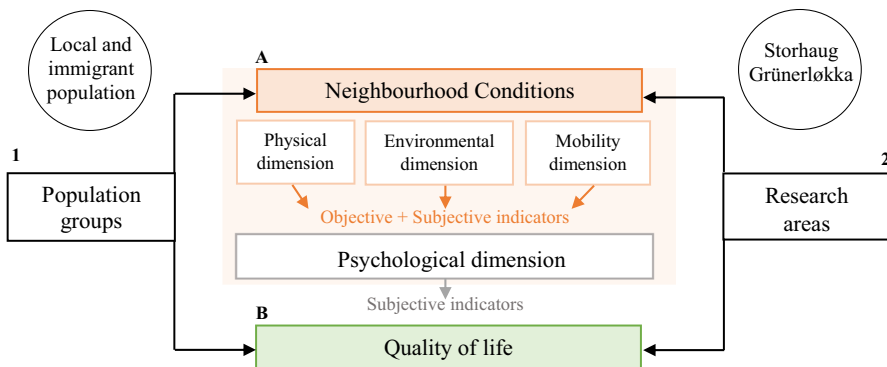
This study aims to identify the relationship between neighbourhood conditions and QoL of the local and immigrant populations in two Norwegian neighbourhoods. Storhaug (Stavanger) and Grünerløkka (Oslo) are the Case Study areas, selected due

to their percentage of immigrant population as well as their urban, social and environmental characteristics. Local and immigrant residents have been interviewed in both neighbourhoods (238 participants in total). These population groups are being compared based on their neighbourhood conditions and their perceived QoL, as well as the two research areas.

For the purposes of breadth and depth of understanding and corroboration, this research combines elements of qualitative and quantitative research approaches. This combination of qualitative and quantitative methods is defined as mixed methods. Several definitions of mixed methods have emerged over the years that incorporate various elements of methods, research processes, research purposes and philosophy (Creswell & Creswell, 2017). Tashakkori et al. (1998) defined mixed methods as a combination of qualitative and quantitative approaches in the methodology of a study. A more elaborated definition stood years later as a research in which the investigator collects and analyses data, integrated the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry (Tashakkori & Creswell, 2007).

Figure 1 presents a research design model in which the relationship between neighbourhood conditions and QoL is explored using the previously mentioned methodologies.

In this study, qualitative data provides a detailed understanding from the participants while quantitative data provide a more general understanding of the neighbourhood conditions. The qualitative data studies individuals and explore their



H1A: What are the neighbourhood conditions for each population group?

H2A: What are the neighbourhood conditions in each project area?

H1B: How is the QoL of each population group?

H2B: How is the QoL of the residents in each project area?

HA-B: How do neighbourhood conditions relate to an individual's QoL?

HAB1-AB2: Are there differences between these relationships among the population groups and/or case studies?

Fig. 1 Model of research design

perspectives in-depth, whereas the quantitative examine a large number of people assessing responses to a few variables related to their neighbourhoods. Qualitative and quantitative data provide therefore different pictures, perspectives and each has its limitations. When studying a certain number of participants qualitatively, the ability to generalize the results to many is lost. Similarly, when examining quantitatively many individuals' situation, the understanding of any individual is diminished. Hence, the limitations of one method can be offset by the strengths of the other, and the combination of quantitative and qualitative data in this project provides a more complete understanding of the research problem than either approach by itself. Integrating both qualitative and quantitative findings into this study helps to gain insight into participants' points of view, explore social, demographic, and urban phenomena.

This study enhances the qualitative method by integrating the subjective component (participants' satisfaction and perception) used to link activities and place perceptions of spatial and physical referents as an essential method for this study and substantial input for research studies of similar scale and purpose.

There have been two approaches for data collection: spatial analysis and questionnaires. Spatial analysis has been carried out in the two case study neighbourhoods, Storhaug (Stavanger) and Grünerløkka (Oslo), where demographic and spatial data at neighbourhood level has been analysed through desktop research. Primary data has been generated for both objective and subjective indicators, i.e. questionnaires where the focus has been on people's perception of the quality of urban life dimensions.

Much of the quantitative secondary data has been collected through desktop-research, i.e., number of educational institutions, cultural and leisure facilities, the quantity of public open space or number of different types of food and shops. Sources are official government data collections, including census data and geographic information systems (GIS). Both Stavanger and Oslo municipalities have official sites with demographic and spatial information (OsloKommune, 2020; StavangerKommune, 2020). *Statistisk Sentralbyrå* (Statistics Norway) has provided much of the objective data related to demographic and physical aspects.

Questionnaires have been created in this studied as a tool for gathering participants' (personal) information, as well as perception and satisfaction with urban, social and environmental aspects. Subjective data has been gathered by using map-based questionnaires (Llopis & Müller-Eie, [under review](#)). Map-based questionnaires, both paper and digital versions were created to interview participants. P-GIS and subjective mapping helped to collect objective and subjective information from the participants. These have helped to map neighbourhood conditions as well as identifying participants perceived QoL.

Measures

A spatial analysis has been used to gather objective information of Storhaug and Grünerløkka as well as mapping the neighbourhood conditions of each research area. Spatial analysis includes topographic information about underlying landscape

features and morphological information about street patterns, building structures and open and green spaces, as well as functions, property structures and transportation system. GIS has helped for gathering part of the objective information (distribution of services, green areas' dimensions) as well as producing the maps for this study. Besides serving as an instrument for collecting objective data, GIS has served as a tool for linking subjective data from the participants to spatial figures.

Regarding the qualitative data, paper-based and digital questionnaires have specifically been designed for this study to interview the participants (Llopis & Müller-Eie, [under review](#)).

Analysis

Statistical analysis is used to describe qualitative and quantitative data as well as validating it. The analytical approach is a cross-sectional ordered logit regression model with self-assessed satisfaction with QoL as the dependent variable and a set of explanatory independent variables: a population group variable, and a research area variable. Also a list of variables regarding neighbourhood conditions: number and specific carried out activities, number of visited green areas and satisfaction with public transport, parking system, green areas and maintenance. Finally, a dummy variable for physical integration.

Satisfaction with "Quality of Life" is measured with a five-point Likert scale. As "Quality of Life" is a discrete and ordered variable rather than a continuous variable, it has been used an ordered logit regression with maximum likelihood estimation (MLE).

Sampling and Limitation

In this research study, 238 participants have been interviewed. These are inhabitants of the two research areas and therefore considered individuals who can provide significant data about their housing circumstances and their perception and satisfaction with their residences and their QoL.

Participants were randomly reached as they passed by public streets, green areas, or open public spaces around their neighbourhoods. The selected areas for conducting the questionnaires are located around the neighbourhood and distanced from each other, expecting to reach as many participants as possible living in the different areas of the neighbourhood. In Storhaug, 124 people have been interviewed, 74 Norwegians (60%) and 50 immigrants (40%). In Grünerløkka, 114 people have been interviewed, 68 Norwegians (60%) and 45 immigrants (40%).

There is an overrepresentation of Norwegian participants. This can be due to different reasons. The immigrant group may be more concerned to talk about their personal situation or QoL especially if they consider it is still different from what they are aiming for; and therefore, not willing to contribute to this research by answering the questionnaires. Another reason may be that participants were approached in public spaces, in streets or in green areas in their neighbourhoods. Local participants have reported using more public spaces and green areas than immigrants, being this

a possible reason why it has been easier to find a higher number of local inhabitants in open spaces and green areas than immigrants. Participants were firstly approached without indeed knowing if they were residents of the project areas. Some participants happened to just be visiting the area and therefore excluded from the study since the purpose is to collect data from participants' satisfaction with their residences living in Storhaug and Grünerløkka. Map-based questionnaires (digital and paper format) are the qualitative method used in this study for registering participants' perception and satisfaction. These questionnaires have been designed for this specific study. Participants were able to choose the format since the interviewer could conduct the questionnaire using paper or digital format. Certain groups were more interested in the digital format, especially younger participants, probably due to their familiarity with technologies. However, both formats resulted favourable, probably due to the positive impact of using a background map, encouraging discussion and dialogue between the participant and the interviewer. Presenting a map to the participants where they can locate their residences and identify the areas they normally visit, may contribute to starting a discussion about areas they feel familiar with.

Neighbourhood Conditions and Quality of Life Among Local and Immigrants in Grünerløkka and Storhaug

Storhaug (Stavanger) and Grünerløkka (Oslo) as cases studies have been selected due to the high percentage of immigrant population as well as their economic and urban development situation. Storhaug is 11,5 km², with a population of 17.174 and 21% of the immigrant population. Grünerløkka is 17,4km², with a population of 60.844 and 20% of immigrant population (Statistikkbanken, 2019).

The biggest immigrant community in Storhaug is Polish (16%) followed by Swedish (6%) and English (6%). In Grünerløkka, the most prominent nationalities are Swedish with 16%, followed by 13% Polish and 5% of Spanish (Statistikkbanken, 2019). For this study, 124 people have been interviewed in Storhaug, and 114 in Grünerløkka, where 60% were Norwegians and 40%, immigrants.

Objective Data: Neighbourhood Conditions in the Case Studies

Physical, environmental and mobility indicators have been studied in each neighbourhood to identify the neighbourhood conditions in each research area.

Storhaug and Grünerløkka differ from each other in demographic and urban aspects, i.e., physical distribution of services, housing types or transport system. The most prominent difference between the neighbourhoods is the housing structure, where 93% of the residences in Grünerløkka are apartments compared to a more variety of residence types in Storhaug (Llopis Alvarez & Müller-Eie, 2022). The urban structure in Grünerløkka is mostly formed by blocks of apartments compared to single-family, detached and terraced houses in Storhaug.

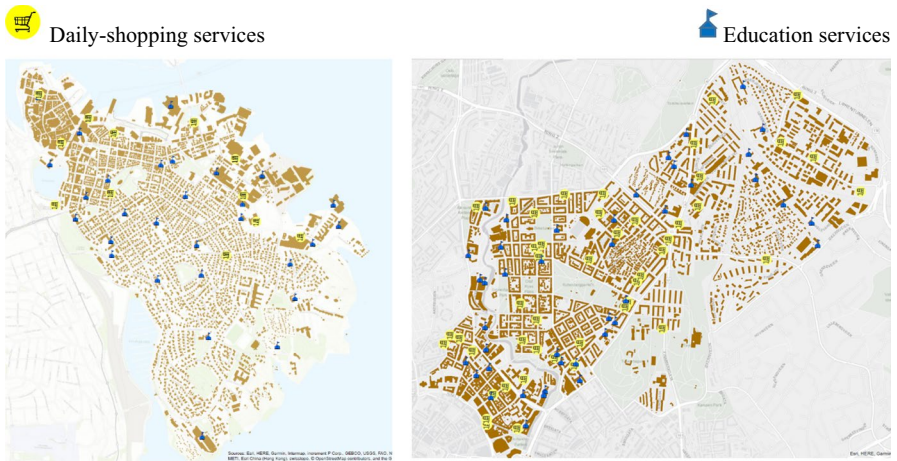


Fig. 2 Daily-shopping services and educational services in Storhaug (left) and Grünerløkka (right)

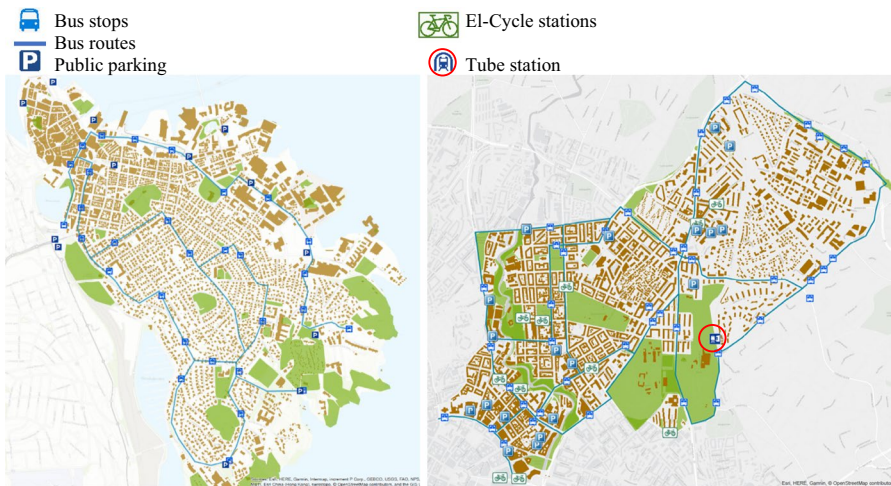


Fig. 3 Green areas and transport structure in Storhaug (left) and Grünerløkka (right)

Another difference is the distribution of services in the neighbourhoods. Figure 2 shows the daily-shopping and educational services in Storhaug and Grünerløkka. Administrative, economic, or social services are also located in the area. However, daily-shopping and educational services happen to be the most visited type of service by the participants of this research. As Fig. 2 shows, there is a higher number of these services in Grünerløkka, probably due to a larger number of residents.

Figure 3 shows the green areas and the transport infrastructure in the neighbourhoods. Both areas have a similar percentage of green areas (around 15% of their extension), but with different characteristics. Most of the green areas in Storhaug are

located by the seafront and connected between them. In Grünerløkka they are spread around the neighbourhood, being two of them larger than the rest (*Tøyen* and *Sofienberg*). According to the transport system, Grünerløkka offers more possibilities (bus, tram, tube and el-cycle) than Storhaug does (bus). Probably due to a larger amount of population or the relevance of the transport system in Oslo, as being the capital of Norway and the most populated city.

The above-presented objective information, i.e., services and facilities in the neighbourhood, green spaces or public areas, and transport infrastructure is now linked and evaluated to the subjective information gathered from the participants.

The Physical Dimension

Participants were asked about how many services they visit or activities they carry out in their neighbourhoods. The possible answers were: participant uses education services (kindergarten, school, university or similar), works in the research area, uses services related to daily shopping, visits green areas and/or public outdoor spaces and other services/activities not mentioned in the previous options.

Locals in both research areas are the ones who carry out the most activities or visit more services in their neighbourhoods. Subsequent questions help us identify possible reasons why immigrant population are less participative.

The most frequented activities are “daily shopping” and “green areas”. In Storhaug, 85% of all the participants use services related to daily shopping, and 82% visit green areas. In Grünerløkka, 74% and 97% respectively.

80% of the local participants use daily shopping services, and 92% of them green areas. In contrast, 77% of the immigrant participants use daily shopping services and 84% use green areas (Fig. 4).

Figure 5 shows green areas in Storhaug and Grünerløkka. The green and red colour indicates which participants visit (or not) the green areas in their

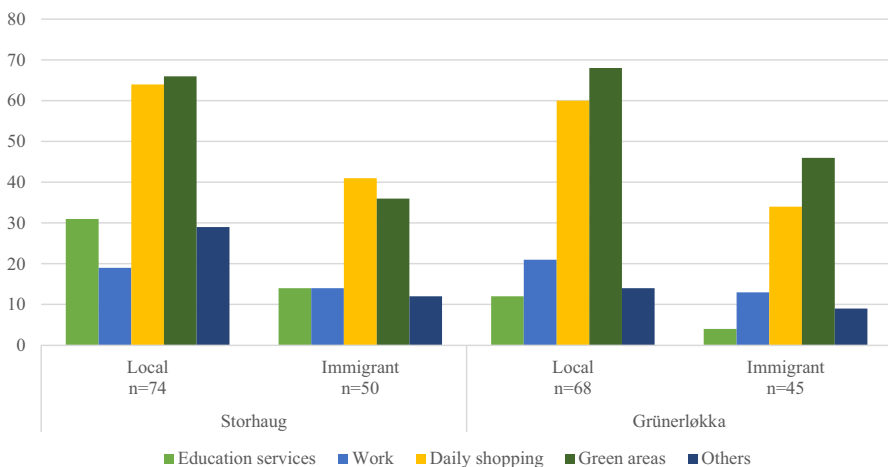


Fig. 4 Count of participants according to the activities or services they use

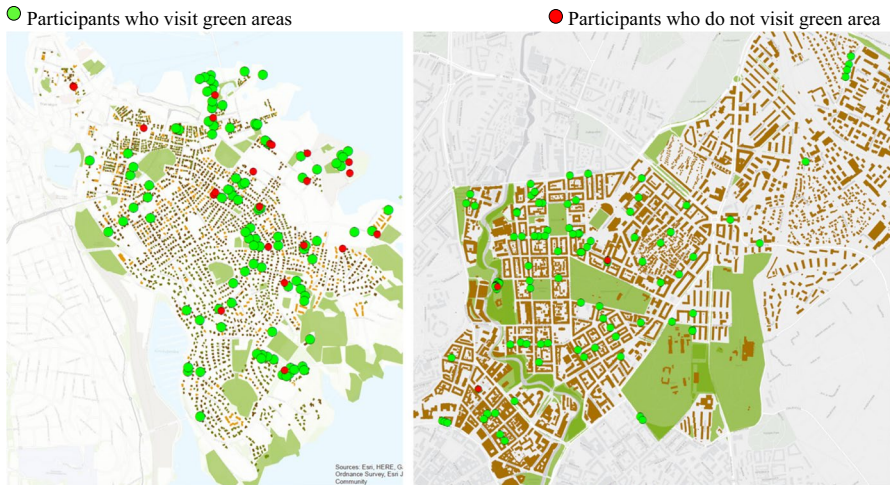


Fig. 5 Green areas and participants' use, Storhaug (left) and Grünerløkka (right)

neighbourhoods. Figure 5 indicates whether the distance between participants' residences and green areas plays a role in their behaviour. Accessibility or distance could be a reason why certain participants are not visiting green areas in their neighbourhood. However, as Fig. 5 indicates, it may be due to personal preferences or alternative factors why certain participants do not visit green areas since the distance from their residences is considered as a walking-distance. The spatial registration confirms that all the participants live within 500 m of at least one green area.

The Environmental Dimension

Storhaug (14%) and Grünerløkka (15%) have similar percentages of their surface occupied by green areas: graveyards, playgrounds or another type of green areas (source: geographic information systems).

From all the participants, 90% visit green spaces, more specifically 93% of the local population compared to 86% of the immigrant population. Visiting outdoor spaces between both groups of population in both neighbourhoods is the most frequent activity (Fig. 4). Outdoor spaces can be understood as recreational places or common spaces for gathering and socializing, which are positively related to neighbourhood satisfaction.

Participants were asked about which areas in Storhaug or Grünerløkka they visit more repeatedly. *Rosenli* and *Godalen* are two of the most frequently visited green areas in Storhaug; *Sofienberg* and *Birkelunden* in Grünerløkka. As Fig. 6 presents, participants who visit them are not necessarily living nearby. Indeed, some of their residences are not within 500 m.

Rosenli and *Godalen* share similar characteristics, as well as *Tou*, also marked repeatedly by participants in Storhaug. They are at the waterfront, highly considered as the reason why participants frequent them.

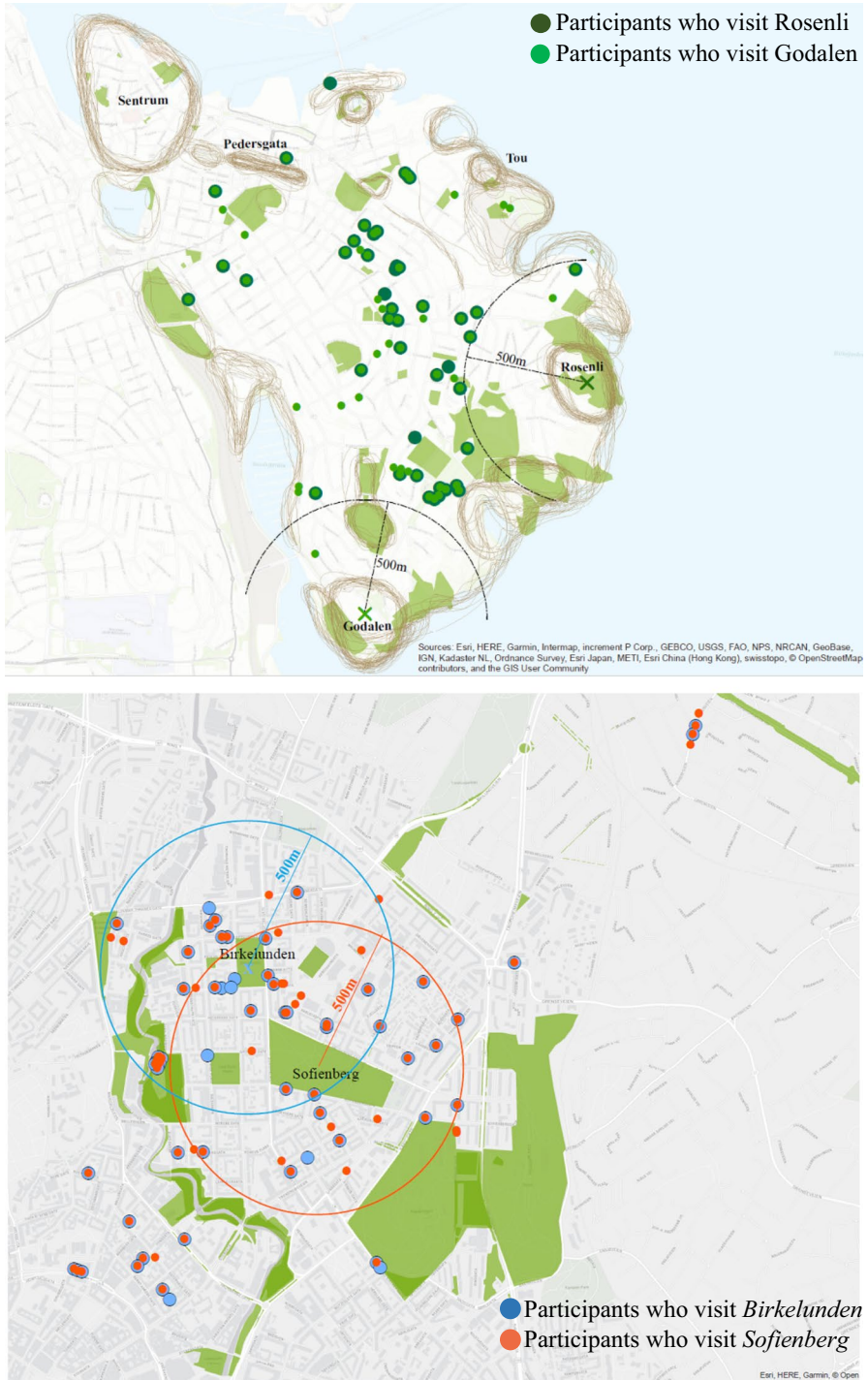


Fig. 6 Visited areas and participants' residences location in Storhaug (top) and Grünerløkka (bottom)

Sofienberg and *Birkelunden* in Grünerløkka are the most visited. *Sofienberg* is the largest area in the neighbourhood and offers different activities as playgrounds for children or picnic areas. *Birkelunden* is smaller but located around shops, restaurants and transport connections. These may be the reasons why participants visit these two areas the most.

Participants were asked about their satisfaction with green spaces or outdoor areas.

Participants in both research areas are notably satisfied with green areas (Fig. 7). Referring to the two highest degrees of satisfaction, locals in Grünerløkka (88%) and immigrants (82%) are very similar. In Storhaug, 71% of the local participants are either satisfied or very satisfied, compared to 68% of the immigrant population. This fact is not surprising, since 'visiting green areas' is the most representative activity in both neighbourhoods. The difference between population groups could be due to certain factors as the maintenance of the green areas, the environment or surroundings, the accessibility or personal factors that induce participants to perceive differently the spaces.

The environmental dimension also refers to the maintenance of the neighbourhood. The maintenance of public spaces includes all municipal services and changes that are determined day by day to a favourable development of the city, guaranteeing citizen welfare and facilitating urban evolution and transformation concerning green and biodiversity, water or energy in the city (Carrera, 2004; Wolff et al., 2017). Participants of each research area reported their satisfaction with the maintenance of their neighbourhood. Their answers are expected to be based on aspects as cleanliness of the urban area, public order or acoustic aspects among others.

Figure 8 shows that most of the participants are either neutral (26%) or satisfied (45%) with the maintenance of the neighbourhoods. Comparing both research areas, 25% of the participants are very satisfied in Storhaug, compared to 16% in Grünerløkka. The perception of the maintenance of an urban area is very individualistic, since the quality of the built layout and the environment, the neighbourhood landscape or the cleanness can be understood differently from one person to another. Percentages at the highest degree of satisfaction are lower if compared with other

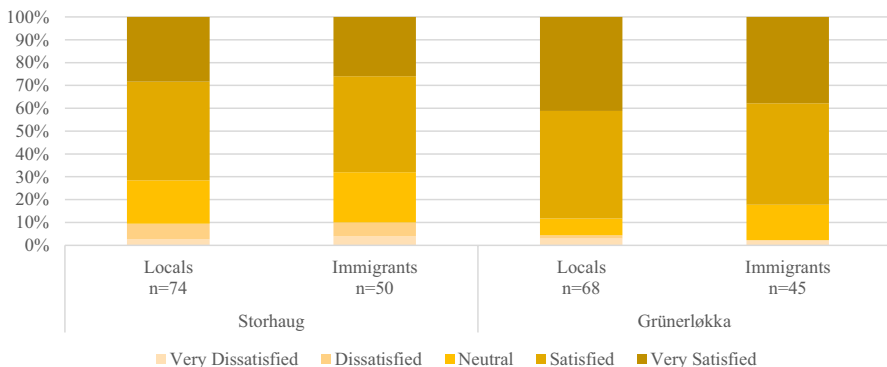


Fig. 7 Participants' satisfaction with green areas

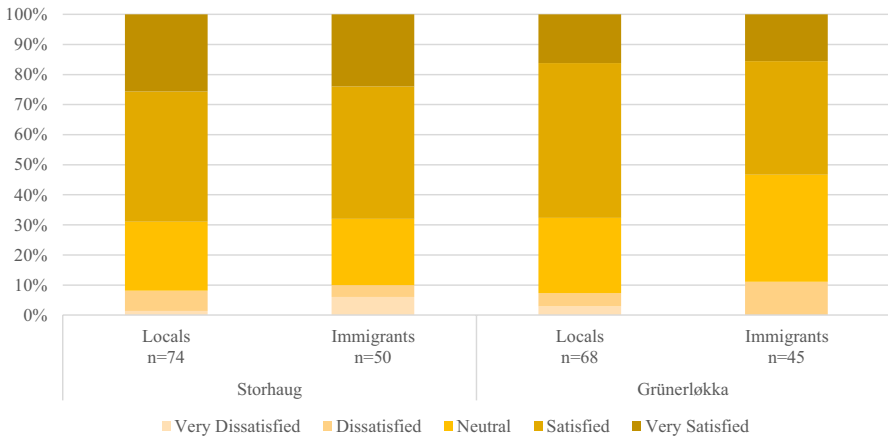


Fig. 8 Participants of both research areas according their satisfaction with the maintenance of Storhaug and Grünerløkka

indicators and dimensions. This can be due to the concept itself since it involves various aspects (cleanliness, acoustic problems, well-preserved landscape) and therefore less possibly to be satisfied with all of them.

The Mobility Dimension

Participants were asked if they are satisfied with the public transport, in case they use it.

54% of all the participants are satisfied with public transport; 34% are not, and 12% do not use it (Fig. 9). 63% of local participants use public transport, compared to 37% of immigrants. The difference between areas is present, since 48% of the

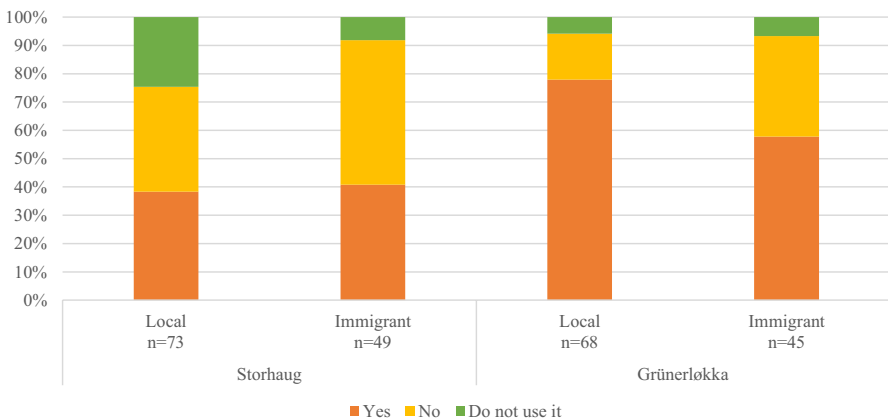


Fig. 9 Participants according to their satisfaction (or use) about public transport

participants in Storhaug use public transport, compared to 75% in Grünerløkka. This could be due to the public transport possibilities that Grünerløkka offers.

Once the participants said whether they use public transport or not, they were asked about how they move around their neighbourhood: bus, car, cycling or on foot in Storhaug; and tram, tube and el-cycle besides in Grünerløkka.

The immigrant population in Storhaug uses all the modes of transport equally. As for the local population, the bus is the least used (only 10%) and the car the most (35%). In Grünerløkka public transport is more used than private (car) is. More specifically, tram (26%), bus (22%) and walking (26%).

This fact can be related, first, to the wider public transport possibilities that Grünerløkka offers, and second, to the urban layout. Blocks of apartments are the most predominant housing type (93% of the residences are apartments) in Grünerløkka, while in Storhaug there is a higher variety of residences, e.g. semi-detached, terraced or single-family houses. These typologies allow better arrangement for parking system, and therefore, preferences for private transport (car) in Storhaug may be more considered.

Participants were asked about their use and satisfaction with the parking system in the research areas.

From all the participants, 42% are satisfied with the parking system, 39% are not, and 19% do not use it (Fig. 10). 63% of the local participants are satisfied, compared to only 37% of the participants from the immigrant group. This could be associated with the fact that most of the locals in Storhaug live in residences where the typology allows private parking places, unlike most of the immigrant population who lives in apartments and therefore different parking arrangement (Llopis Alvarez & Müller-Eie, 2022).

However, it must be also considered that many participants are not satisfied with the public transport system (34%) nor the parking arrangement (39%) in the research areas. This is a concept worthy of attention since the connectivity and accessibility of an urban area is decisive when pursuing favourable neighbourhood conditions. In Storhaug the reason why participants are not satisfied with the public transport may

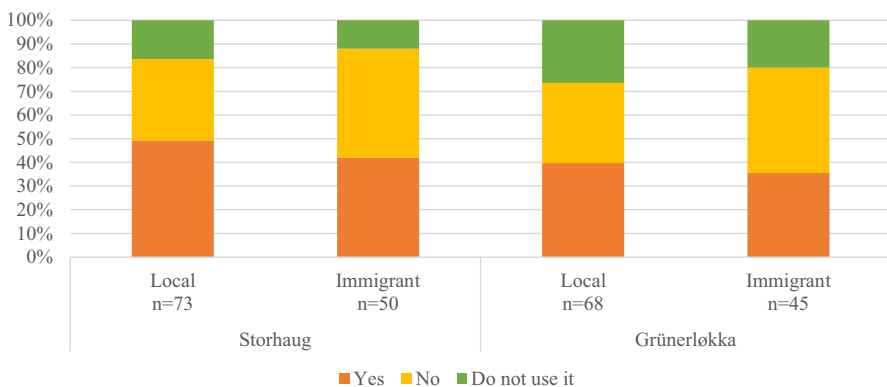


Fig. 10 Participants according their satisfaction (or use) of parking system in each research area

be to the assiduity of it, or the distance between the residences and the bus stops. In Grünerløkka they are less satisfied with the parking arrangement. This could be due to the number of apartments compared to the availability of parking places in the area.

The last concept participants were asked about was their physical integration, e.g., if they feel physically connected to the rest of the city. 84% of the local participants feel physically integrated compared to 70% of the immigrant group. Figure 11 is a representation of native (green) and immigrant (yellow) participants. 78% of the participants feel physically integrated (84% of the local participants feel physically integrated compared to 69% of the immigrant group).

Figure 11 shows that participants feel physically integrated regardless of their residence location. 51 participants, out of 238, reported to not feel physically integrated. These participants' residences are located near public transport facilities, which indicates that physical integration is a subjective concept, and can be perceived differently from each participant. Some participants may commute more often to other parts of the city, Stavanger/Oslo, and feel more familiar or with more awareness about the transport infrastructure than others. This could be a reason why, despite living in the same neighbourhood and under the same public transport possibilities, some participants feel more physically integrated.

Subjective Data: The Psychological Dimension

The questionnaires conclude asking the participants to rate their QoL.

Figure 12 shows that the local population has a greater satisfaction with QoL than the immigrant population does. 85% of the local participants are either satisfied or very satisfied with their QoL, compared to a 75% of the immigrant population. The levels of satisfaction are slightly higher in Storhaug than in Grünerløkka. 83% of all the participants are either satisfied or very satisfied in Storhaug, compared to 78% in Grünerløkka. The highest difference is observed when comparing local and

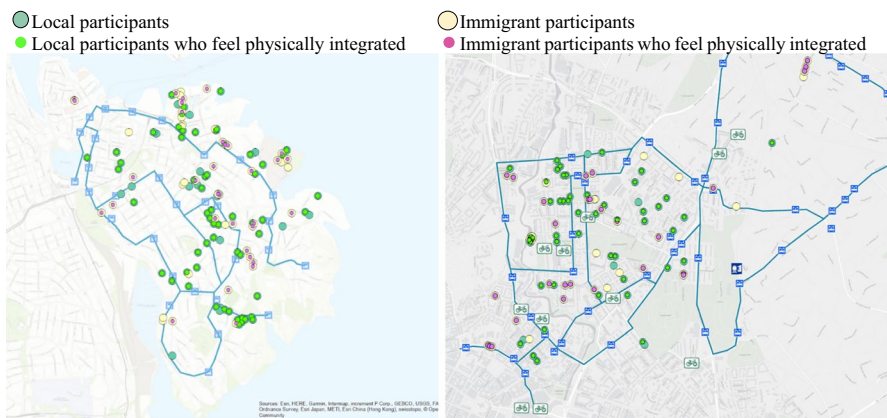


Fig. 11 Participants in Storhaug (left) and Grünerløkka (right) according to their physical integration

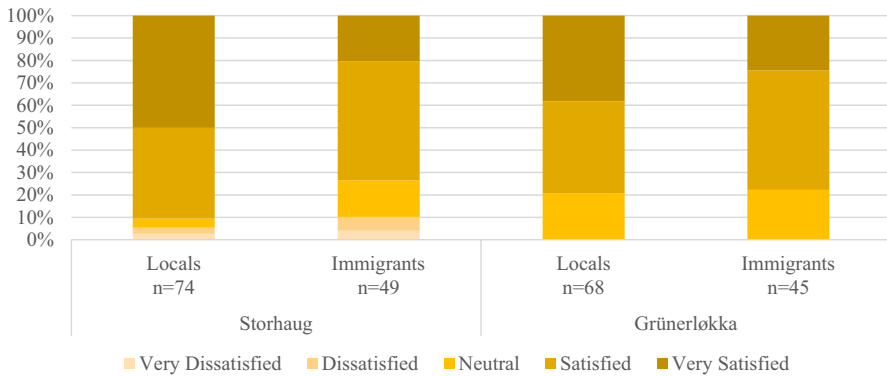


Fig. 12 Degree of satisfaction of the participants with their QoL

immigrant population in Storhaug at the highest degree of satisfaction, since 50% of the local participants are very satisfied, compared to 20% of the immigrants.

Relationship Between Neighbourhood Conditions and Satisfaction with QoL

This study has considered certain indicators that represent the (1) physical, (2) environmental and (3) mobility dimensions. These indicators have been spatially studied and connected to participants' satisfaction and perception. This connection allows to understand in which degree certain neighbourhood conditions affect participants' QoL.

Table 1 shows the direct effect of neighbourhood conditions on satisfaction with QoL. Considering QoL a wide concept that includes other dimensions than the studied in this research, i.e., financial situation and housing conditions, social aspects, economic and physical safety, health, education, employment and basic rights, the goodness of it for this model is quite adequate.

(1) Indicators for physical dimension: daily-shopping and green spaces

In this study, participants who have the highest degree of satisfaction with QoL are those who visit the daily shopping services and green spaces in their residential areas, being the most frequented activities. As mentioned, well-designed urban layouts can influence the livelihood, the use of space and thus the QoL of an individual by combining the presence of primary basic needs, as daily shopping or recreational areas.

From all the participants, only 9% do not visit green areas in their neighbourhoods. From the 91% who does, 85% are either satisfied or very satisfied with their QoL. This reflects the importance in the urban environment of presence and accessibility of green areas and how this impact on individuals' QoL.

Table 1 Regression results on satisfaction with QoL

QoL	Odds Ratio	Robust Std. Err	z	p-value	Confidence interval	0
Storhaug	1.27	0.31	0.98	0.329	0.79	2.06
Local population	2.37	0.6	3.41	0.001	1.44	3.88
Visits educational services	2.8	0.84	3.44	0.001	1.56	5.02
Works in the neighbourhood	1.29	0.38	0.88	0.382	0.73	2.29
Visits daily shop. services	2.25	0.81	2.25	0.025	1.11	4.56
Visits green/public areas	5.26	2.13	4.1	0.000	2.38	11.63
Carries out other activities	1.34	0.41	0.94	0.350	0.73	2.45
Number of carried out activities	1.95	0.27	4.76	0.000	1.48	2.56
Number of visited green areas	1.15	0.06	2.88	0.004	1.05	1.27
Satisfaction with public transport	1.61	0.43	1.78	0.075	0.95	2.73
Satisfaction with parking system	2.05	0.57	2.58	0.010	1.19	3.55
Satisfaction green/public areas	0.88	0.97	-0.12	0.906	0.1	7.64
Satisfaction maintenance	2.37	0.92	2.23	0.026	1.11	5.06
Physical Integration	0.21	0.07	-4.68	0.000	0.11	0.41

Pseudo-R²: 0.33

p < 0.05 statistical significance

(2) Indicators for environmental dimension: maintenance

When relating the satisfaction of the maintenance of the research areas with the participants' QoL, it can be observed that those who are satisfied or very satisfied with the maintenance of their residential areas are the ones representing the highest degree of satisfaction with their QoL. This fact can be related to the number of green spaces used in each research area. Results showed that in Grünerløkka participants visit a higher number of green areas in comparison to Storhaug and the satisfaction with the maintenance of these areas may be the reason. Participants may be attracted to visit different places due to better maintenance, healthier environment, or more desirable visual aesthetics.

(3) Indicators for mobility dimension: transport and parking arrangement

According to the mobility dimensions, participants who are the most satisfied with their QoL in Storhaug are those who use private transportation, more specifically, the local population (31%). On the contrary, in Grünerløkka the highest degree of satisfaction is from participants who use public transport, especially bus (23%) or tram (23%). Grünerløkka offers more public transport possibilities and a more spread transport network in the neighbourhood. These facts, together with the housing structure in each neighbourhood may be the reason why private transport seems to be more favourable in Storhaug and public transport in Grünerløkka.

When relating the concepts of physical integration and QoL, participants who said that they are physically integrated are the ones with their greater degree of satisfaction with their QoL. It seems that physical integration in neighbourhood environments has a positive impact on perceived QoL.

The above-stated information allows confirming that to create neighbourhoods that contribute to positive living conditions, these need to be well-integrated in terms of distances, transport connectivity and accessibility. Besides of a having a favourable distribution of services and green areas in a favourable and adequate maintained condition.

Results

The results of this study answer the questions introduced on the research design model (Fig. 1). This study has analysed indicators that define the physical, environmental and mobility dimensions in two Norwegian neighbourhoods (H1B) and connect them with the concept of satisfaction with QoL (H1A). The results confirm that that certain neighbourhood conditions can contribute to improve or decrease individuals' perceived QoL (HA-B).

A well-designed urban space with a variety of services and activities, which contribute to a balance between daily primary needs and leisure, can contribute to higher satisfaction of an individual's QoL (HA-B).

This study demonstrates that participants who visit more services or carry out more activities report higher perceived QoL. Storhaug and Grünerløkka offer services related to education, social and administration, daily amenities and accessibility to recreational activities and green areas. In the current study, a well-designed urban layout is considered as favourable for QoL, since the participants carrying out more activities are the ones perceiving greater QoL (HA-B).

The use of green spaces and participant's satisfaction with them, have been the two neighbourhood conditions that strongly predict satisfaction with QoL (HA-B).

Besides these physical aspects, the transport infrastructure of an urban area must also be considered when referring to a well-design urban space. The connection between the different activities or services of an urban space is a concept that can interfere on an individual satisfaction with his/her QoL (HA-B).

This study compares two population groups, local and immigrant. The local group has a higher degree of satisfaction with most of the analysed concepts, as well as with their QoL (H1B). Local population carries out more activities and visits more services than the immigrant population. The number of visited green spaces is also higher for locals than immigrants. The local group is more satisfied with the maintenance of the studied areas. They are more satisfied with public transport and parking system and use a wider variety of modes of transports than the immigrant population. Referring to the physical integration, a higher percentage of local population confirmed they feel more physically integrated in compared to the immigrant population. It is therefore expected that when asking about their satisfaction with QoL, locals are more satisfied than immigrants, especially when referring to the highest degree of satisfaction (H1B).

Obtaining different results when asking participants about the same residential area, makes us consider personal factors as the reason why the immigrant group differs from the local group despite living under the same physical conditions. These personal factors can possibly refer to social, labour, economic, migration or personal aspects as the reason why immigrant population uses, perceives and is differently satisfied with their neighbourhood conditions (HAB1-AB2).

Besides comparing the two population groups, this research allows comparing results in the two studied areas. Storhaug and Grünerløkka have been selected due to high percentage of the immigrant population. Despite this similarity, Storhaug and Grünerløkka differ on physical, demographic and environmental characteristics (H2A). When asking participants about their QoL, percentages are very similar in Storhaug and Grünerløkka, i.e., 83% of the participants in Storhaug are either satisfied or very satisfied with their QoL, and 78% in Grünerløkka (H2B).

These results confirm the importance of the individual perception on the satisfaction with residential areas. Personal circumstances, employment status, economic situation or simple preferences can influence individuals' life-satisfaction. This may be the reason why, despite living under different residential scenarios, participants may coincide on the degree of perceived QoL (HAB1-AB2).

Conclusion and Implications

This paper raises theoretical and practical implications as well as providing suggestions for future research. *Theoretically*, the study demonstrates and responds to the first-stated research question about how certain neighbourhood conditions influence individuals' satisfaction with their residences and their overall QoL in Norwegian neighbourhoods.

Most wellbeing studies in the area of geography and urban planning refer to the national or regional level (Campbell, 1976; Cummins, 2000a; Kahn & Juster, 2002). Few empirical studies have contemplated the impact of minor settings such as neighbourhood units. Furthermore, limited studies attempt to investigate the influence of the neighbourhood conditions on QoL among the immigrant population in these mentioned minor settings.

This study presents several findings on the effects of neighbourhood environments on QoL. These findings confirm that specific neighbourhood conditions influence individuals' QoL in Norwegian minor settings. In support with other studies (Ambrey & Fleming, 2014; Rogerson, 1999; Westaway, 2009), this study confirms that the built environment, the concept of connectivity and distribution of services have a repercussion on residents' QoL. Many factors influence QoL, and there is a growing consensus among urban and regional policymakers that the character of the built environment is one of them.

Among the presented neighbourhood conditions, number of carried out activities and visited green areas as well as satisfaction with outdoor areas or maintenance of the neighbourhood are directly related to the dependent variable. The neighbourhood conditions that strongly predicted satisfaction with QoL are the ones related to the built environment or environmental amenities, i.e., visited

services or green spaces. Previous studies mentioned it (Ambrey & Fleming, 2014; Burton & Matson, 1996; Elariane, 2012; Sirgy & Cornwell, 2002), and this current study does not appear to be different.

Subjective assessment from the participants has been included in this study to complement the objective analysis of each dimension. This aspect enforces the importance of subjective analysis when studying the neighbourhood conditions. Storhaug and Grünerløkka differ in physical, demographic and environmental characteristics. However, perceived QoL are similar in Storhaug and Grünerløkka despite these differences. The subjective dimension is therefore necessary to include for understanding why participants living in different urban scenarios perceive similar QoL.

This result responds to the second-stated research question about whether immigrants and locals who have same neighbourhood conditions have different QoL satisfaction.

Referring to *practical implications*, there are two aspects worthy of consideration. *First*, the fact that the local population is more satisfied with QoL in comparison to the immigrant population makes us consider that personal factors may be the reason for these results (HAB1-AB2). Therefore, this study suggests being complemented with another study focused on the social aspects, where the social dimension will be present, with indicators such as social environment, social integration or reason of migration.

Another suggestion is to approach the same study from the migration perspective, where other indicators related to the migration process, i.e., pull and push factors, can be evaluated. Location choices (Dura-Guimera, 2003), reason of migration, labour and economic situation, and social integration (Rogerson et al., 1989) could determine, first, how migration indicators can influence on perceived QoL, and second, if these indicators are more or less determinant than physical, environmental and mobility indicators.

Secondly, the contribution of this paper is to enhance the importance of green spaces, the maintenance of the neighbourhood and the existence of well-connected services in urban areas of this scale.

Urban green spaces provide a range of benefits in various forms and offer a variety of opportunities for individuals. These spaces can contribute positively to both the QoL and the competitiveness of the urban setting. It is crucial to pay more attention to initiatives designed to foster sustainable development and to improve the QoL in urban areas by 'greening' environments, through the implementation of parks, playgrounds, greenways and other open spaces. Green areas gather recreational, aesthetic, cultural, historical and social interaction value.

Concerning the maintenance of an urban area, proper management of public spaces contributes to the creation of sustainable habitats, enabling social interaction and physical distribution of services. Similarly, the existence in minor settings, as neighbourhoods, of local facilities, services and recreational areas reduce travel distances by encouraging the use of these local amenities being easily reachable. Equivalently, the proximity to public transport networks may influence travel behaviour and contributes to reducing environmental impact.

Initiatives related to green spaces, maintenance and transport structure set sight on enhancing not only individual's QoL, but the quality of urban life.

Because this study is limited to two specific Norwegian neighbourhoods, the sample is not highly representative of the entire immigrant population residing in Norway and consequently not generalizable. Future considerations include obtaining equal participation of the two population groups, where social events or gathering people for community participatory GIS would help. Focus groups can help to ensure that the immigrant population feels comfortable sharing their thoughts and perceptions to the interviewer even though these are negative or less favourable when compared to the local group. Future research may replicate the present study in other Norwegian neighbourhoods and thus be able to contrast, confirm, refute or complement results and gather more information about the housing domain at the neighbourhood level in Norway.

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Declarations

Research involving Human Participants.

Conflicts of Interest/Competing Interests All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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