Doctoral Dissertation

Transport-based Social Exclusion and its Implications for Urban Policy

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Abstract

Motivated by the Sustainable Development Goals of the United Nations, this study explores transport-based social exclusion (TBSE) based on a comparative analysis between Japan and Bangladesh, aiming to derive useful insights into inclusive urban policy, with respect to those disadvantageous areas and population groups. It is difficult to measure social exclusion directly because of its *social* features. This research challenges the measurement by making use of the concept of well-being, which has been widely studied, and argues that TBSE occurs when transport disadvantages lead to a decline of individual's well-being.

The thesis consists of eight chapters, where identification of TBSE, links between transport disadvantage and TBSE, influence of social exclusion (SE) on future life and migration choices; and the links between travel behaviour, well-being and health-related quality of life are mainly examined. All the analyses are conducted in association with the living (built) environment.

This study contributes to literature significantly in terms of capturing TSE from the life-oriented perspective in a comprehensive way across the whole thesis. This is the first study in the urban/transport policy literature, to apply the time perspective theory, associated with migration choices, and to apply the life-oriented approach to the SE study. Considering the explanations of framework and methodologies that have been employed, this section will describe the main contents of each chapter and the connections between them.

In Chapter 1, the fundamental aspects behind the transport-based social exclusion theories are discussed, as well as the motivation and main research questions arisen, where the importance of transport systems and urban planning and their influence on social exclusion and deterioration or enhancement of the citizens' quality of life is highlighted.

In Chapter 2, a literature review covering some of the most fundamental theories behind transport disadvantage and social exclusion is conducted. In addition, relevant information regarding the different societal and geographical backgrounds related to the different survey locations is provided in that chapter.

Chapter 3 describes the process and the main features for collecting the data that were employed in the empirical studies, and the most important descriptive analysis and aggregate

results for understanding in full perspective the research background and objectives. After that, the main body dissertation is divided into four chapters (see Figure 6).

Chapter 4 explores the identification of transport disadvantage conditions in the context of a developing country (Bangladesh) based on variables that were chosen and adapted from the existing literature on transport-based social exclusion. Factor analysis techniques are utilized to identify the main underlying factors behind the evaluated aspects, as well as their similitudes and differences with respect to the existing theory.

Chapter 5 focuses on the negative impacts of transport disadvantage on well-being that arise from the operation and use (or lack of use) of transport systems, travel behaviour patterns and social interactions in the living environment. The data that were used for elaboration of these chapters were obtained from a field survey. The survey was conducted between March and May 2015 in the three main Bangladeshi cities (Dhaka, Khulna and Chittagong).

Chapter 6 focuses in future life choices of young people in selected areas of Hiroshima prefecture. More specifically, we surveyed high school students in 1st, 2nd and 3rd year of high school between May and September 2016. Some locations were selected in depopulating areas of Hiroshima prefecture. Japanese society is currently facing serious issues related to population decline in specific areas, attributable mostly to internal migration and aging population. In consideration of this, in this chapter the implications of situations of transport disadvantage and social exclusion on future life choice are examined,

Chapter 7 deals with the links between the built environment, travel behaviour and Health-Related Quality of Life (QOL) in Japanese urban areas. Data from a survey on Health-Related QOL conducted in 20 Japanese cities in 2010 were used for the analysis of this chapter. The interactions between built environment and travel behaviour, the generation of non-motorized trips and their positive and negative contributions to well-being are examined in detail in this chapter. In a second section of this chapter, we examine the influence of parks and green urban areas on health-related QOL. Based on different travel behaviour patterns, specific groups at higher risk of social exclusion were identified.

Finally, Chapter 8 recalls and summarizes the main findings and conclusions from all the chapters of this dissertation, describes the limitations of the study, policy recommendations oriented toward more inclusive urban environments and the planning of transport systems that

enhance people's quality of life and well-being. Policy implications, limitations and future research directions are also discussed in this section.

The incorporation of well-being and life-oriented approach aspects to the characterization of transport-based social exclusion provides new methodological insights into the identification of vulnerable groups, in terms of their higher risks of social exclusion due to exposure to conditions of transport disadvantage. Discussions on the implications of existing and potential transport-based social exclusion issues are also provided in this dissertation, in consideration of specific problems associated with each survey location: efforts to alleviate poverty and unplanned urban expansion in Bangladesh, depopulation in rural areas of Japan, and rural-to-urban migration and aging population in Japan.

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The conclusion on this thesis would not have been possible without the support of an uncountable number of people during all these years of study.

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David Perez Barbosa
Hiroshima University
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1. Introduction

Chapter 1
Introduction

1.1 Motivation

The use of transportation services allows people to access goods and services in order to satisfy the daily life needs. People usually perform various life activities by moving from one place to another. The better the accessibility between places is, the higher the probability of activity participation, and the higher the quality of activity participation (e.g., shorter travel time and more effective use of time). As a result of various levels and qualities of accessibility, people's lives may be affected in diverse ways.

That is why it is a generally accepted idea that the urban mobility can have social and cultural meanings for citizens, and boosts the individual and collective development potential of cities. At the same time, it has been simultaneously widely recognized how poor or unavailable transport can be reflected in a reduced accessibility to social networks, facilities, goods and services. Increasingly with the time it has become acknowledged that poverty, destitution, disabilities, social exclusion and social vulnerability are aspects that contribute to the existence of disadvantaged communities.

In the Sustainable Development Goals of the United Nations, it is widely recognized the needs to reduce poverty, ensure access to adequate, safe and affordable housing; provide access to safe, affordable, accessible and sustainable transport with special attention on the vulnerable users; reduce the number of affected people by disasters, reduce the deaths and injuries from road traffic accidents, reduce the environmental impact of cities, provide access to green and public spaces and the need to strengthen national and regional development planning through economic, social and environmental links; among other goals. (UN, 2006).

A basic principle must be considered when realizing the importance of the study of social exclusion related issues: economic and social opportunities (should) be made available to each person without any discrimination. It is also recognized that the exclusion and marginalization can lead to frustration, hostility and fanaticism (UNESCO, 1995).

We can easily derive that transport operations and transport systems have a big impact and decisive role for the accomplishment of the above mentioned goals. Therefore, it is especially important to ensure that developing societies will be able to adapt their transport systems, as well as their population and economic growth to ensure the sustainability for future generations and guarantee the accomplishment of those goals.

In cities of the developing world (South Asia and South America) a diverse type of transport disadvantage issues can be easily noted: lack of adequate spaces for the circulation of pedestrians and cyclists, growing demand for transport services that completely outstrips the supply of these services, severe levels of air pollution, noise, congestion and traffic fatality levels that keep increasing in some cases, citizens in monetary poverty who cannot afford the transport fares, the presence of important numbers of captive users due to mode accessibility and residential location and therefore in a situation of overreliance with respect to a single mode. In addition, it is quite usual the existence of informal transport services that provide important services to populations that could not afford the cost of the formal ones.

In many cities of the developing world, existing mechanisms of planning and decision-making have not allowed a successful inclusion of the demands of city residents who are pedestrians, bicyclists and public transport users; who happen to be a neglected majority of the city residents.

As for the developing cities of the world, most of the discussion has been primarily focused on urban mobility and poverty. Urban poverty is generally recognized as a growing phenomenon in many countries around the world, and a growing number of researchers are investigating its relationship with mobility (Davila, 2013).

Having examined the concept of health-related quality of life, by addressing the transport-based social exclusion we can also formulate and propose policy approaches for improving the quality of life of vulnerable populations, including but not only limited to the health-related quality of life. By improving the transportation systems and therefore providing disadvantaged individuals with more possibilities to travel (i.e. better quality, more affordable, more accessible, more convenient, etc.), we can eliminate or reduce the transport-based social exclusion that they are experiencing and improve the quality of life in a broad sense, or addressing its specific components.

We can consider different approaches to define transport-based social exclusion depending on the location and other characteristics of the disadvantaged communities.

- Having a disability, being elderly, etc., reduces the chances for a quick or comfortable mobility.
- Having a low income and therefore, a very limited and constraint budget for traveling poses many undesirable restrictions on many people's daily life, especially in developing countries, where long travel times or unaffordable fares for transport can add serious difficulties to people's daily lives.

We consider that relatively little of transport-based social exclusion has been studied in developing countries, in comparison to the situation in developed countries such as Australia or England where transport-based social exclusion have been more consistently studied during the previous years. In addition, it is important to consider that urban dwellers in

developing countries are less motorized and therefore less car-dependent than developed societies. Therefore we expect the mechanisms that lead to transport-based social exclusion will be drastically different between developed and developing countries. I consider this to be one of the most important contributions of this work, since no studies have previously compared and put into perspective how these mechanisms that allow social exclusion operate among different social backgrounds.

Many measures to tackle and reduce the social exclusion and transport disadvantaged related phenomena are largely based on government policies. But for decades, social inclusion has not been included in the outcomes of interest for policymaking processes, especially in developing countries. Policymaking, in essence, concerns making choices regarding a system in order to change the system outcomes in a desired way (Marchau et al., 2008)

1.2 Background and scope

Commonly, specific groups have been identified as more vulnerable than others: immigrants and ethnic minorities, persons and households with no car possession and living in places where public transport services are expensive or inaccessible, elderly people (who are too old to drive), low income groups, women and other travel-impaired individuals. However, in developing countries; no car possession and higher dependency of non-motorized and public transport are more common, so it is expected that low income cut-off values will have more variation when identifying disadvantaged groups in this sense.

It is important in this context to make a distinction between the monetary and the non-monetary types of poverty. From the monetary poverty point of view, for instance, the UN recognizes people living on less than $1.25 a day as a measure for extreme poverty. The conceptualization of (monetary) poverty will change according to national standards and

definitions, but it will be mostly associated with income. In the non-monetary implications of poverty, aspects others than income such as access to social protection systems, equal rights to economic resources, access to basic services, ownership and control over land and property, natural resources, appropriate new technology and financial services are taken into account. Additionally, the measurement of poverty based solely on income has a number of drawbacks, including in relation to transport. For example, the number of dependents will substantially impact on the cost of travel and household expenditure, and the cost of housing is related to location and in turn to availability of transport. Thus, little or no account is taken of needs, consumption, assets and other factors which impact on life quality, such as personal satisfaction (Stanley, 2009).

1.2.1 Developing countries - Bangladesh

These cases can be widely observed in Bangladesh a relatively small but densely populated country, with a dynamic economy and growing population, principally in the urban areas. However, those who migrate are often low-skilled and poor, with the outcome that they end up in the informal economy and in low quality housing (Cervero 2000). For very poor people, savings are often lost in travelling to higher-income opportunities in the city, as well as medical, educational and other essential services (Cervero 2013).

The study has been conducted in the three main cities of Bangladesh: Dhaka, Chittagong and Khulna. Dhaka, the capital of Bangladesh, is one of the fastest-growing megacities in the world. An estimated 300,000-400,000 migrants, mostly poor, arrive at the city annually (World Bank, 2007), therefore Dhaka's population of 12 million is expected to grow to around 20 million in 2020, and Dhaka is projected to be one the world's most populous cities (UN-Habitat, 2006). There is a tremendous pressure of influx of migrants in Dhaka city, much driven by rural poverty, river erosion and natural calamities forcing them to migrate to Dhaka

city in search of better livelihoods. The continuous migration of rural people to Dhaka city has added significant pressure to its already overstretched infrastructure. (Shams et al., 2014)

Dhaka's poor work in a range of sectors providing much needed labour to the city. Much of this employment is in the informal sector. Poor male workers are mainly employed as production workers (including rickshaw pullers and other transport workers) and trade workers (street vendors, retail trade, etc.). In Dhaka City, the poor spend the majority of their budget on food (62 percent) and housing (14 percent) as the major expenditures. Around 3% of the budget expenditure goes for transport among the poorest of Dhaka. More than two thirds of male workers from poor households are found in two categories of jobs - production workers (including transport labourers such as rickshaw pullers) and trade workers (street vendors, retail trade) (World Bank, 2007).

Many migrants coming to Dhaka end up in slums where living conditions are particularly grim, where overpopulation, polluted environment, lack of jobs, and deteriorating law and order are often complaints of the new migrants when they arrive. However, in spite of these negative factors, they do not usually express a desire to go back to their villages (Bhuyan et al, 2001). A substantial increase in earnings contributes largely to this situation since it seems to compensate for most of the drawbacks of life in Dhaka.

1.2.2 Japan

Japan has been experiencing a natural population decrease with annual deaths overtopping the births. It is estimated that the number of people aged 65 or above will exceed 30% in all Japan's prefectures in 2040. Furthermore, in 2060, Japan's population will be about 86.7 million, about 30% less than in 2010 (National Institute of Population and Social Security Research, 2014).

Japan has experienced a long and complex migration process. This process has been accompanied by a long and slow out-migration from rural to urban areas before the World Wars as a result of the industrialization process. Population were concentrated around the Tokaido megalopolis—the area along the Pacific coast between Tokyo and Osaka during the period of rapid economic growth in the 1950s and 1960s, and then suburbanization appeared in the areas surrounding the large metropolises in the later period. However, after 1983, population again concentrated towards the megalopolis (Wang, 1991).

Depopulation and ageing communities largely give disadvantages to the rural areas. With little prospect of the younger generations taking over the farming or remaining businesses in the region, the number of abandoned agricultural lands and the vacant houses have been increasing. Further, this condition also leads to the increasing demand on the social services for residents, such as medical and nursing care.

Several comprehensive development plans have been implemented by Japanese government to fight rural depopulation. However, persuading people to reside in rural areas is not an easy task. As the alternative solution, Japanese government is looking at the importance of urban-rural exchange. Moreover, much is being discussed about “revitalization” as one of the key strategies that should be considered to mitigate and reverse the negative effects of depopulation.

In the period May 2015 – February 2016 a group project was conducted in Kita-Hiroshima, a predominantly rural municipality in the northern part of Hiroshima prefecture where depopulation issues are quite evident. In consideration of the issue of depopulation, efforts were dedicated to make contacts with local residents and understand the conditions of their daily life, as well as the difficulties and needs associated to the depopulation and aging population issues that are present in the area. The purpose of the

group project was to propose useful strategies to promote and foster revitalization of the areas of Kita-Hiroshima.

It is common that small scale farmers (one of the most important population groups) cannot depend on the income from agriculture only. In other words, they are basically not full-time farmers, as most of them must do another job for living. In addition, we discovered that Kita-Hiroshima has interesting and relatively unknown natural spots that could be exploited as a resource, since Kita-Hiroshima is very rich not only in natural but also in cultural heritage. Due to the mountainous topography of the area, infrastructure for winter sports is well-developed (i.e. sky resorts), but there are still lack of options for tourism activities in summer, especially for sports tourism.

What the rural people think is uninteresting can eventually be an amazing attraction for a visitor from outside. Far from boring, the rural areas are full of experiences and things that can never be experienced in the cities. Therefore, these natural assets could play a role in attracting more visitors, thus contributing to the revitalization and further diversification of the local economy.

Having this in mind, from the group project we found that ecotourism and sport-related activities (e.g. cycling, hiking) could be better promoted by diffusing information to potential visitors. One the outcomes of the group project consisted of a cycling map (see Figure 1) that aims to attract more visitors in the future to the area and contribute to the revitalization of the zone. The map shows with some detail recommended routes for visitors, classified by distance and difficulty level, and depicts the most attractive sightseeing spots that can be found along the routes.

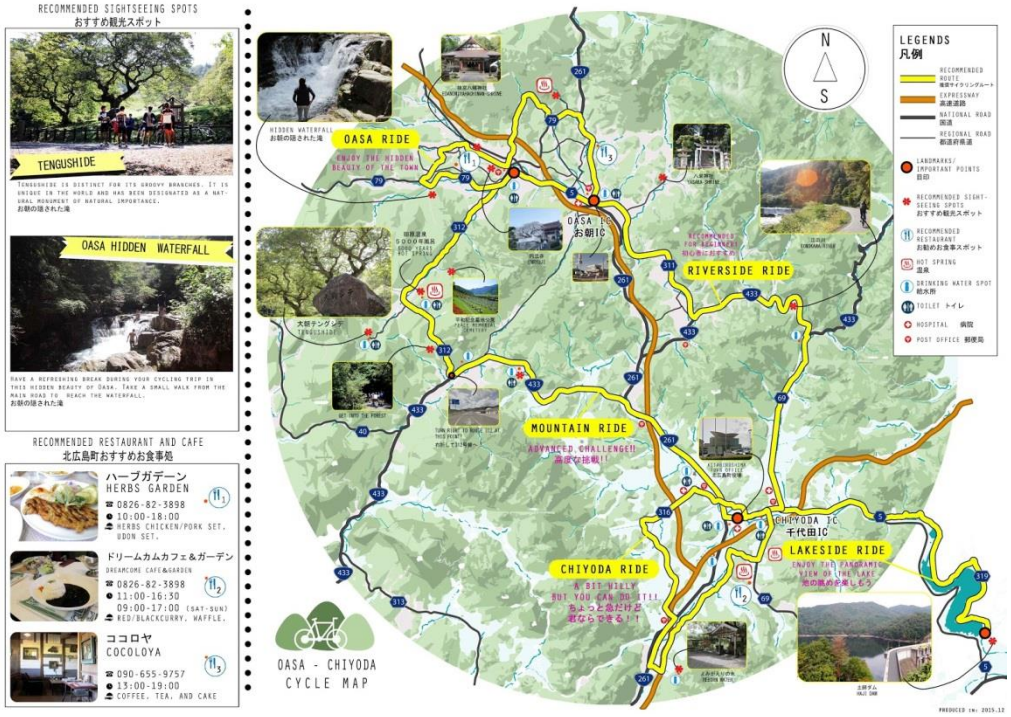

Figure 1. Design of cycling map for Kita-Hiroshima

After this group activity, I designed and implemented a survey in selected locations of Hiroshima prefecture, with Chiyoda town in Kita-Hiroshima included (see Figure 1). The survey aimed to find future migration preferences of young people (i.e. high school students) in rural areas of Hiroshima prefecture. In the context of aging population and depopulation, the current ideas, intentions and preferences of young people related to temporary and permanent migration are of crucial importance for the future development of the regions. Making rural areas like Kita-Hiroshima more attractive for young people to stay and settle would also contribute to revitalization efforts, which are of interest to the government at the local, regional and national levels.

In addition, a survey for assessing Health-related Quality of Life (QOL) in several Japanese cities (large metropolitan areas and middle-size cities) was conducted in 2010 (Zhang, 2013). Based in this available information, I analyse how several factors related to

built environment and travel behaviour affect health-related QOL of urban dwellers. More details are explained in the following sub-sections.

1.3 Research questions and objectives

Considering the background and scope discussed above, the main research issue to be addressed in this dissertation is related to the necessity of identifying and characterizing groups of people that should be considered as transport-based socially excluded, and understanding more in detail the underlying reasons behind the exclusion in order to undertake mitigation or elimination measures.

Social exclusion has been defined in terms of limited access to resources, goods and services, and the inability to maintain a certain level of social contacts and participation, which are normally available to others (Levitas et al., 2007). It has been difficult to measure social exclusion directly, because it is a *social* concept. In other words, it is hard to reach social agreements on which levels should be adequate because different stakeholders have different sets of mind on socially acceptable standards and norms.

Nevertheless, measurements and characterization of social exclusion are necessary because its existence may affect the individual's well-being. According to the definition of social exclusion, it can be caused by several factors among which access to transport services is included. In other words, social exclusion can be a potential consequence of a transport disadvantage situation. Thus, in the context of transport policy, measures could be considered for reducing and alleviating social exclusion.

With the above considerations, we raise the following questions for this study.

- Can we measure social exclusion caused by transport (i.e., transport-based social exclusion: TBSE)? If so, how?

- How social exclusion and well-being can be related to each other?
- What implications can be derived from transport-disadvantage situations that residents of a certain area face in their daily lives?

Here, we assume that TBSE occurs when transport disadvantages lead to a decline of individual's well-being. Poor access to transport services is very likely to pose important limitations to the levels of social contacts and participation that a person can reach, thus making him/her less able to perform activities that would contribute to enhance his/her quality of life. As a consequence, a decline of well-being could be eventually observed. Considering that there is a limited understanding on which aspects of transport systems impact individual's well-being as previously mentioned, related objectives associated to the former questions are:

- To understand more in detail what how transport-based social exclusion in a developing country in Asia (Bangladesh) occurs, based on associated indicators for measuring transport disadvantage and well-being.
- To quantify the effects of transport-based social exclusion on future migration and life choices of high-school students in rural Japan (Hiroshima prefecture).
- To analyse how the transport systems and travel behaviour affect people who can be considered at higher risk of becoming "socially-excluded", within a general framework of health-related quality of life in Japanese urban areas.

The impacts on well-being caused by the (lack of) access to and use of different transport systems are quantified in all the chapters, considering several cases of study regarding developed and developing countries in Asia and involving specific target groups.

In Bangladesh, urban dwellers in the three main cities of the country were randomly surveyed. They answered questions regarding their perceived well-being, travel behaviour, use of time and difficulties they face when using transport services.

For the case of Japanese rural areas, the main research questions are focused on the phenomenon of migration of young people. A general idea of how transport disadvantage is experienced in rural areas, but a deeper understanding of it is necessary in order to understand its implications in social exclusion, future life choices and future migration plans. Being able to predict better the drivers of migration behaviour can allow policymakers and planners to monitor and control more properly for internal migration and its multiple implications.

In the case of Japanese urban areas, we aim to provide additional evidence on how the residential environment affects the use of active travel modes and health-related quality of life (QOL) in the context of Japan. Improving the health-related quality of life for residents in urban areas has been a goal for policymakers and urban planners in Japan. Links between transport-based social exclusion and a deteriorated health-related quality of life – particularly in the mental and social aspects – are explored for the case of urban dwellers in Japanese cities. The influences of use of active travel modes associated with the residential environment, as well as the heterogeneity in travel behaviour on transport-based social exclusion are therefore examined in detail.

1.4 Outline and structure of the dissertation

Considering the explanations of framework and methodologies that have been employed, this section will describe the main contents of each chapter and the connections between them.

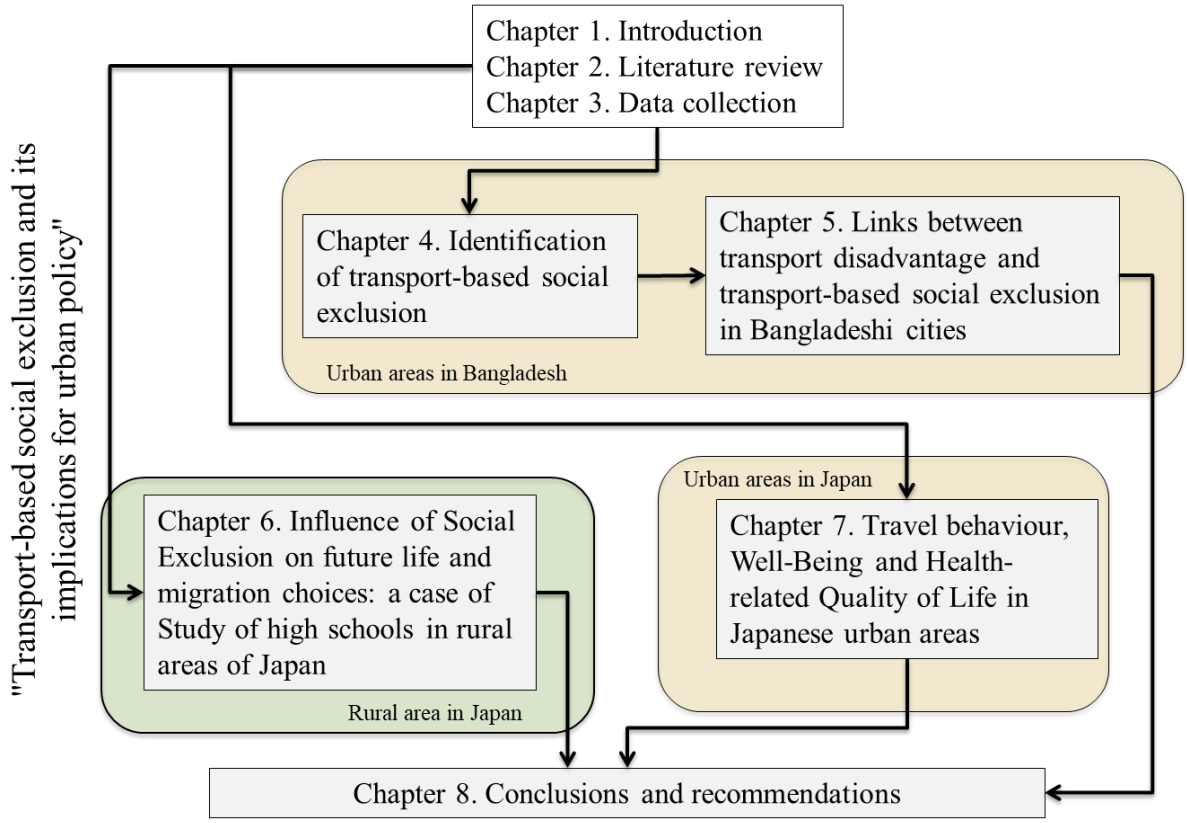

Figure 2. Outline of the dissertation

In Chapter 1 the fundamental aspects behind the transport-based social exclusion theories are discussed, as well as the motivation and main research questions arisen, where the importance of transport systems and urban planning and their influence on social exclusion and deterioration or enhancement of the citizens' quality of life is highlighted.

In Chapter 2, a literature review covering some of the most fundamental theories behind transport disadvantage and social exclusion is conducted. In addition, relevant information regarding the different societal and geographical backgrounds related to the different survey locations is provided in that chapter.

Chapter 3 describes the process and the main features for collecting the data that were employed in the empirical studies, and the most important descriptive analysis and aggregate

results for understanding in full perspective the research background and objectives. After that, the main body dissertation is divided into four chapters (see **Error! Reference source not found.**).

Chapter 4 and Chapter 5 focus on the identification of transport disadvantage conditions and negative impacts on well-being derived from the operation and use (or lack of use) of transport systems, travel behaviour patterns and social interactions in the living environment. The data that were used for elaboration of these chapters were obtained from a field survey. The survey was conducted between March and May 2015 in the three main Bangladeshi cities (Dhaka, Khulna and Chittagong).

Chapter 6 focuses in future life choices of young people in selected areas of Hiroshima prefecture. More specifically, we surveyed high school students in 1st, 2nd and 3rd year of high school between May and September 2016. Some locations were selected in depopulating areas of Hiroshima prefecture. Japanese society is currently facing serious issues related to population decline in specific areas, attributable mostly to internal migration and aging population. In consideration of this, in this chapter the implications of situations of transport disadvantage and social exclusion on future life choice are examined,

Chapter 7 deals with issues related to travel behaviour and health-related Quality of Life. Data from a survey on Health-Related quality of Life conducted in 20 Japanese cities in 2010 were used for the analysis of this chapter. The interactions between built environment and travel behaviour, the generation of non-motorized trips and their positive and negative contributions to well-being are examined in detail in this chapter.

Chapter 8 recalls and summarizes the main findings and conclusions from all the chapters of this dissertation, describes the limitations of the study, policy recommendations

oriented toward more inclusive urban environments and the planning of transport systems that enhance people's quality of life and well-being. Future research directions are also discussed in this section.

Furthermore, it should be clarified that the chapters were numbered in this way that is different from the chronological order in which the different surveys that provided data for each one of these chapters were conducted. The reason for considering this was to provide a logical framework for connecting the ideas. In the chapters 4 and 5, the basic elements of the connections between transport disadvantage, social exclusion and well-being are discussed. In chapters 5, 6 and 7, the application of these concepts into different specific backgrounds and targeted populations were examined.

1.5 Research framework and methodology

This dissertation consists of a series of empirical studies that were based on information collected though 3 different surveys, chronologically ordered as follows: the first one was conducted in 20 urban areas across Japan and was aimed to collect information related on health-related quality of life; the second one was conducted in the three main urban areas of Bangladesh and was aimed to collect information of travel behaviour, transport disadvantage and social exclusion related issues; and the third survey was conducted among high school students of rural areas in Hiroshima prefecture, it aimed to collect information on social exclusion related to life in depopulating areas and future life choices. For details of the survey contents, please refer to Chapter 3.

First, a theoretical development and a comparison with the concept of utility in econometrics were adopted as an approach for understanding the impacts of transport disadvantage on social exclusion and well-being.

Factor analysis was used in order to understand factors related to transport disadvantage and their covariance structure, in terms of a smaller number of underlying unobservable (latent) “factors”. Using this technique has proven useful to find useful interpretations and grouping for a set of proposed questions (observed variables) in the surveys conducted in Bangladesh and Hiroshima Prefecture, when inquiring about lists of disadvantage or exclusion factors that are relatively numerous in elements.

Tests of the social exclusion related variables by using correlation matrix techniques were also employed. Although it is considered that there are two main types of correlation, Pearson's product-moment correlation coefficient was preferred since it is the one people most often refer to when they use the term correlation coefficient. It has been widely used in social sciences, and considered useful in sorting through different factors to determine which, if any, have an association with each other.

In order to analyse differences in targeted indicators among proposed groups, the analysis of Variance (ANOVA) has been employed. ANOVA is a statistical method used to test differences between the means of three or more independent (unrelated) groups, by comparing the means between the groups of interest and determining whether any of those means are statistically significantly different from each other.

In order to determine the influence of different factors on well-being, different types of regression models were adapted depending on the type of well-being variable to be analysed. Variables such as life satisfaction (LS) involving several life domains are treated as a continuous type variable with normal distribution, so a linear regression is used in this case, in order to examine whether features within individual attribute, travel behaviour and built environment as a set of predictor variables do a good job in predicting LS as an outcome variable, and which variables in particular are significant predictors of LS as well. Similar

cases can be observed for health-related quality of life assessment, in which scores are assigned to the different dimensions of health (physical, mental, social) after being calculated (see section 2.7.1 The SF-36 questionnaire). These scores are treated as continuous variables with normal distribution.

Other variables such as Optimism are treated as an ordinal-type variable, with respondents answering in a scale from 1 to 5 to the question "*Do you think you are very optimistic about the life of you and your family in future?*" Therefore, ordinal regression models are used for predicting Optimism, an ordinal variable whose value exists on an arbitrary scale where only the relative ordering between different values is significant.

For the case of happiness, it has been treated as a continuous variable in the case of the survey in Hiroshima prefecture, whereas it has been treated as 2 binary-type variables ("*Happy"*: "Yes" or "No" and "*Unhappy*": "Yes" or "No") in the case of the survey in Bangladesh, after noting that there is little tendency to choose extreme values in responses of Happiness as values of an ordinary scale (from 1 to 5). This type of approach yields to interesting results that can be observed in Chapter 5.

In Figure 3 the research background of transport disadvantage and transport-based social exclusion in function of how well-being is affected corresponding to chapters 4 and 5 - can be observed.

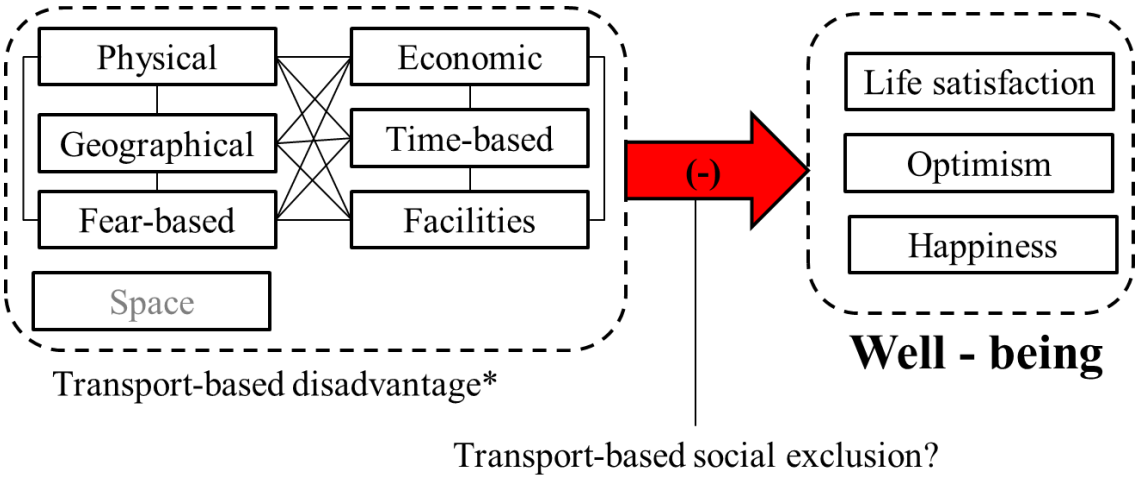

Figure 3. Influence of transport disadvantage on well-being in Bangladeshi cities – basic framework for Chapter 4 and Chapter 5

Chapter 6 deals with the future life choices of high school students in rural areas of Hiroshima prefecture (see Figure 4). These choices were categorized by using confirmatory factor analysis (CFA), which is a special form of factor analysis that is commonly used in social research. It was used to test whether measures of the construct Future Life Choices were consistent with a hypothetical understanding of the nature of that construct into three types of choices: family, career and individual plans.

In Chapter 6 we employ a multinomial logistic regression (MNL) model for predicting the possibilities of choosing different migration options: *decided to migrate, decided to stay, will possibly migrate,* and *has not considered*. MNL models are used when the dependent variable in question is nominal (the dependent variable falls into any one of a set of categories that cannot be ordered in any meaningful way unlike an ordinal type variable) and for which there are more than two categories. In addition, the possibility of returning to the current residential location after a hypothetical migration case is modelled by using "Consider returning: Yes or No" and "Consider migrating permanently: Yes or No" as a binary type variable, therefore using binary logistic regression models to predict the influence.

In addition, structural equation modelling (SEM) was used in several parts of this dissertation work. SEM is a multivariate statistical analysis technique that is used to analyse structural relationships, by combining factor analysis and multiple regression analysis, and it is used to analyse the structural relationship between measured variables and latent constructs upon specification of a measurement model (which indicate how the constructs should be constituted according to the theories) and a structural model (which specifies relations among constructs). Considering this, the joint influence of different types of social exclusion on future life choices, the influence of Time Perspective (TP) profile scores on future life choices (by applying Simultaneous Equation Regression Models which are an extended form of a SEM procedure), and the influence of lifestyle habits, residential environment and travel behaviour on health-related quality of life were assessed by using SEM.

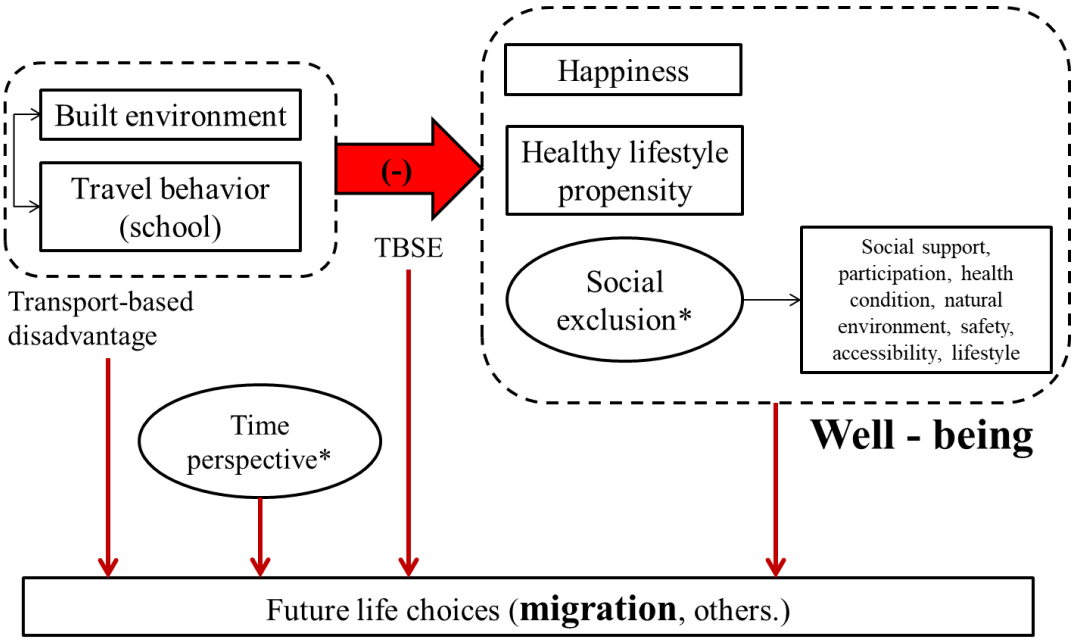

Figure 4. Transport-based disadvantage, social exclusion and future life choices of high school students in Japan – basic framework for Chapter 6

In the study of health-related quality of life in Japanese cities (Chapter 7), Cluster Analysis techniques are used in order to more easily understand travel behaviour patterns when it comes to combine commuting and non-commuting activities. Cluster analysis is a

data exploration (mining) tool for dividing a multivariate dataset into "natural" clusters (groups), which can be considered as an unknown number of distinct sub-populations.

In Chapter 7, some cases of continues variables which do not follow normal distributions can be observed; hence other types of regression models were used, such as Tobit regression for predicting the influence of several predictors on active travel scores (measure relative to the frequency for cycling and walking) and zero-inflated negative binomial (ZINB) to predict which variables influence the frequency of trips for activities different than commuting. In the second part of Chapter 7, path analysis and SEM are employed to assess the influence of park usage on Health-Related Quality of Life, considering aspects of park usage and satisfaction with several park functions.

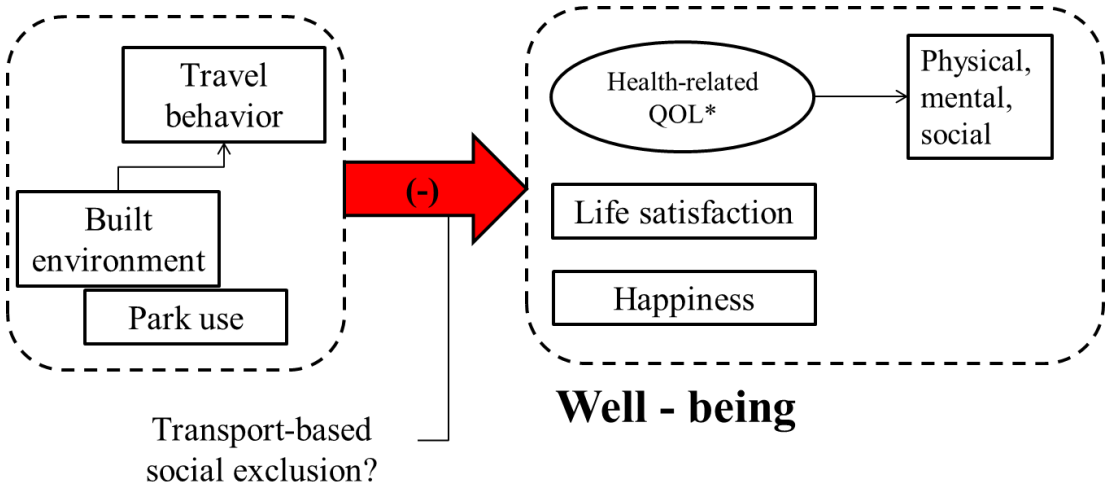

Figure 5. Influence of built environment on travel behaviour and well-being in Japanese cities – basic framework for Chapter 7

Finally, a general framework is provided for understanding the overall connections among the different parts of the dissertation in a logical way rather than in the sequential way that they have been previously discussed. In Figure 6 the distinction between rural and urban areas as cases of study, as well as between developing and developed countries (i.e. Bangladesh and Japan respectively) can be observed. In different social and geographical

contexts, several transport-based social exclusion situations are represented and characterized in function of the impacts that situations of transport disadvantage (associated to travel behaviour and urban planning as well) have on an individual's well-being. Definitions and more detailed explanations of the basic terminology for understanding the framework can be observed in the following sub-section.

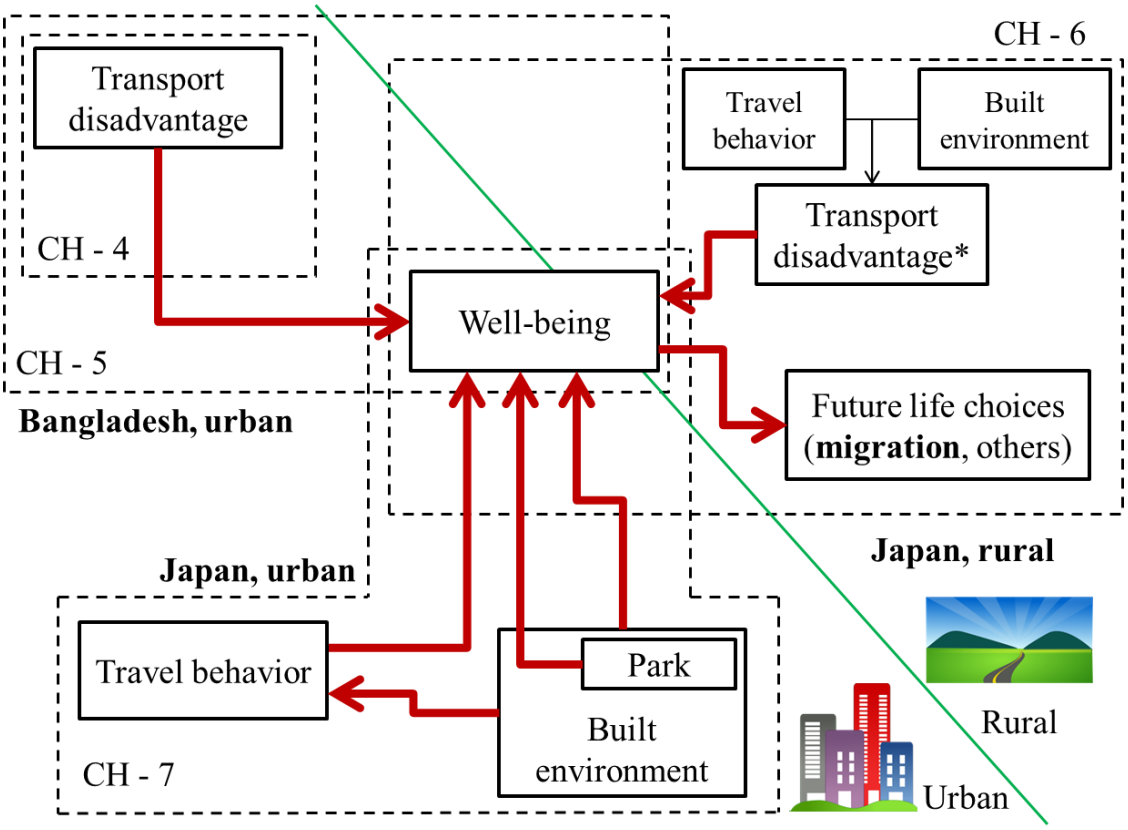

Figure 6. General framework of the dissertation

1.6 Terminology related to this study

As it occurs with well-being, the terms "transport disadvantage" and "social exclusion" have been interchangeably used in the literature, together with terms such as transport poverty, mobility disadvantage, and accessibility.

- Well-being:

The term of well-being is also called on the ground of human happiness studies, and it can be

a synonymous of “quality of life” or might denote that something is in a good state. It is a generic term for all the good. Well-being is usually correlated with how well a person’s life is going from their point of view. Therefore, well-being is a subjective concept, related to each person’s reference of ‘what is good’ for them (Duarte et al., 2010).

Well-being is very often associated with words such as ‘happiness’, ‘quality of life’ and ‘life-ability’ when used in a broad sense. In addition, an enduring satisfaction with one’s life-as-a-whole is called 'life-satisfaction' and often it also commonly referred to as 'happiness' (Veenhoven, 2004). In general, a variety of terms related to well-being have been interchangeably used.

Focused on individuals within their lives, psychology has been, since their early stages, concerned about observing and developing measures of individuals’ well-being. Research developments of the latest decades have strengthened the importance on the individuals’ behaviour to understand, not only their choices, but also how can this be incorporated in the modelling tools that are used to picture present demands and future calls on society levels such as economy, transport and social policies, among others (Duarte et al., 2010).

- Health-related quality of life

In public health studies, the health is seen as a multidimensional construct that includes physical, mental, and social domains (WHO, 1946). The Centres for Disease Control and Prevention (CDC) define Health-related quality of life (HRQoL) as an individual's or a group's perceived physical and mental health over time[1].

While many HRQoL indicators measure when people feel ill or sad or when they are limited in their daily tasks, well-being indicators measure when people feel very healthy and satisfied or content with life. It has been argued that many traditional HRQoL and social indicators fail

[1] From: https://www.cdc.gov/hrqol/concept.htm

to capture these types of positive experiences of people's daily lives – the quality of their relationships, their positive emotions, resilience, and realization of their potential (Healthy People 2020, 2010; Diener and Seligman, 2004).

- Built environment

The built environment has been defined in different ways by different researchers. Most generally it is defined as the part of the physical environment that is constructed by human activity (Saelens and Handy, 2008). The built environment includes all of the physical parts of where we live and work (e.g., homes, buildings, streets, open spaces, and infrastructure). For this dissertation, the built environment is represented by the location (distance) of urban facilities that can be found in the neighbourhood and are necessary for routinely life activities.

- Transport disadvantage

Ongoing difficulties associated with access to transport are commonly referred to as "transport disadvantage" (Rosier and McDonald, 2011). Situations of transport disadvantage usually include having a poor public transport infrastructure, the need to travel further distances in order to get to places of employment, services and activities; and any situation of difficulty for accessing or using transport services or traveling in order to satisfy daily needs. However, transport disadvantage situations change according the individual, the social environment and the geographical context. It has been commonly assumed that for socially disadvantaged groups transport difficulties tend to relate to the ability to access transport and the costs of travel whereas for socially advantaged groups transport difficulties tend to relate to traffic congestion and time availability (Currie et al., 2010). However, in this dissertation each chapter deals with specific situations of transport disadvantage.

- Social exclusion:

One of the most accepted definitions of Social Exclusion describes it as a process in which

individuals or people experience difficulties in accessing various rights, opportunities and resources that are normally available to members of a different group. Social exclusion is a complex, multidimensional construct and is rarely measured empirically (Delbosc and Currie, 2011). In an extended definition, we can think of social exclusion as a perceived situation that can be considered undesirable, especially when put into comparison with members of the community or other groups in a relative position of advantage.

- Transport-based social exclusion:

We adopt the definition provided by Kenyon et al. (2003) which states that *Transport-related social exclusion is the process by which people are prevented from participating in the economic, political and social life of the community because of reduced accessibility to opportunities, services and social networks*. In the section 2 of this dissertation we discuss more in detail the theoretical discussion behind the key concepts that are related to this phenomenon. In this publication, the term "transport-based social exclusion" refers mostly to any situation in which experiencing any type of transport disadvantage involves negative impacts on an individual's well-being. In the context of this dissertation, we will talk about a situation of transport-based social exclusion when any situation of transport disadvantage is affecting someone's well-being or QOL negatively.

1.7 Additional materials in the appendix session

In this section the materials that were used as an appendix are briefly listed and described.

In Appendix A, the items of the survey questionnaire that was implemented in the main areas of Bangladesh in 2015 are shown in detail.

In Appendix B, the survey questionnaire that was implemented in different High Schools of Hiroshima Prefecture is shown with its original contents in Japanese language. The survey was initially designed in English, and translated in to Japanese after the completion of the initial version.

In Appendix C, the detailed description of the surveys that were used as measuring instruments: The SF-36 to measure the Health-Related Quality of Life and The Zimbardo Time Perspective Inventory (ZTPI) Psychometrics and Scoring Key to calculate the Time Perspective profiles are listed, as complementary information for Chapter 6, Chapter 7 and Appendix B.

In Appendix D, we show a copy of the report that was sent to the High Schools in Hiroshima Prefecture where students cooperated with our survey, showing the most relevant descriptive statistics and relevant features.

In Appendix D, the survey called “Health-related Quality of Life in Japanese cities” is shown with the question items and the possible responses in detail, with items displayed in Japanese and in English. This survey originally implemented in 2010 on the Internet (i.e. web-based survey), therefore I do not have any authorship on this survey. However, the contents of this survey were essential to understand issues of Japanese urban areas, and the analyses of these data were employed for Chapter 7 and 8.

2.Literature Review

Chapter 2
Literature Review

In the transport-related literature we have found an increasing interest in social exclusion related to transport and the transport disadvantage as a focus of contemporary transport research and policy (Church et al., 2000) (Social Exclusion Unit, 2003).

As it occurs with well-being, the terms “transport disadvantage” and “social exclusion” have been interchangeably used in the literature, together with terms such as transport poverty, mobility disadvantage, and accessibility. As explained in section 1.6, in this section we differentiate transport disadvantage from transport-based social exclusion. In section we clarify how in the literature the terms have been used by different authors and how we use and adapt the concepts definitions accordingly to the purposes of this work.

2.1 Transport disadvantage

In most societies around the globe, there are groups of individuals that experience difficulties to travel to some places they would like to go or to make use of some transport systems. When these situations occur we consider that they are in a situation of transport disadvantage. We consider that a person may also be in a situation of transport disadvantage if there are any distinctive features of transport systems that restrict some life aspects such as where they can live, what they can do or the times and places in which they can participate in any desired activities.

According to Church et al. (2000), it is possible to group the more particular factors limiting the mobility of socially excluded people into seven main categories: *physical, geographical, facilities, economic exclusion, time-based, fear-based exclusion, and space*

exclusion (see Table 1). In short, these seven main categories relate how the use of transport services by respondents may be limited by physical barriers, psychological difficulties, the access to transportation services, the residential location, the location of certain important urban facilities, the amount of money that can be invested in any transport services, the necessary time to make use of them, feelings of fear and worry, and others (Church et al., 2000; Delbosc and Currie, 2011). These authors provide therefore a very useful framework to understand how a person can suffer different types of negative externalities that are derived from the use of transport systems and the necessary interactions for their operation.

Although seven identified categories by Church et al. (2000) are commonly mentioned as "transport-based social exclusion dimensions" in much of the existing literature, in this study we will refer to them mostly as categories of "transport disadvantage". The idea of proposing social exclusion as one of the possible consequences of being exposed to a transport disadvantage situation is the main reason for such differentiation. In the following sections we will expand the theoretical discussion (see sections 1.6, 2.4).

Table 1. The seven dimensions of transport-based social exclusion

Types of transport-based social exclusion	
Physical	Whereby physical barriers, such as vehicle design, lack of disabled facilities or lack of timetable information, inhibit the accessibility of transport services
Geographical	Where a person lives can prevent them from accessing transport services, such as in rural areas or on peripheral urban estates
Exclusion from facilities	The distance of key facilities such as shops, schools, health care or leisure services from where a person lives prevents their access
Economic	The high monetary costs of travel can prevent or limit access to facilities or employment and thus impact on incomes
Time-based	Other demands on time, such as combined work, household and child-care duties, reduces the time available for travel (often referred to as time-poverty in the literature)
Fear-based	There are fears for personal safety that preclude the use of public spaces and/or transport services

Types of transport-based social exclusion	
Space	Where security or space management prevent certain groups access to public spaces, e.g. gated communities or first class waiting rooms at stations

From: Church et al. (2000)

In contrast to this, it has been argued that social policy has traditionally centred on issues of safety and disability access (Stanley and Brodrick, 2009). Therefore, in consideration of the seven-dimension framework proposed by Church et al. (2000), we can reasonably observe that some of these aspects have received more attention and efforts from policymakers at the expense of neglecting or underestimating the importance of others based on the impacts they are causing in people's lives.

Often the concept of transport disadvantage can be closely associated to a situation of poor transport accessibility. According to Geurs and Wee (2004), the analysis of accessibility can be divided into three specific components (see Figure 7Figure 7). The first component is land, which relates to the capacity of a certain territory to provide and carry out economic activities, and includes quantity, quality, the distribution of productive activities in a destination and the demand for goods and services generated in residential centres as origin locations. The second component is transport, which can be comprehended in terms of the disutility for a user when moving between an origin-destination pair and analyses the supply (infrastructure and services) and demand, including time, costs and other effort-related variables such as reliability, safety, convenience, etc. The third component refers to the individuals and their set of needs, skills and abilities that allow them to access areas for their desired activities. Individual attributes such as income, educational level, car ownership, configure the available money budget, time budget, as well as their relationship with respect to each other and to the aforementioned demands.

Following the focus on accessibility issues as a measure of transport disadvantage, Currie et al., (2008) identify four main factors that describe transport disadvantage, as

follows: *transit disadvantaged* (availability and capability to use buses, trains and trams), *transport disadvantaged* (being able to travel when you want to, finding transport so you can travel, being able to get around reliably, getting to places quickly and finding the time to travel when you need to), *being vulnerable or impaired* (being able to physically get onto/off buses/trains/trams, needing help to get around on your own, being able to understand where to go, feeling safe from theft/attack when travelling on your own) and *having to rely on others for transportation* (either for assistance or for covering the costs).

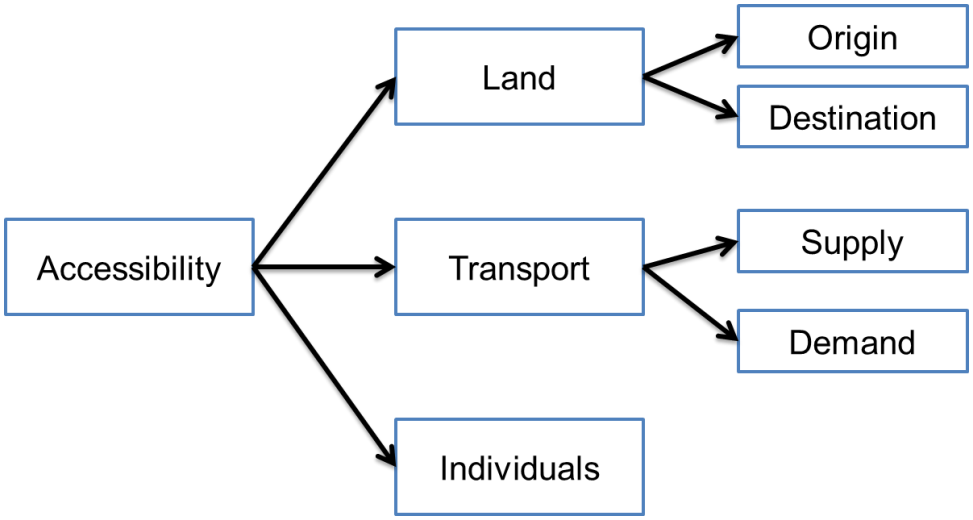

Figure 7. Components of accessibility
Adapted from Geurs and Wee (2004)

The Social Exclusion Unit (2003) in the United Kingdom identifies the meaning of accessibility by considering the following aspects: people can access key services at reasonable cost, in reasonable time and with reasonable ease; they have knowledge about the available transport, trust its reliability and feel safe using it; they are physically able to access it; and the services and activities are within a reasonable distance. In short, people should be able to get to key services within a reasonable time and cost, reliably and safely.

We can think of those as minimum and reasonable requirements that users of any transport system should be able to meet under any circumstances. Now, depending on the

geographical location, social context and individual preferences the ideal settings of time, cost, reliability and safety are expected to be different, across countries, cities, groups and individuals. For instance, the government of South Africa in support of the millennium development goals (MDG) to mitigate (exclusion) has set some standards, as follows (Dimitrov, 2012: 51).

- The average travel time to work should be less than 1 hour
- Public transport should be affordable accounting for less than 10% of a person's disposable income
- In urban areas the access to public transport should be possible within 1 km – or the equivalent of a 15 minutes' walk.
- The access to a regular public transport service should be located within a 2 km walk (or 30 minutes).
- The ratio of use between public transport and private car use should be 80:20.

It has been similarly argued that, depending on certain characteristics of individuals, such as level of income or car ownership, travel money budget remains stable, oscillating between 7% and 9% of individual income (Zahavi, 1981; Bocarejo and Oviedo, 2012).

2.2 Social exclusion and Transport-based social exclusion

Transport-based social exclusion theories concern how people can suffer any negative effects (e.g., unemployment, poor health, less social contacts and lack of participation in other activities) as a consequence of a poor access to transport services (Church et al., 2000, Hine, 2003, Stanley et al., 2009, Currie et al., 2010, Lucas, 2012).

A widely used definition for social exclusion is provided by Levitas et al. (2007) as follows: "*the lack or denial of resources, rights, goods and services, and the inability to*

participate in the normal relationships and activities, available to the majority of people in a society" (Delbosc and Currie, 2011).

Social exclusion may negatively affect the individual's quality of life. Keeping this in mind, we may argue that transport-based social exclusion is a potential consequence of a transport disadvantage situation if the individual's well-being is affected. This argument is consistent with that by Lucas (2012), who stated that transport disadvantage and transport-related social exclusion are not necessarily synonymous with each other. A situation of transport disadvantage may result in losses of productivity, increased poverty, reduced participation in educational activities, negative effects on health, increased dependency on others and increased risk of injuries, etc. If those undesirable outcomes arise, a person may become more socially excluded. Usually, vulnerable groups (i.e. those most vulnerable to transport disadvantage) such as the elderly, people with health problems, women, unemployed, low income, and youth are considered more likely to be socially excluded, because they are more likely to suffer from the consequences of poor transport accessibility more intensely than others (Hine and Mitchell, 2003; Clifton and Lucas, 2004; Delbosc and Currie, 2011).

As an example for case illustration, Currie et al (2010) adopts in his research a combination of two main measures of the spatial distribution of social disadvantage or 'need' indices: 1) the Index of Relative Socio-Economic Advantage/Disadvantage (IRSAD) adopted by the Australian Bureau of Statistics, a measure of advantage and disadvantage in a spatial continuum that considers income, employment, qualifications, dwelling characteristics, household characteristics, access to services (Internet in the Australian case), etc., by assigning weights to each item; and 2) a transport needs index, which considers measures of accessibility, car possession, aged population, income and occupation and household composition, etc.

Social exclusion is considered a complex, multi-dimensional construct. It is more than

just poverty and its measurement includes multiple dimensions such as economic, social and political dimensions, and a further refinement of those dimensions can include aspects such as income level, unemployment, political engagement and social interaction (Burchardt, 2000) (Delbosc and Currie, 2011). The concept of social exclusion can be strongly associated to a lack of access to adequate mobility and lack of access to opportunities, social networks, goods and services. (Kenyon, 2002). In addition, Delbosc and Currie (2011) measure five dimensions of social exclusion: income, unemployment, political engagement, participation (referred as the exclusion a range of activities such as hobbies, sport and visiting libraries, etc.) and social support (being able to get help from others when needed). The seven specific features of the transport system(s) that are contributing and/or related to the exclusion of certain population groups (in section 2.1), would appear to confirm the multidimensional nature of the problem when considered in line with social exclusion theory, as denoted by Church et al. (2000) (see Table 1).

According to Lucas (2012), whilst the (former) list maps the overall nature of the problem of transport-related exclusion, it does little to express at which level or layer of activity it occurs and, thereby, fails to identify where the policy attention should be directed, whether is it the individual which needs direct policy assistance, the social capital of the community that needs to be enhanced or better local services that are needed or the more strategic system of transport or land use planning that needs to be addressed. In order to make any progress towards improving the accessibility of socially excluded populations, policy makers need to find ways to address all seven of these dimensions in tandem (Lucas, 2010)

Kenyon et al. (2003) referred to transport-related social exclusion as the process by which people are prevented from participating in the economic, political and social life of the community, because of reduced accessibility to opportunities, services and social networks., due in whole or part to insufficient mobility in a society and environment built around the

assumption of high mobility.

Preston et al. (2007) argues that In order to avoid social exclusion, an individual requires a set of accessible facilities and social contacts, although the composition of these sets will vary across individuals. Therefore, they suggest the following policy approaches to deal with social exclusion - policy responses to social exclusion:

1. Reduce transport costs (and times) and hence promote physical mobility (and accessibility). This may be seen as promoting exchange entitlements, as cheap and fast transport permits proximate contacts to be exchanged for distant contacts.
2. Increase social contacts through information technology, by promoting virtual mobility.
3. Increase proximate facilities and contacts by, for example, decentralising facilities and hence promoting accessibility through land-use measures. This may be seen as promoting production entitlements, as this increases the number of proximate contacts.
4. Increase incomes so that transport budget constraints no longer apply, hence promoting mobility. This might be achieved through promoting endowment and transfer entitlements.
5. Increase proximate contacts by pro-family/pro-neighbourliness policies. This may also be seen as promoting production entitlements.

Furthermore, Preston et al. (2007) make use of 3 criteria to identify the degree of transport-related social exclusion, in the following levels: area mobility (travel in the area as a whole), individual mobility (travel made by particular individuals or groups) and accessibility (overall access of the area).

There are currently no widely accepted standards to determine adequate levels of social

inclusion (or exclusion), since it depends on each community must determine its own standards and develop its own evaluation methods. With this in consideration, Litman, (2003) lists some indicators that people experience as transport-related social exclusion, keeping in mind that not everybody in each category faces severe social exclusion under all circumstances, but the more these factors apply to an individual or group, the greater degree of social exclusion they are likely to experience. Those include without being limited to:

- Households that do not own an automobile.
- People who do not have a drivers' license.
- People with significant physical or mental disabilities.
- Low-income households.
- People who are unemployed or underemployed.
- People on social assistance and other programs to help disadvantaged groups.
- People too young to drive, or being elderly (i.e., over 70 years of age).
- Recent immigrants from developing countries, who tend to face language barriers, social isolation, poverty, unemployment, and low rates of vehicle ownership and drivers' licensing.

Based on the accessibility related to journey times and distance to bus stops some indicators have been proposed by the Social exclusion Unit (SEU, 2003) as follows: proportion of people within 10 minutes' walk of a [5, 10, 15]-minute bus service, proportion of people who can get to [key employment locations/appropriate hospital/affordable food shop/] within [45] minutes door-to-door by public transport, proportion of 5–11-year-olds who can get to [xx] primary schools within [1 kilometre], barriers to using public transport, proportion of fully accessible buses on certain routes or in areas, proportion of people who say they do not use public transport because of fear of crime.

2.3 Links between disadvantage and transport-based social exclusion

From the review in the previous sections, it is evident that the concepts of transport disadvantage and transport-based social exclusion can be differentiated, but at the same time they are interrelated at many levels so their association or dissociation depends on a greater number of factors that could be associated to the environment, the social context and the individual. It must be kept into consideration that Transport-based social exclusion is a multidimensional concept. Then it is well acknowledged that the transport (and land-use) system can either facilitate social inclusion or exacerbate social exclusion (Delbosc and Currie, 2011).

Numerous authors have studied the effects of transport disadvantage and social exclusion, and how these processes relate and impact upon particular groups in society and different places which for one reason or another experience poor access to both public and private transport (Hine, 2003).

Titheridge et al. (2009) argue that transport can contribute to social exclusion by limiting access to jobs, education and training, health services, sports and recreation facilities, and social networks whether due to the cost of transport or the availability of appropriate transport.

Currie et al. (2008) found that people who are not commonly seen as disadvantaged (the employed and those with higher incomes) can have feelings of isolation associated with time poverty. Although these people are not socially excluded using traditional measures they exhibit lower ratings of wellbeing. Thus, transport disadvantage can relate to socially advantaged as well as social disadvantaged groups. On the other hand, social exclusion and well-being do not necessarily relate to self-reported travel and access difficulties. In their study, Currie et al. (2008) found by testing a SEM model that using this theoretical model

provided mixed results. The social exclusion-well-being link proved strong (.76. $p < .001$) and a significant though modest link was established between social exclusion and transport disadvantage (.18, $p < .05$). However no statistically significant link was found between transport disadvantage and well-being. (See Figure 8)

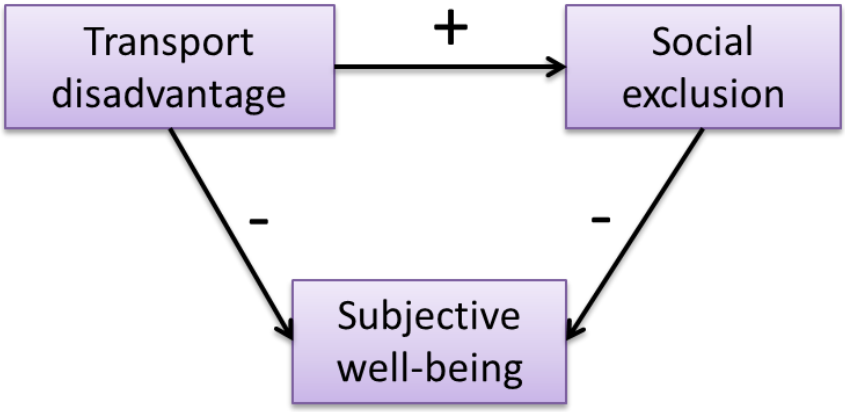

Figure 8. Influence of Transport Disadvantage and Social Exclusion on Well-Being
Adapted from Currie et al. (2008)

The research theorized that time poverty might be an important construct in linking transport disadvantage with social exclusion and well-being (Currie et al., 2008). However it was found that the link between transport disadvantage and well-being was indirect and mediated by time poverty (Currie and Delbosc, 2010). Moreover, it has been argued that transport policies and transport systems can contribute to create or alleviate social exclusion that is created by transport poverty (Martens, 2013). The Figure 9 is adapted as an illustration.

Therefore, it is necessary to bring issues of social, spatial and environmental justice the development of 'just cities' for all. Transport and access has a fundamental role to play in this transition and so understanding the processes, actions and decisions which lead to transport-related exclusion should be one of the key foci of future transport policy research (Lucas 2012)

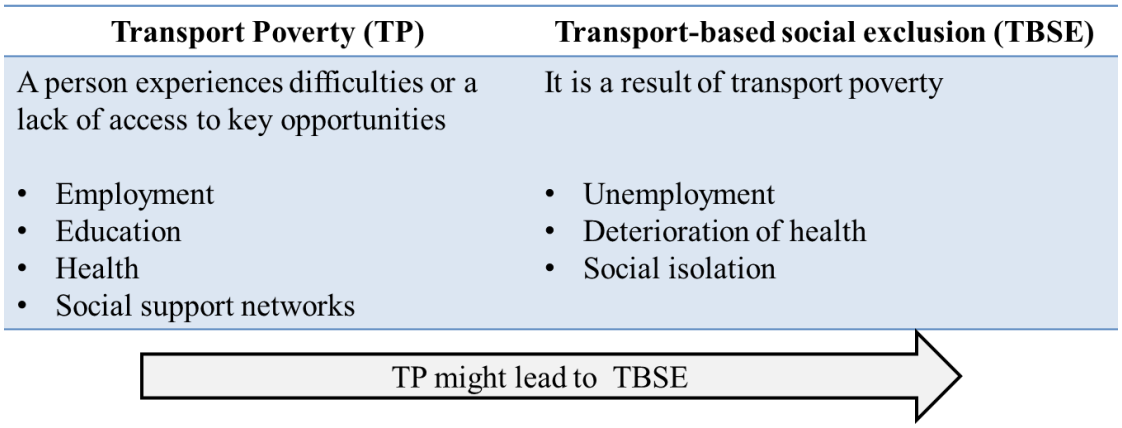

Figure 9. From transport poverty to transport-based social exclusion.

The Social Exclusion Unit (SEU, 2003) remarks that people may not be able to access services as a result of social exclusion, and at the same time problems with transport provision and the location of services can reinforce social exclusion. A proper provision of transport services allow people to access local services and activities, such as work, learning opportunities, healthcare, food shops, social and cultural activities, etc. Accessibility can be understood as the capability that people has to get to key services at reasonable cost, in terms of money, time and ease. A good accessibility depends on several things, such as the availability of infrastructure and services that are reliable, safe, affordable and therefore within reach of the users.

By using the above mentioned transport-related social exclusion categories (see Table 1), we can have a wide perspective of the transport-based exclusion implications, yet it has been also recognized that it does little to express at which level or layer of activity it occurs and, thereby, fails to identify where the policy attention should be directed, i.e. the individual, the social capital of the community, implementation of better local services, or even at the transport or land use planning level (Lucas 2012). She argues that one must consider the complex interactions between people, the activities they wish to or need to undertake, and their transport options, which becomes a paradigm that is used as a guide in crafting ‘‘accessibility audits” to identify areas in need of policy interventions.

2.4 Transport disadvantage, social exclusion and well-being associated to travel

It has been commonly assumed that poor transport services can compound the problem of living on a low income, particularly in peripheral locations yet not strictly limited to them. At the same time, the problems related to transport disadvantage and transport based social exclusion have been associated with a poor access to a private car or public transportation, which make very restrictive the access to goods and services, such as retail facilities, health facilities, jobs and any other activities located outside neighbourhoods. In Australia, it has been found that the transport disadvantage situation is concentrated in the sprawling outer suburbs of large urban areas and rural and regional areas, with very limited or non-existent public transport services (Currie, 2007; Battelino, 2009).

Note that transport plays an important role in the establishment and development of modern economies and has a significant impact in individuals' happiness (Duarte et al., 2008). The transportation field is undoubtedly embed on daily choice making processes, and therefore plays an important role on the individual's life, contributing for its overall perception of life satisfaction. Traveling can be an enjoyable activity by itself (i.e. generating happiness), and studies have found that travellers' attitudes and personality are more important determinants of travel liking than objective travel amounts (costs) (Duarte et al., 2010; Ory and Mohktarian, 2005) For instance, an intrinsic value of enjoyment can be attributed to the solely fact of walking as an exercise of relaxation associated with active travel (Laverne, 2014; Smith, 2014). From a basic human psychology principle, humans were born to move, this is why travelling more slowly and using effort can offer us some satisfaction and negative consequences for the bodily and mental functions may appear from immobility (Matt, 2013).

Furthermore, utility, life satisfaction and affect are interrelated but not identical. Affect

during a trip is one contributor to its overall utility, since the impact of that trip on our feelings is one aspect of that trip's benefits or costs. But at the same time utility is also a function of many other factors. Thus happiness and utility may not always covary (Morris and Guerra, 2014). For instance, modal choices that would seem irrational from the happiness perspective can become logical when the utility of the trips is examined, which is usually closely related to purposes. The evolution on both complexity and alternatives of choice makes necessary to focus on target the reasoning behind transport mode choices (Duarte et al., 2008).

In general, it has been widely recognized that further research is necessary to develop a clearer sense of how mobility options influence human emotions, how we can more comprehensively understand the relationship between how we travel and how we feel. This understanding offers valuable insights into ways of improving existing transportation services, prioritizing investments and maximizing the benefits of travel for the well-being and the health of citizens. As a consequence, the linkages between transport disadvantage and social exclusion are increasingly becoming a key policy concern for governments and institutions around the world.

2.5 Transport-based social exclusion in developing countries

It is to some extent difficult to find studies about transport-based social exclusion in the context of the developing countries of the world; where income, urban environment and transport systems in cities exist under remarkably different context conditions in comparison to developed countries. As for the developing cities of the world, most of the discussion has been primarily focused on urban mobility and poverty. Urban poverty is generally recognised as a growing phenomenon in many countries around the world, and a growing number of researchers are investigating its relationship with mobility (Davila, 2013).

It is a generally accepted idea that the urban mobility can have social and cultural

meanings for citizens, and boosts the individual and collective development potential of cities. The capacity to move (daily or occasionally) in the cities mediates not only the income earning opportunities, but access to health, education, leisure, etc. as well; and this capacity hinges on factors such as the ease of physical access to a mode of transport, the frequency of the mode and the economic cost of travelling, represented, for example, in public transport fares or in the opportunity cost of travel time using different modes (Davila et al., 2013).

In a context of monetary poverty, assuming someone's scarcity of money to cover a fare - which is often the case in the poorest households – household strategies will be used to face the situation, which is usually giving one of its members a capacity to travel in detriment of other household members' capacity to travel, possibly depriving them of essential elements for personal and social development. As the world's population continues to urbanise, cities represent an ever-higher proportion of the national and global economy and the climate change affects specially people who are socially, economically, culturally, politically, institutionally or otherwise marginalised from societies (Goldenberg, 2014)

2.5.1 Urban transport related issues in Bangladesh

In Bangladesh, we selected the 3 main cities of the country Dhaka, Chittagong and Khulna as our locations of study, which means we interviewed urban dwellers on selected locations in those 3 cities. Therefore, in this section we will mention some relevant findings of the literature review related to transport development, transport disadvantage and transport poverty in the 3 cities.

Dhaka is fast becoming one of the largest cities in the world. It is estimated that the city has more than 15 million people which causes around 25 million daily trips (DTCA), making it one of the most traffic congested. By 2020, the megacity's population is expected to rise to 22 - 25 million. (World Bank, 2007). In addition, Dhaka has one of the highest average urban

densities in the world, together with some of the highest neighbourhood densities: some slum (shantytown) population densities reach 4,200 per acre, which is equivalent to more than 1,000,000 per square kilometre. Estimates of the slum population are between 25 and 60 percent of the area population within the city (Cox, 2012).

For the case of Dhaka city, traffic jam topped and environmental pollution top the list of major urban problems identified by the residents (World Bank, 2007). It is also estimated that more than half of the daily trips by sampled respondents were non-motorized, i.e. by walking, bicycling or on a rickshaw. The use of buses and 2-stroke engined scooter/tempos is also notorious and in a great part responsible for the air pollution in the city. The non-motorized transport modes – bicycles and rickshaws - have played a definite role in the overall public transport system in Dhaka for many years. However, there is a lack of control on their numbers and operations leading to inefficiencies and danger. Many smaller streets are in poor condition and it is a detriment to their use within neighbourhood areas. Bicycles also face hazardous conditions and there are virtually no provisions for their operations (The Louis Berger Group, 2005). At present the rickshaw is the primary travel mode in the city, together with other six other types of non-motorized transport (bicycles) operating in Dhaka: flat-topped rickshaws; handcarts (known locally as 'thela garis'); hand trolleys; bullock carts and horse-drawn carriages.

The city experiences the proliferation of scattered development without appropriate guidance resulting in urban system difficulties. The lack of integration between land-use planning and transportation system has resulted in uncontrolled and unplanned development, non-compliance and a poor mix of land uses leading to inefficiencies in the Dhaka's transportation system (Mahmud et al., date unknown). On the other side, Dhaka has developed as a city with a mixed pattern of land use. This has developed organically to enable people to minimize their journey times by walking, cycling or traveling by rickshaw between

their residences and their places of work. Motorized vehicles have played a minor role in providing commuter services. Central Business Districts (CBD) are presently located in a few main areas namely. Manufacturing activity is spread geographically not only in the peripheral zone but also in the immediate and inner zones (garment industries). The workers follow the employment locations living in nearby temporary shelter housing and creating slum areas.

In the case of Bangladeshi cities, like in many areas of South Asian cities, pedestrians are the most vulnerable of all road users and require special facilities for their protection. The absence of properly designed sidewalks or footpaths on neighbourhood streets and main routes poses significant hazards for the pedestrians. It is not difficult to agree that the effects of lack of pedestrian priority policies are notorious.

For Dhaka city it has been observed that motorized vehicles have played a minor role in providing commuter services. Central Business Districts (CBD) are presently located in a few main areas namely. As one of the most important sectors for the local and national economy, manufacturing activity is spread geographically not only in the peripheral zone but also in the immediate and inner zones (garment industries). It has been largely observed that the workers tend to follow the employment locations living in nearby temporary shelter housing and creating slum areas (The Louis Berger Group, 2005).

At present, automobile ownership and usage is low due to lack of enough available income. In the longer term and as the economy expands, the automobile ownership will increase, but it will likely not happen in a short time considering different economic forecasts. Dhaka is one of the least motorized cities in the world with a figure of approximately 30 motorized vehicles per 1,000 population, and automobile usage limited to 8% of the population (The Louis Berger Group, 2005).

Chittagong is the second largest city and the principal seaport of Bangladesh. It is situated where the river Kharnaphuli meets the Bay of Bengal. Due to those facts, the port city

of Chittagong handles the major volume of export and import of the country in Bangladesh (Ali and Molla, 2009). Its estimated population is about 4 million, still with a rapid population growth, stimulated by divisional headquarters, important trade and commercial activities, industrial bases and educational institutions (Khan and Jafrin, 2014).

In a revision of literature related to the urban planning and future development plans in Chittagong, we can easily find that they are mainly focused in the construction of new roads, widening and improvement of major city roads, consolidation of city road network and ring roads, construction of shopping complex, development of industrial and residential estates and commercial plots and other necessary urban developments. Chittagong has canals and waterways where there is a big potential for a successful mass water transit upon revival and renovation of the canals in their original condition. However, the future infrastructure development plans are mostly oriented in providing infrastructure for motorized traffic, much of which is induced as a natural consequence of the activities in the port area and the traffic demand they generate. We can argue that there is little or no mention of future infrastructure development plans or policies that are oriented to enhance the conditions for any non-motorized transport users.

Khulna is a smaller city than Dhaka and Chittagong yet it is a major industrial and commercial centre, with an estimated population of 1,400,000 inhabitants. The average trip distances vary among 1 – 3 km depending on different trip purposes (Kabir, unknown). The main transportation modes are essentially no different than in other Bangladeshi cities, with bus, rickshaws and scooters accounting for most the motorized urban trips.

2.5.2 Urban transportation in Bangladeshi cities

In the Strategic Transport Plan for Dhaka (2005), it is mentioned that the transportation systems in Metropolitan Dhaka are considered much below standard compared with other

capital cities. Among its main issues, we can find a high rate of collisions and injuries in traffic which are caused by factors such as badly designed and maintained roads, poor driving capabilities, defective vehicles, lack of public awareness, lack of proper traffic management, minimal enforcement, etc.

In Dhaka and other cities in Bangladesh, the pedestrians are frequently forced to walk on the road and are therefore subjected to unnecessarily high risks of accidents. There are many factors contributing to this situation including absence of continuous footpaths. The absence of a clearly defined system for pedestrian mobility makes travel by foot unpleasant and hazardous, and put pedestrians into a much undesired vulnerability situation. Aside from walking and cycling, public transport is the only means of travel for the majority of the city dwellers, albeit the relatively high cost places these modes is usually out of the reach of many lower paid workers. At present the rickshaw is the primary travel mode in the city, together with other six other types of non-motorized transport (bicycles) operating in Dhaka: flat-topped rickshaws; handcarts (known locally as 'thela garis'); hand trolleys; bullock carts and horse-drawn carriages. Interestingly, at times of flooding, most of the motorized vehicles become ineffective and a large number of the city dwellers depend on rickshaws and small boats (dingis) for transport. The poor service provided by the operators makes these modes almost always unpleasant to use.

At present, automobile ownership and usage is low due to lack of enough available income. Dhaka is one of the least motorized cities in the world with a figure of approximately 30 motorized vehicles per 1,000 population, and automobile usage limited to 8% of the population. Despite the low motorization rates, the environmental condition of Dhaka has been very bad for many years and the city is rated as one of the most polluted cities in the world. That has been most largely caused by the two-stroke baby taxis and the diesel-burning buses that circulate in the city. Noise pollution is a serious issue as well in most of the urban

areas of the country.

We can observe that Dhaka has a mixed pattern of land use. This has developed organically to enable people to minimize their journey times by walking, cycling or traveling by rickshaw between their residences and their places of work. The motorized vehicles have played a minor role in providing commuter services. Central Business Districts (CBD) are presently located in a few main areas namely. Manufacturing activity – one of the main industries in Dhaka city - is spread geographically not only in the peripheral zone but also in the immediate and inner zones (garment industries), and this makes workers follow the employment locations by living in nearby temporary shelter housing and creating slum areas. Many of the people who walk from those places to work are landless migrants from the rural areas. As a result, a large number of the journeys in Dhaka are done by walking. This is also due to the fact that the majority of people in the city are poor and are not able to pay for transportation. These people come to the city for work but most of them are unskilled and illiterate. As a result they live below the poverty level which is estimated to constitute about 50% of the total population of the city.

The importance of a 24-hour internal public transportation system, safe walkways and improved street lighting and visibility have been identified as necessary interventions that would help to reduce violence and crime in Dhaka streets (World Bank, 2007) as well as in other cities of the country. Urgent improvements for travel demand management, urban freight transport, implementation of mass transit systems, integration of modes and parking issues are needed in the city. In terms of transport, the goal of poverty alleviation (of uttermost importance) should translate into making the systems affordable to the majority of those wishing to use it.

2.6 Life-oriented approach

As part of travel behaviour studies, life events and life cycle stages have been increasingly considered by researchers. These approaches are commonly based on the assumption that life choices affect travel behaviour in a one-way fashion. Zhang (2015) argues that travel behaviour researchers should put more effort into investigating the relationship between travel behaviour and life choices.

More importantly, the life-oriented approach argues that people's decisions on various life domains (e.g., residence, neighbourhood, health, education, work, family life, leisure and recreation, finance, and travel behaviour) are not independent of each other and that an understanding of life choices should not be constrained by the boundary of any single discipline (Zhang, 2015). One specific life choice may result from and/or affect other life choices (Zhang, 2017). In addition, people face constraints to perform life choices, and the constraints are given by a limited amount of resources of time, money and capability. Accordingly, they must trade-off between life choices, which generates interdependencies.

From the behaviour viewpoint, the ignorance and inability of understanding travel behaviour from the life choice perspective may lead to a biased estimation of travel demand and behavioural changes, and from the transport policy viewpoint, the ignorance and inability may lead to a failure of consensus building. In the case of urban policy, the relevance and importance of the life-oriented approach is more obvious because the urban policy needs to reflect people's various life aspects into the policy decision-making process simultaneously (Zhang, 2014).

Therefore, any understanding of travel behaviour is secondary to a fundamental understanding of life choice decisions. Moreover, the life-oriented approach emphasizes two-way relationships between travel behaviour and life choices. From the perspective of transport policy, the life-oriented approach captures the effects of policy implementation in the form of not only policy outputs (e.g., modal share and trip frequency) but also policy

outcomes (e.g., influence on other life choices and the resulting Quality of Life), whereas other similar approaches tend to focus only on the policy outputs (Zhang, 2015).

In Figure 10 the interdependencies across life domains are depicted. Ultimately, the Life-Oriented approach considers the improvement of the Quality of Life as the motivation behind human behaviour and life choices. Moreover, the correct understanding on human behaviour is influential for the success pf public policies, as stated by Shafir (2013).

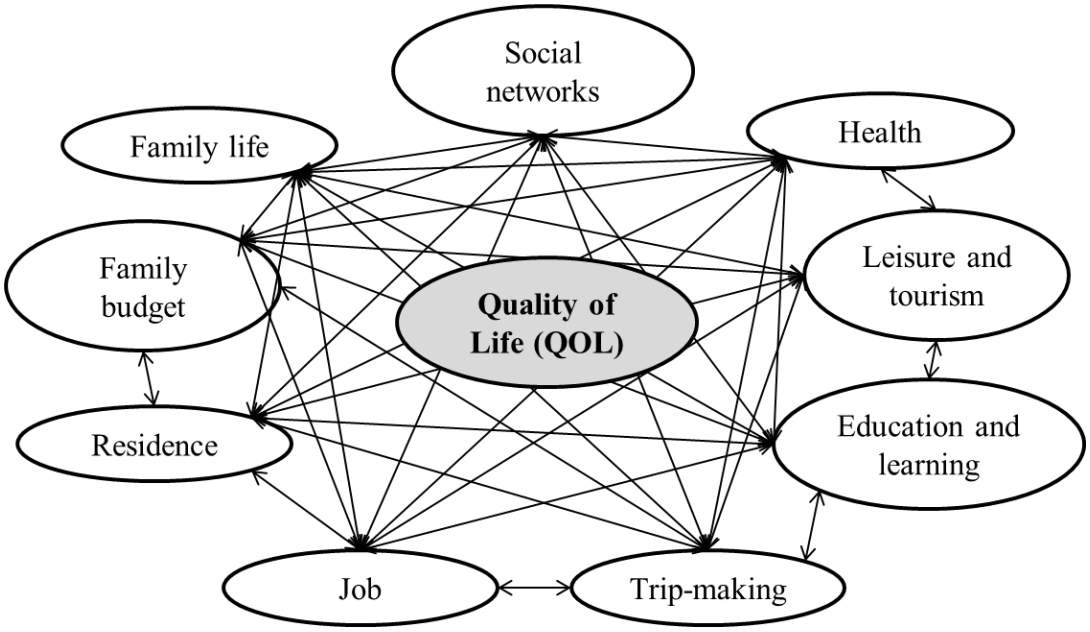

Figure 10. The life-oriented approach: interdependencies across life choices
Adapted from Zhang (2017).

2.7 Health and health-related quality of life

According to the World Health Organization (WHO, 1946), a healthy life means a balanced condition of not only physical health, but also social and mental health. Thus, we note that the quality of life (QOL) directly linked to health is usually called health-related QOL. In addition, the World Health Organization has noted that health is "a state of complete physical, mental, and social well-being and not merely an absence of disease and infirmity".

In order to understand more comprehensively the concept of Health-Related QOL, we

consider three basic components: physical, mental and social. Physical health assumes the ability to function normally in activities, including baseline activity (e.g., standing, walking slowly, and lifting lightweight objects) and health-enhancing physical activity (e.g., brisk walking, cycling, yoga, and dancing). The people who do only the baseline activity are considered to be physically unhealthy (OHA, 2000). Mental health is a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and to cope with challenges (OHA, 2000; USDHHS, 2008). Social health relates to one's ability to participate in society, fulfilling roles as family member, friend, worker, or citizen or in other ways engaging in interactions with others (OHA, 2000, Lando et al., 2006).

2.7.1 The SF-36 questionnaire

The SF-36 health survey is a standardized questionnaire used to assess patient health across eight dimensions (Ware et al., 1993). It consists of items or questions which present respondents with choices about their perception of their own health conditions. Thus, the SF-36 is a short-form survey with only 36 questions. It yields 8 sub-scales of functional health and well-being scores as well as psychometrically-based physical and mental health summary measures and a preference-based health utility index.

According to the definition by Ware et al. (1993), the eight health concepts measured in the SF-36 represent the most frequently measured concepts in widely-used health surveys that have been shown to be affected by disease and treatment. SF-36 items also represent multiple operational definitions of health, including function and dysfunction, distress and well-being, objective reports and subjective ratings, and both favourable and unfavourable self-evaluations of general health status (Ware et al., 1993). The eight sub-scales are: vitality (VT), physical functioning (PF), bodily pain (BP), general health perceptions (GH), physical

role functioning (RP), emotional role functioning (RE), social role functioning (SF) and mental health (MH). A more detailed explanation of the eight sub-scales is provided in the Table 2. The eight health sub-scales of SF-36

.In order to summarize the SF-36 scores, Suzukamo et al. (2011) utilises a three-component model which includes: Physical Component Score (PCS), Mental Component Score (MCS) and the (social) Role Component Score (RCS). They use exploratory and confirmatory factor analysis techniques in their study. By the exploratory factor analysis they could validate the use of the three-component model in function of the proportion of variance explained under the assumed structure (see Figure 11). Based on these findings, the use of the three-component model is more supported for Japan rather than a previous version of the model with 2 components, limited to the PCS and MCS scores respectively.

Table 2. The eight health sub-scales of SF-36

Scale	**Description**
Physical functioning (PF)	A low score indicates that you feel limited in performing all physical activities while a high score indicates that you can perform all types of activities in daily life, including the most vigorous ones.
Role-physical (RP)	You (do not) experience problems with work or other daily activities as a result of physical health
Bodily pain (BP)	You experience a very severe and extremely limiting pain, or you do not have any pain or limitations due to the physical pain.
General health (GH)	This category evaluates the personal health as poor, excellent or a general belief of it likely to get worse.
Vitality (VT)	Feeling tired, worn out; or full of pep and energy all of the time.
Social functioning (SF)	Extreme, frequent or no interference with normal social activities due to physical and emotional problems.
Role-emotional (RE)	You (do not) experience problems with work or other daily activities as a result of emotional problems
Mental health (MH)	You feel nervousness and depression; or calm, peaceful and happy all of the time.

Source: Elaboration by author, based on Ware et al.'s (1993) conceptualization

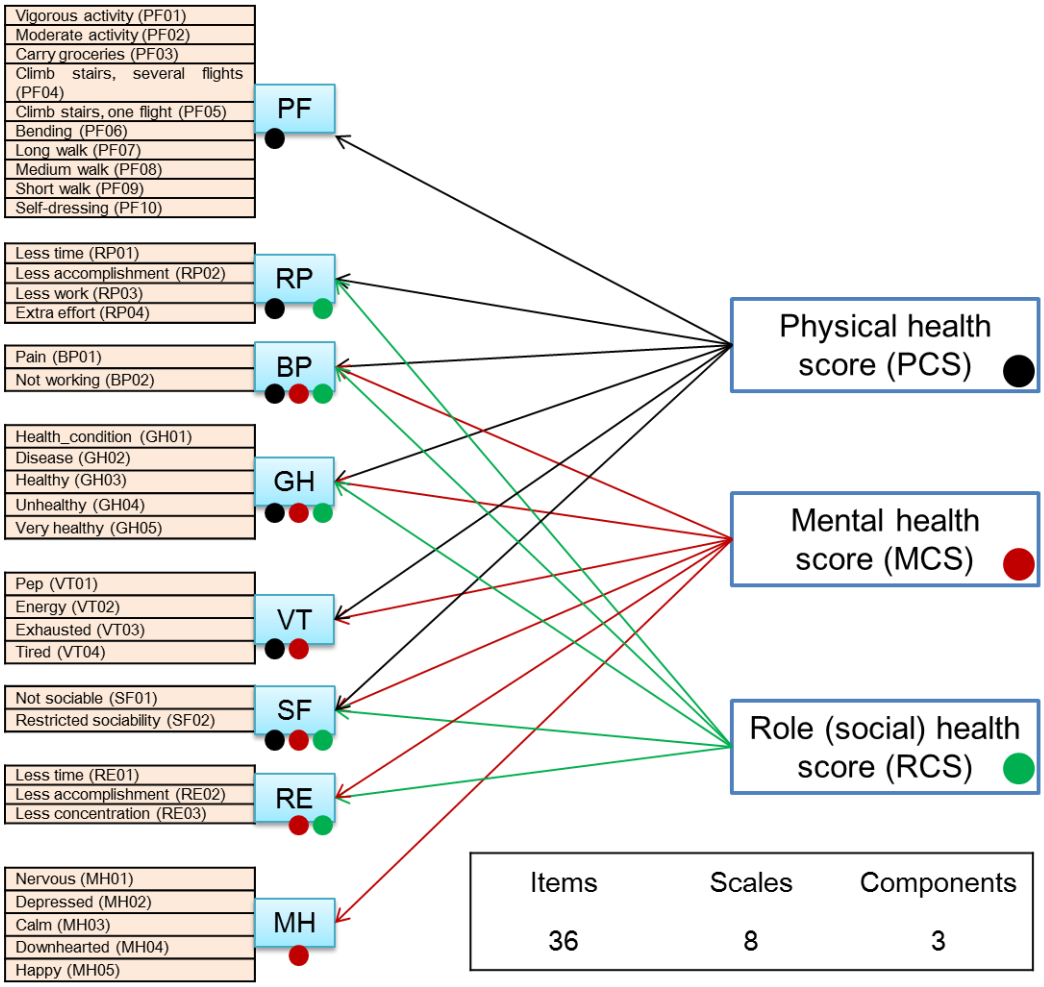

Figure 11. Items, scales and components of the SF-36 model

2.8 Social exclusion in the context of rural japan

Social exclusion has been a widely conceptualized issue, usually considering aspects such as poverty and capability deprivation. The concept of capability relates much to the importance of taking part in the life of the community (Sen, 2000), and also related to the access to the necessary resources for an essential livelihood, thus not limited to a shortage of money but extended to the access to opportunities, social networks, goods and services. A commonly accepted definition of social exclusion is any condition which hinders people to: fully participate and develop their potential in the economy and society, access and benefit from the basic services and opportunities, participate in the decision-making process which affect their

lives, and live a decent life that is in norm with the standard and cultures of their respective society (The Japan Foundation, 2009).

It is generally considered that there have been few or no attempts to measure the extent of social exclusion in the general population of Japan. Furthermore, the concept of the social inclusion/exclusion is also fairly new to Japan. In his study, Abe (2010, 2012) recognizes 8 dimensions of social exclusion: lack of basic needs, material deprivation, exclusion from systems, lack of activities, housing deprivation, lack of social relations (social capital), subjective poverty and income poverty. In contrast, other authors such as Kenyon et al. (2002) recognize several possible dimensions of social exclusion: economic, societal, social-networks related, organized political, personal political, personal, living space, temporal and mobility.

Abe (2010) found that disadvantages at earlier stages of life seem to exhort influences in some aspects of current social exclusion, and that poverty during childhood does not only influence adult well-being via education and occupation (and thus, income) but that there is also a path which connects childhood poverty and adult social exclusion directly. Sen (2000) emphasizes the importance of understanding the relational aspects of deprivation, so that people concerned with practical measurement and public policy have reason to pay attention to the more specific issues to which the ideas of social exclusion studies help to draw attention.

Gray (2006) discusses the importance of social capital as a concept to understand more in depth the implications of social exclusion in rural areas. Whereas social capital has been defined as the connections and relationships among and between individuals, it is suggested suggests that there can be two geographic and social extremes when connecting social capital, rural mobility and social exclusion: one extreme is characterized by communities where local social capital and associated networks are generally weak with people too reliant on the car to

maintain dispersed social networks, and other consists of tight knit communities where social networks are important in conferring mobility in a context of limited and overlapping spheres of activity.

Other cases of the study of social exclusion that are specific to Japan can be found in the literature. Okamoto (2016) points out social exclusion from a housing perspective, since a number of households that cannot sustain housing in Japan is increasing; thus putting elderly people, the handicapped, low-income earners and single parents at special risk of becoming excluded from the rental housing market. Abe (2012) emphasizes the social exclusion that women suffer due to gaps in income, poverty, employment status, education and marital status.

2.8.1 Depopulation in rural Japan

In modern Japan, the large-scale migration from rural areas to the cities of Japan is not a new phenomenon at all, it has been observed in the country since the 1950s. The main destinations for most of the urban migrants have been the larger cities in the so-called Pacific Coast Manufacturing Belt, stretching from northern Kyushu in the west to Tokyo (Kakiuchi and Hasegawa, 1979). The disparities of population and income levels between cities in the Belt and the regions outside of it have been evident since then. The out-migration from rural regions has been largely stimulated by the dynamic and rapid growth of export industries which has created demands for a large number of workers throughout the last decades particularly in sectors such as manufacturing, construction and services.

Due to the deterioration in the socio-economic conditions of the increasingly isolated rural areas, the government of Japan officially recognized and designated these areas as depopulated areas, so that the corresponding administrative units became eligible for governmental aid (Kakiuchi and Hasegawa, 1979).

Japan is one of the first countries in the world to experience the depopulation of society in a serious scale. The population reached its peak in 2008 and since that year, it has been dropping back in approximately 800,000 people (JFS, 2014), and according to expert predictions, Japan is expected to shed about one-third of its population — 40 million people — by 2060 (Makinen, 2016). In consideration of this phenomenon, the Japanese government has repeatedly expressed its intent to make intense efforts to raise the birth rate, and in fact has taken various measures, including providing support to families raising children (JFS, 2014). It is considered however, that none of these measures has had a major impact so far.

The Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has projected that approximately 60 percent of the land area will be unpopulated by 2050 due to the declining population. Based on those projections, development policies are being oriented to prepare for the shrinking population. For the future design of the nation the rapid population decline, the declining birth rate, an aging society, and the upcoming of technical innovations which include drastic advances in communication and information technologies are being considered as the main trends to shape the future development of Japanese society. (JFS, 2014). The government is considering the adoption of measures to counter the depopulation and the low birth rates (1.43 in 2013) such as raising the minimum wage, shortening working hours, and increasing the number of hours for enjoying things other than work. These measures could contribute to reach the target set by the Japanese government to keep the population above 100 million until 2060 and stabilize it at around 90 million in and after 2100 (JFS, 2015).

As a consequence of migration, isolation, poverty and deterioration have become evident in the rural depopulating areas. It has been commonly reflected in worsened means of livelihood for local villagers, abandoned croplands, and a progressive lack of services and facilities that could no longer be adequately maintained, reducing the access to cultural, social

and economic opportunities. Problems associated with depopulation of rural areas include schools being shuttered, vacant buildings that pose serious safety hazards, reduction of bus and train services that can no longer be justified due to economic reasons, abandoned farms and family enterprises. Even higher suicide rates in rural areas of Japan have been largely attributed to social and geographical isolation factors (Otsu et al., 2015).

2.8.2 Life plans and migration of young people

Recent studies have increasingly focused attention on the life preferences of young people. Garikapati et al. (2016) reports that the Millennials generation (young people born mostly between 1979 and 2000) have been found to travel less, own fewer cars, have lower driver's licensure rates, and use alternative modes more in comparison with recent previous generations. Other features distinguishing the Millennials generation that have been identified are: less value of ownership in favour of a sharing economy (Lutz, 2014), delaying marriage and waiting to have children (Garikapati et al., 2016), increasingly seeking overseas travel experiences (Machado, 2014), increasingly seeking to live in suburban locations that offer the amenities and benefits of city living without the associated challenges (Rossenfeld, 2015), no longer valuing a steady job and considering a good impact in society through a purpose-driven life (Guay, 2015).

Nevertheless, for Japanese Millennials there are other special characteristic issues that must be highlighted. In comparison to other countries of the world, many more young Japanese still prefer a long-term stable employment at a major company, are less likely to get married in comparison to older generations due to a pessimistic perspective of the future economy due to relatively low and stagnant wages, save a larger share of their earnings consuming less in average than other age groups, shop more online, rely heavily on their parent's income (Hoenig and Ujikane, 2016; Yoshikawa, 2016), have less interest in sex and

relationships (Jozuka and Ripley, 2016) and have still one of the lowest participation rates of females in the workforce (Kadakla, 2015).

The gender gap in Japan has been historically and still today a serious issue. The rapid industrialization and urbanization of the Japanese economy in the post-war period and its vigorous growth established and entrenched the male breadwinner and female homemaker as Japan's social norm, largely supported by the key elements of the life-time employment system such as the seniority wage system within a pyramidal structure (Osawa, 2012), so most persons working away from home in Japan are males (Otsu et al., 2004). Furthermore, Japanese working women are frequently confronted with the choice between work and family, which leads to low fertility (JFS, 2015). The social norm has been largely supported by the employment system adopted by most of the big corporations in Japan. On the other hand, in Japan the wealth is becoming more concentrated, and many economists coincide that it is increasingly difficult for younger workers to spend much, have families, buy houses, invest in stocks or access property in general; as consequences of imbalanced tax systems and many younger workers side-lined into low-paid, dead-end jobs (Pesek 2015).

Due the aforementioned characteristics of the employment system in Japan, some people argue that the permanent employment system in Japan is on the way to collapse, something that is reflected in an increase in the number of unstable jobs (Iizuka, 2017) and the working poor. There has been a notorious rise in non-permanent workers and working poor, with inequality being the cause of the worsening employment situation in Japan (JFS, 2017) and evidencing not only a wage disparity between regular salaried workers and contract workers but important changes in the attitudes of young people. It seems that– at least for some - the perspective of a lifetime fixed employment position in a big company is not regarded as a synonym security and satisfaction for a special and increasing number of young people. It was recently found that regular employees and employees with long work hours are working

longer hours than they actually want to and prioritizing their personal lives over work much less than they actually would like to do (Niitsu, 2016).

These changes in the attitudes of young people towards the work-life balance can reasonably be contributive for the rise in the numbers of non-permanent workers. Alternatively, in Japan it is becoming increasingly common to find cases of young people who are opting for the benefits of "slow living" over the hustle and bustle of big city life and trying to "rediscover the value of old things that were left behind during modernization" (JFS, 2016). Plans for retirement, considerations of poverty, sustainable lifestyle and culture, preference for organizations that prioritize social contributions over profits by young professionals (JFS, 2016), and even increasing possibilities to pursue a career from remote locations are nowadays influencing the decisions for migration of important sectors of young population.

2.9 Time perspective theory

The basic concept of time perspective theory is that our perception of time influences our actions. So the time perspective is a fundamental dimension in the construction of psychology that emerges from the cognitive processes that partitions the human experience into past, present and the future (Zimbardo & Boyd, 1999). In other words, our sense of psychological time refers to the way that our decisions are framed by the time zones that we have learned to prefer and tend to overuse. The time zones that we prefer are determined by multiple factors including childhood experiences, education, culture, social environment, and other experiences with economic and family life. They gradually turn into reason for most of us to develop a biased temporal orientation that favours one time frame over others, thus becoming excessively oriented to past, present, or the future (Zimbardo, 2012).

The Zimbardo Time Perspective Inventory (ZTPI) was created to make it possible to

determine exactly the extent to which we fit into each of these time zones (Zimbardo & Boyd, 1999). In addition, the ZTPI correlates scores on these time dimensions with a host of other psychological traits and behaviours, making the ZTPI scales useful to predict a wide range of behaviours, such as risk taking, alcohol, drug use and abuse, environmental conservation, medical check-ups, creativity, problem solving, and much more (Zimbardo, 2012). Increasingly more behaviours and choices that are considered irrational could be better explained by applying the concepts of time perspective. Figure 12 shows the five different time perspective possible profiles that describe people's prevalent time zones when it comes to decision-making: past positive (PP), past negative (PN), present hedonistic (PH), present fatalistic (PF) and future oriented (FO). An additional dimension called "transcendental future" is used to describe spiritual and religious beliefs, however usually considered separately from other time perspective profiles.

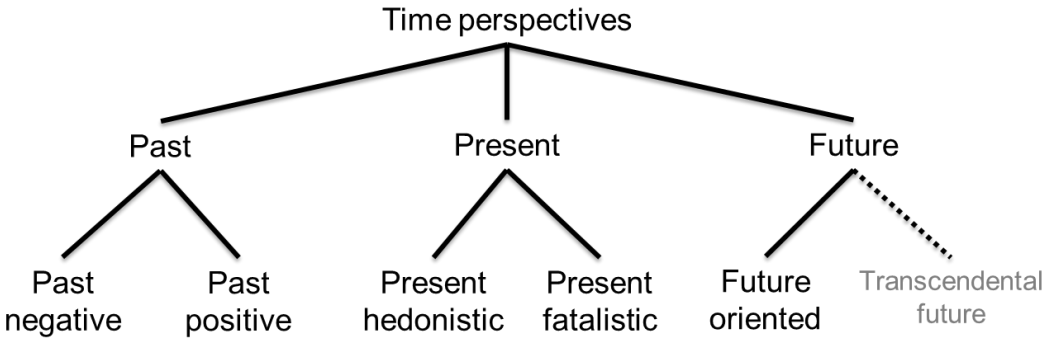

Figure 12. Classification of time-related perspectives

The past oriented people tend to focus more on earlier experiences and memories. They also tend to be conservative and much concerned over maintaining the status quo. Past-oriented individuals have also a sense of rootedness. The past-negative (PN) people tend to focus on traumatic events of the past, regret, failure, abuse and other aversive views of the past. On the other hand, the past-positive (PP) people tend to focus on nostalgia, gratitude and successes of earlier times. The present-hedonistic people (PH) prioritizes pleasure, novelty

and sensation seeking, so they tend to be highly impulsive for making decisions and are much more risk-taking in comparison to others. The present-fatalistic people (PF) tend to believe that the future is predestined and uninfluenced by individual actions. The future-oriented people (FO) have a behaviour dominated by striving for future goals, and accept the delays of immediate gratification to achieve longer-term better goals, they tend to healthier behaviours and are much more aversive to take risks (Boyd and Zimbardo, 2008; Zimbardo, 2012; Stolarski et al., 2015).

2.10 Active travel and health-related quality of life

It is generally argued that the promotion of active travel (cycling and walking) in daily life can contribute to the improvement of health conditions, especially if cycling and walking replace short-distance car trips (WHO, 2014). Travel is generally recognized as an essential component of life and a means of providing access to goods and services. Different travel modes are associated with specific impacts on society, including health, environment, and social effects (WHO, 2014). On the other hand, the level of physical activity involved in daily travel is of particular interest because most people must travel to meet their daily life needs.

Among the benefits of walking and cycling for health, we can count a reduced risk of premature death, heart disease, diabetes, high blood pressure, breast cancer, depression and anxiety, and increased psychological well-being, among others (De Jong et al., 2003; Nurul, 2012; Ohta et al., 2007; Olmedillas et al., 2012; De Hartog et al., 2010; Pucher et al., 2010; Rojas-Rueda et al., 2011; Oja et al., 2011). The World Health Organization (WHO) European Charter on Counteracting Obesity mentions that safe cycling and walking are part of the package of measures and policies to be promoted to address overweight and obesity (Ohta et al., 2007). Among individual motivations to adopt cycling and walking as part of daily travel behaviour, it is possible to count health, a desire to build community and familial ties, and

financial considerations (Gayah et al., 2013).

2.10.1 Active travel in Japanese cities

In Japan, urban cycling is a widely accepted transportation mode, even though Japanese cities do not have extensive cycling networks. Traditionally, Japanese urban cycle plans consider aspects such as shared pedestrian/bicycle circulation areas in most sidewalks, implementation of bicycle parking facilities around railway/subway stations and road markings for bicycle zones within road intersections (Andrade et al., date unknown). It is important to note that under the current regulations, bicycles are not allowed on public transport in Japan, and a bicycle can only be carried under very restrictive conditions (the use of special bags to cover them is necessary, for instance).

While Japanese cities are amongst the largest and most populated in the world, residential neighbourhoods within Japanese cities in terms of services are largely self-contained. Residents usually have to cycle no more than 5 to 10 minutes to reach supermarkets, kindergartens, schools, doctors, dentists, and other services covering most necessities for everyday living, since they can be found within walking or cycling distance without the need to travel excessive distances (Kidd, 2012).

However, “self-contained” does not necessarily mean that residents are satisfied with their residential environment, living functions, and services provided. In fact, suburban large-scale shopping centres built along roadsides are popular in Japan. This is partially due to some dissatisfaction with the services provided by neighbourhood shopping stores, and a car-dependent lifestyle. Other factors such as efficient public transport systems, the cost and inconvenience of owning a car in big metropolitan areas, and the provision of bicycle parking infrastructure are important factors that contribute to the extensive daily use of bicycles in almost all urban areas of Japan. In Table 3 we introduce the modal share information for some

of the main cities of Japan that were included as survey locations in this study. As can be seen, non-motorized trips in Japanese cities account for a very significant part of the modal share. While the use of cars can be as low as 13%, the use of non-motorized modes (walking and cycling) for travel can be 28%–57% of all trips undertaken in the selected urban areas (MLIT, 2010).

Table 3. Modal shares on weekdays in major Japanese cities

	Train	Bus	Car	Motorcycle	Bicycle	Walk & others
Sapporo	17.6	3.9	42.0	0.3	11.4	24.8
Sendai	11.2	6.4	50.3	2.5	10.1	19.5
Saitama	30.1	1.7	26.6	1.8	18.4	21.4
Chiba	27.4	1.6	38.2	0.8	10.5	21.6
Tokyo (23 wards)	36.7	3.8	14.2	1.7	16.3	27.3
Yokohama	35.8	7.0	21.7	2.7	7.1	25.8
Kawasaki	42.0	3.5	15.7	1.7	12.1	25.0
Shizuoka	7.5	2.2	46.6	4.1	21.4	18.1
Nagoya	18.9	2.1	42.9	1.0	15.5	19.7
Kyoto	18.8	5.2	26.4	5.5	18.2	25.8
Osaka	30.0	2.2	13.6	2.2	27.6	24.3
Sakai	20.2	1.5	39.7	3.5	18.7	16.3
Kobe	27.6	4.6	29.5	3.3	9.1	25.8
Hiroshima	8.8	5.0	47.6	5.7	12.5	20.3
Kitakyushu	5.2	8.0	56.9	1.9	5.8	22.2
Fukuoka	11.4	6.0	35.2	3.8	15.1	28.5

Source: The Nationwide Person-trip Survey in Japan, 2010 (MLIT, 2010).

2.11 Influence of the built environment on active travel behaviour and health-related quality of life

A built environment that promotes walking can be associated with improved health conditions in many different ways, so urban planners clearly need to integrate health and active living considerations fully into their work (Davis, 2005). A positive relation was found between built environment factors (density of places of employment, household density, green and open spaces for recreation, number of street intersections) and walking activity at the neighbourhood level (Li, 2005).

Active transport, which includes travel by foot, bicycle, and other non-motorized vehicles, has been identified as a strategy that could increase community physical activity levels while producing other environmental and social benefits. Access to large, attractive public open space increases the odds of higher levels of walking, and is said to be restorative, reducing mental fatigue, improving well-being, and increasing opportunities for social interaction (Giles-Corti, 2006). The quality of the public realm and public spaces appears to be important for health, both mental and physical, yet further research is needed to quantify the strength of association between green spaces and urban health, but also to investigate the psycho-social and economic dimensions that are more difficult to measure (Lee and Maheswaran, 2011).

Health research on the consequences of suburban sprawl has been to some extent limited (Frumkin, 2003). We know that urban sprawl contributes to health inequalities because residents there have less access to exercise opportunities and healthy food than do others, usually wealthy people (Giles-Corti, 2006; Resnik, 2010; Gordon-Larsen, 2006). Sometimes, people want to live outside of city centres to avoid traffic congestion, noise, crime, and other problems, and to have homes with more square footage and yard space; however, there is substantial evidence that urban sprawl has negative effects on human health and the environment (Frumkin, 2003; Giles-Corti, 2006). In general, more negative than positive effects of urban sprawl have been observed for public health, partially due to factors linked to physical activity, daily life, increased dependency on motorized travel, and reduced population densities.

Although most of the available evidence in the literature mentions the benefits to health of high density environments that encourage cycling and walking, some studies suggest the negative effects of high-density living on the availability of green areas where people can do healthy activities (Echenique et al., 2012). This might be applicable to the case of Japan.

Research strongly suggests that greenery-filled public areas that are close to residences and easy to walk in should be further emphasized in the development and redevelopment in the metropolitan areas of Japan through cross-sectoral collaboration. Such greened areas positively influence the longevity of urban senior citizens, independent of attributes such as their age, sex, or socioeconomic status (Takano et al., 2002).

Attention to the health problems of the urban centres has focused largely on social and organizational factors rather than features of the built environment. Some studies in public health research suggest that environmental changes may be more effective in changing long-term physical activity patterns than are interventions centred on structured activities such as formal exercise programs. If so, then we may find that interventions to promote walking could contribute substantially toward increasing the activity levels of even the most sedentary residents (Oglivie et al., 2007).

Having enough evidence that the environment does influence levels of physical activity and obesity, another body of evidence appears to suggest that any influences of the environment are small, that the mechanisms by which environmental components may operate are as yet unclear, and that the exact environmental components that affect body weight and activity are yet to be identified (Jones et al., 2007). Thus, further research is required to establish how different environments affect different individuals, because individuals interact with the environment on a number of levels, and experience effects from the physiological and emotional to those related to social, spiritual, and intellectual well-being (Lake et al., 2006; Frank et al., 2006).

2.11.1 The influence of open spaces, parks and other facilities

Many of the best places for increasing the activity levels are neither the home nor the workplace, but are rather “third places” in the public realm, such as streets, sidewalks, parks,

cafes, theatres, and sports facilities. Such public places are important venues for a wide variety of activities, of which some—such as social interaction and physical activity—have clear health implications (Frumkin, 2003). Those places create a sense of convenience and this convenience is often positively associated with walking (Jones et al., 2007), as are some aspects of urban design (particularly property density and street connectivity) (Jones et al., 2007; Li, 2005). Thus, these aspects need to be considered as a fundamental criterion when siting, designing, and building public places in ways that attract people, encourage them to socialize, and promote physical activity in the environment.

We know for a fact that having parks is beneficial for cities and urban dwellers. In city parks, people can spend time on activities, such as walking a dog, playing sports, eating outside, or enjoying the natural environment. Leisure activities in parks can provide many health benefits, from providing direct contact with nature and a cleaner environment, to offering opportunities for physical activity and social interaction (Gies, 2006). A group of studies reviewed in the American Journal of Preventive Medicine showed that "creation of or enhanced access to places for physical activity combined with informational outreach" produced a 48.4% increase in the frequency of physical activity. The same studies showed that easy access to a place to exercise results in a 5.1% median increase in aerobic capacity, along with weight loss, a reduction in body fat, improvements in flexibility, and an increase in perceived energy (Gies, 2006; Kahn et al., 2010). Other studies have associated parks and their greenery with significantly higher levels of active travel and of not being overweight or obese, as well as with other self-rated health indicators that provide evidence for important causal pathways that could provide a focus for public health intervention strategies (Cummins, 2005).

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3. Data collection

Chapter 3
Data collection

In this chapter, we introduce the main features of the data that have been collected and used for the development of this study.

Principally, 3 surveys were conducted, so this chapter will be divided in 3 sections, whereas each section related to a different location and survey conducted. The sections will be covered according to the chronological order in which the different surveys were conducted. The first study was conducted in 2010, and data were collected in 20 Japanese cities (information used for chapter 8). The second survey (information used for chapters 4 and 5) was conducted in the period March – May 2015 in the three main cities of Bangladesh: Dhaka, Khulna and Chittagong. Finally, a survey was conducted in the period May – September 2016 in rural and locations of Hiroshima prefecture (information was used for analysis in chapter 6).

3.1 Survey on health-related quality of life

A health-related QOL survey was implemented in 20 major Japanese cities during November 22– 29, 2010. The selected areas were Tokyo, Osaka, and Nagoya (as the three megacity metropolitan areas in Japan), and 17 other government-ordinance-designated cities that are smaller in terms of population but still with a population larger than 500,000 inhabitants: Sapporo, Sendai, Saitama, Chiba, Yokohama, Kawasaki, Sagamihara, Niigata, Shizuoka, Hamamatsu, Kyoto, Sakai, Kobe, Okayama, Hiroshima, Kitakyushu, and Fukuoka (see Figure 13). The differences in population and population density among the selected areas can be observed in Figure 14.

Figure 13. Locations of the survey in Japan

For this questionnaire survey, the target number of samples was set to 1,000 persons. The survey was done with the help of a major Internet survey company, which had more than 1.4 million registered members. The respondents were randomly selected but they reflected some representative attributes of the population (age, gender, and residential locations). To reach the desired target within a limited survey time (a week), a total of 14,534 members were contacted. As a result, valid answers were successfully collected from 1,213 persons, with a return rate of 8.3% (Zhang et al., 2013).

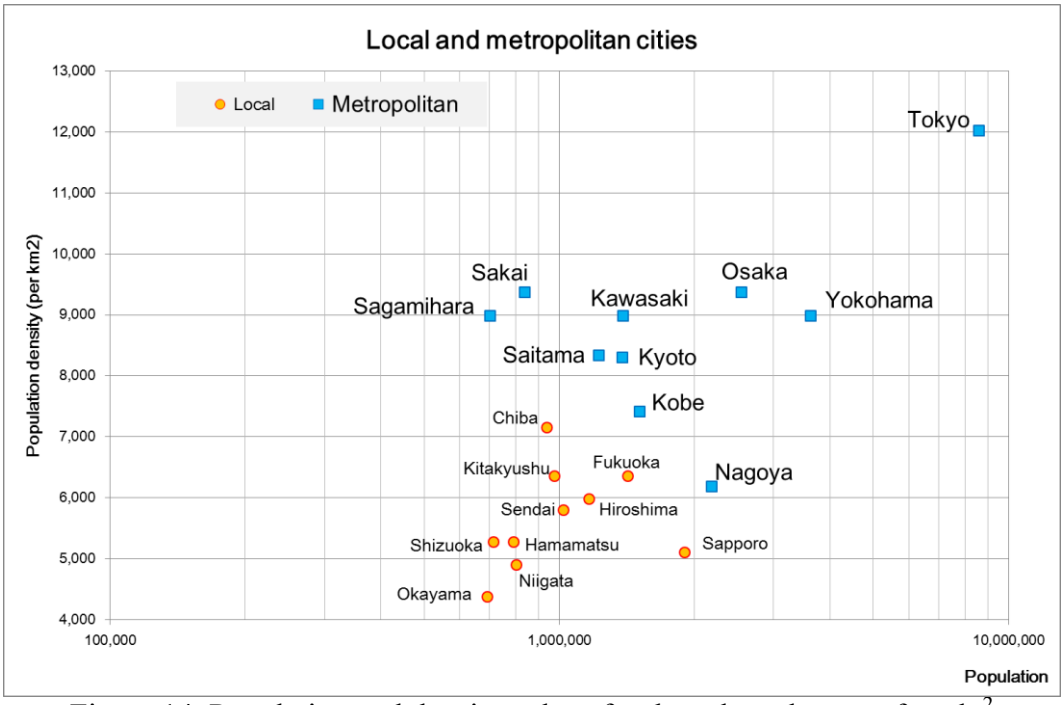

Figure 14. Population and density values for the selected areas of study[2]

The questionnaire consists of questions about travel behaviour, health-related QOL, residential environment, lifestyle habit, health promotion activities, park usage, QOL (happiness and life satisfaction), and individual and household attributes.

The questionnaire consists of health conditions, lifestyle habit, health promotion activities, park usage, daily activity and travel, residential environment, evaluation of happiness and life satisfaction (well-being indicators); and certain individual and household attributes. These contents were selected based on careful literature review.

- Individual attributes: questions regarding individual and socio-economic attributes are included here, like age, gender, occupation, household characteristics, possession of driving license and/or a car, and level of happiness, etc.
- Residential environment: The distance to nearest facilities in the neighbourhood or the city district where the respondents live (e.g. city hall, post office, schools, hospitals, train

[2] Elaboration of the figure was based on data from the Statistical Survey Department, Statistics Bureau, Ministry of Internal Affairs and Communications. Japan. 2012.

stations, bus stops, park, etc.).

- Housing data: The type and style of house, disposition of elevator and household income are considered in this section.
- Health habits: Questions about lifestyle and daily healthy habits are formulated to the questionnaire respondents, which include: eating breakfast every day, having enough sleep, eating balanced meals, not smoking, playing sports, not drinking alcohol, working within 9 hours a day, and not suffering conscious stress. The health habit indicators were included based on the eight indices proposed by Morimoto (1987).
- Description of health condition. Body characteristics, history of serious disease, subjective evaluation of health conditions and questions regarding the eight subscales of health-related QOL are given to the respondents in this part of the survey.
- Physical activity: In this section of the survey, the respondents provide answers for their practice of different types of sports; and time spent in social activities and communication with family, which are characterized in terms of frequency, activity period in the day, time of the day, place, company, mean of transportation to do these activities and affective experience to do these activities.
- Daily activity and travel. A limited number of activities that demand travelling are listed in this part of the questionnaire. These activities are: commuting or schooling, business, shopping, leisure (amusement, recreation or social contact), sports, non-academic learning and research, volunteering, health care, eating out, personal affairs (like going to the bank or the city hall) and other private business. These activities are characterized by the following attributes: frequency, main travel mode, and distance travelled (from home to the respective activity). The possible travel modes are grouped in the following categories: active (walking, cycling), public transport (bus, train, streetcar or monorail) or other more private modes (car as driver, car as a passenger, taxi, motorcycle or others).

3.1.1 Individual attributes

Questions relevant to the individuals' individual and household attributes were asked to the respondents anonymously. Some of the most relevant features are summarized in Table 4.

Table 4. Individual attributes of respondents in the survey

	N	Min	Max	Mean	SD	Percent (%)
Gender (1 = Male)		0	1	.51	0.50	50.5
Age (years)		15	69	42.14	13.41	
Age group						
15 - 19	77					6.3
20 - 29	129					10.6
30 - 39	336					27.7
40 - 49	349					28.8
50 - 59	161					13.3
> 60	161					13.3
Young adult? (under 35)		0	1	.31	0.46	31.4
Elderly? (over 65)		0	1	0.07	0.25	6.7
Household size		1	9	2.74	1.30	
Children in household		0	1	.33	0.47	32.6
Students in household		0	1	.12	0.33	12.1
Elderly in household		0	1	.22	0.41	21.8
Have a driving license		0	1	.84	0.37	83.8
Have a car		0	1	.50	0.50	49.7
Annual income (x1M JPY)		0.5	29.8	6.21	4.22	

3.1.2 Travel behaviour

When examining the use of different travel modes in the Japanese cities by differencing the type of city involved and the purpose of trip, we can note important differences in the use of non-motorized and private travel modes. More specifically, we can observe a higher car-dependency in local cities than in metropolitan areas of Japan, while we can observe the opposite tendency regarding the use of non-motorized modes, i.e. walking and cycling. Even though the use of bicycles for commuting is of great importance in local cities, in general we can observe that walking as travel mode for all the proposed purposes of trip is more extended in metropolitan cities, whereas the use of car is largely more extended in the local cities of

Japan.

The differences between the shares of users who use car, bicycles and walk for different trip purposes sorted by the type of can be observed in detail in Figure 15. In Figure 16 the number of people by each travel mode type (non-motorized, public transport or private vehicle) and each purpose of travel can be observed.

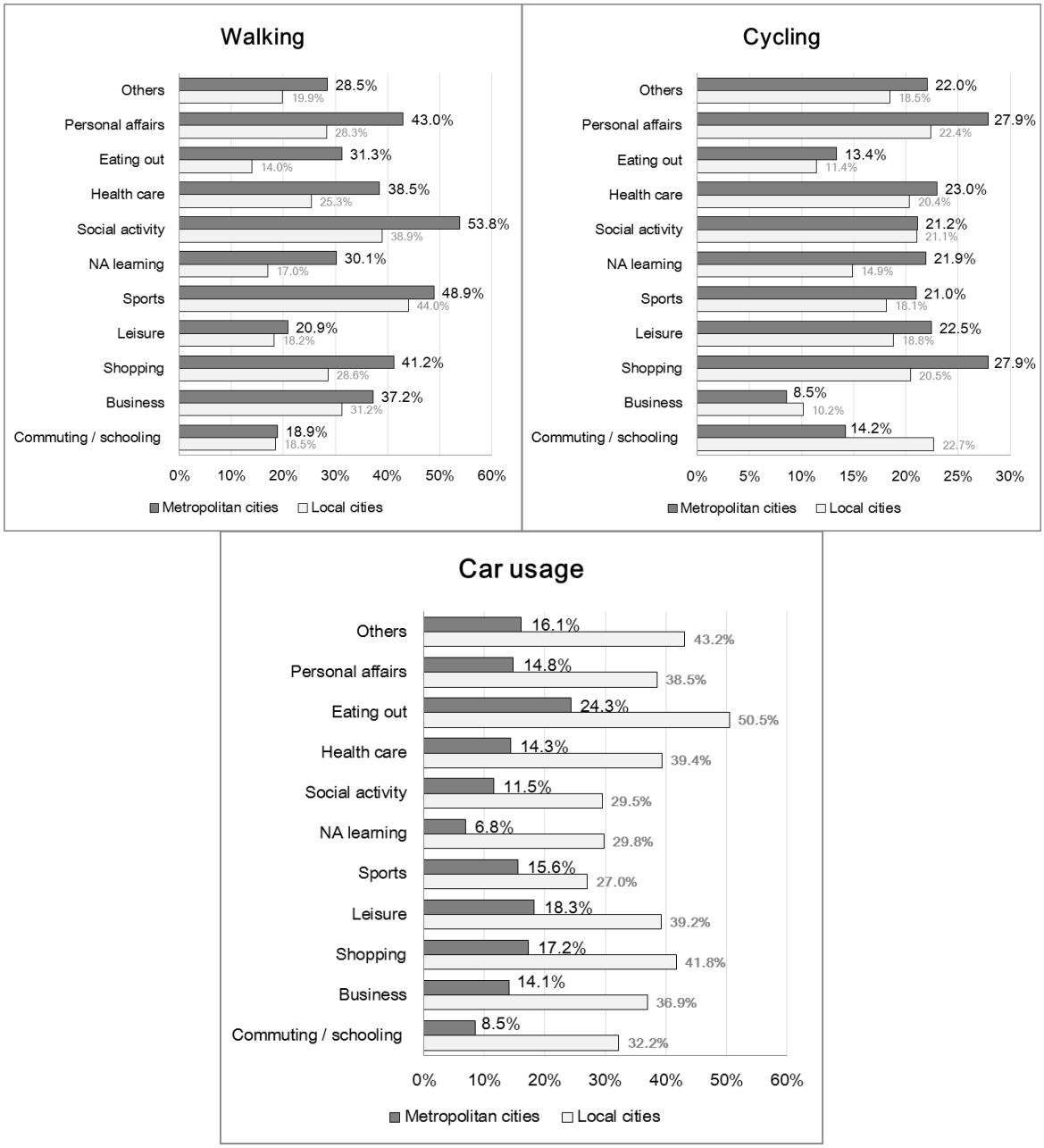

Figure 15. Walking, cycling and car usage according to the type of urban area

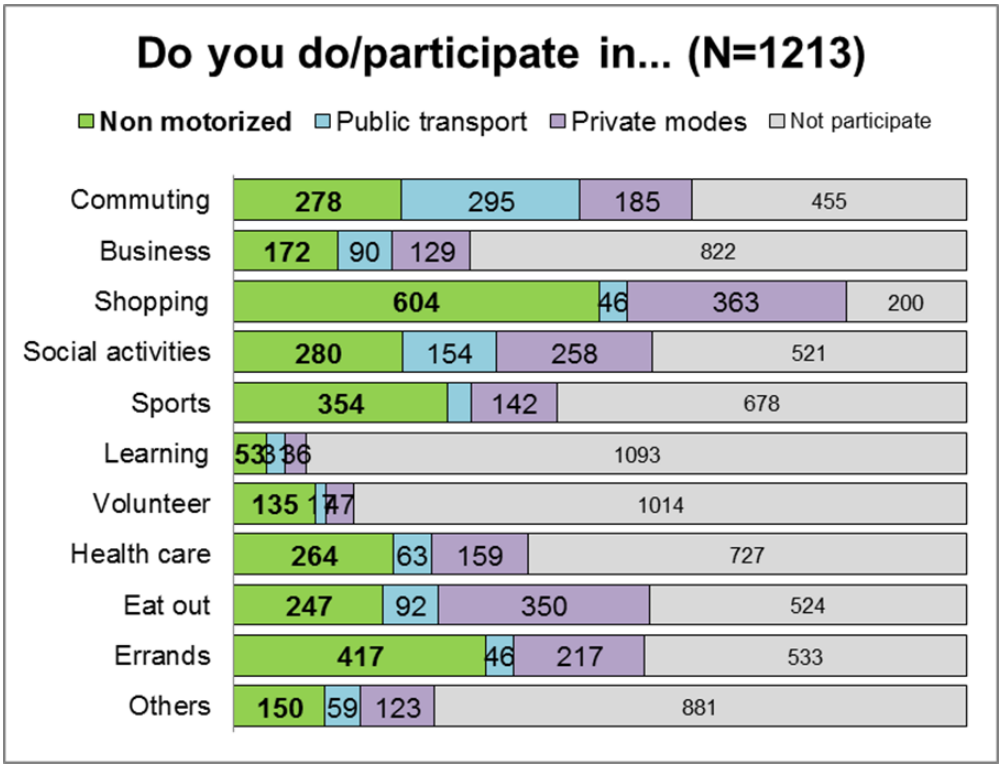

Figure 16. Distribution of main travel mode groups for different travel purposes.

3.1.3 Well-being related indicators

In the survey the respondents were asked to evaluate in a 5-rate scale their satisfaction regarding several life domains. The distribution of scores can be observed in Figure 17. Figure 18 shows the aggregated responses to the questions related to the frequency of practice of the listed health habits. In Table 5, Figure 19 and Figure 20 the histograms and descriptive values for Physical Health, Mental Health, Social Health (Health-Related Quality of Life), total life satisfaction (obtained from a summation of the values for satisfaction with several life domains as displayed in Figure 17) and happiness are shown. Details of calculation of health-related Quality of Life scores can be observed in appendix C.

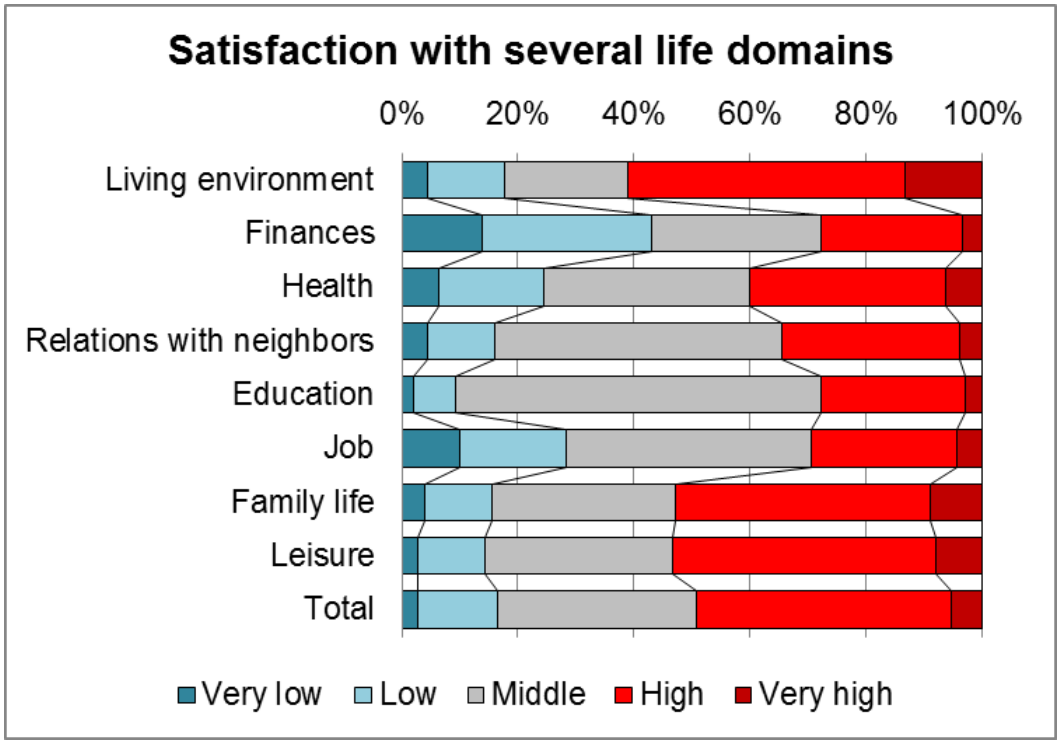

Figure 17. Satisfaction of respondents with several life domains

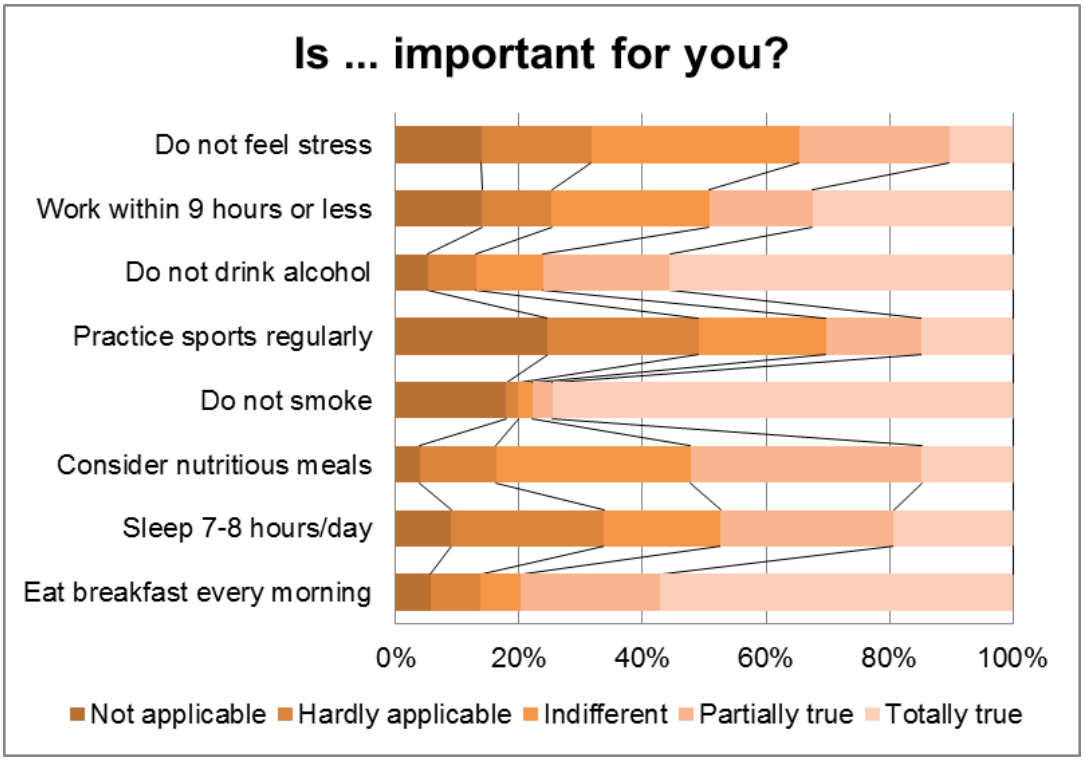

Figure 18. Subjective importance of health habits

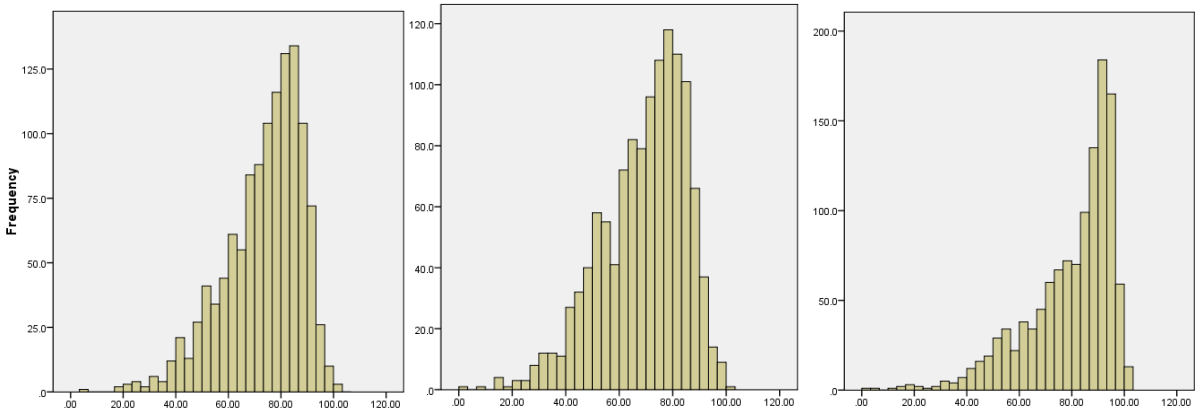

Figure 19. Histogram for the health related indicators (PCS, MCS and RCS)

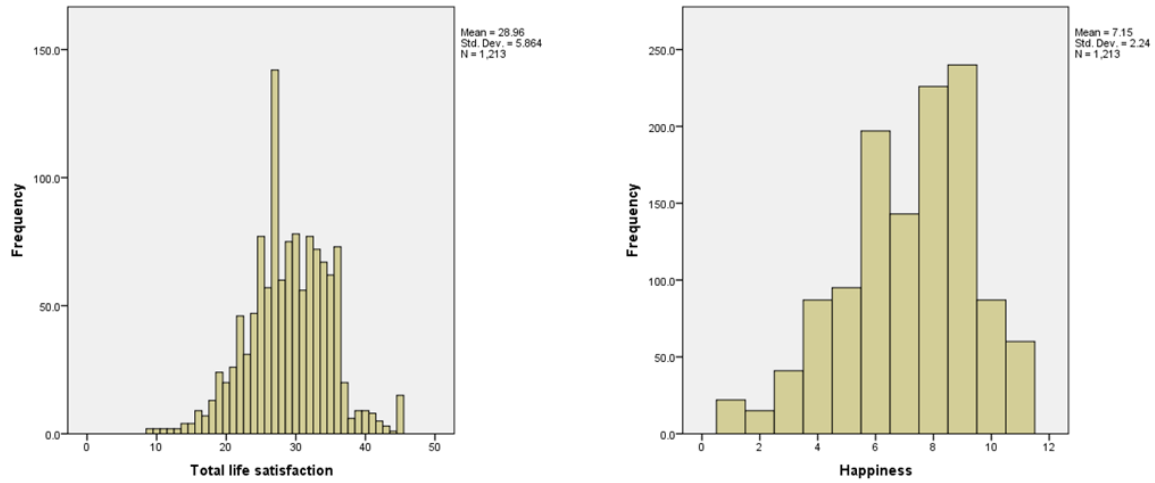

Figure 20. Histogram for Total life satisfaction and Happiness scores.

Table 5. Descriptive statistics of Well-being indicators

	Min	Max	Mean	SD
Physical component score (PCS)	5.4	100.0	73.38	14.8
Mental component score (MCS)	3.2	100.0	69.08	15.8
Role (social) component score (RCS)	.0	100.0	79.75	16.3
Total life satisfaction	9	45	28.96	5.8
Happiness	1	11	7.15	2.2

3.2 Survey in Bangladesh: aspects of transport-based social exclusion

Considering the theoretical aspects of transport-based social exclusion that were discussed in the previous chapter, we designed a survey questionnaire trying to reflect the seven different categories into questions that were adapted to the local context as adequately as possible. 200

sample questionnaire answers were collected in Chittagong and Khulna respectively and 300 sample questionnaire were collected in Dhaka city, for a total of 700 sample answers. The survey questionnaire answers were collected via face-to-face interviews at the household locations in the respective cities, between March and May 2015.

In the survey we inquired about the following aspects: sociodemographic attributes, house and household attributes, use of time during weekdays and weekends, travel behaviour for various purposes, distance to facilities in the urban area, access to services, perceptions of accessibility, road safety and security in the residential area, and life satisfaction regarding several life domains. These questions were oriented to find variables that can adequately reflect the different dimensions of transport-based social exclusion. Some of the questions are based on the self-reported difficulties with aspects of transport in order to measure transport disadvantages (Delbosc and Currie, 2011).

In the questionnaire survey design we reflected the findings in the literature review related to the dimensions of transport-based SE by Church et al. (2000), adapting these dimension-related items as much as possible to the social, economic and geographic characteristics of the places we surveyed in this study. In order to find the ways that transport disadvantage affects the quality of life and well-being of urban dwellers in Bangladesh, we conducted a survey in Dhaka, Chittagong and Khulna with 300, 200 and 200 valid sample answers respectively, for a total of 700 valid sample answers. The answers were collected through face-to-face interviews, in which the participants and the interview locations were randomly selected among public places in selected neighbourhoods (see Figure 21).

For the identification of transport disadvantages, the participants of the survey were asked questions that tapped into five out of the seven factors of transport exclusion (i.e. transport disadvantage) identified by Church et al. (2000).

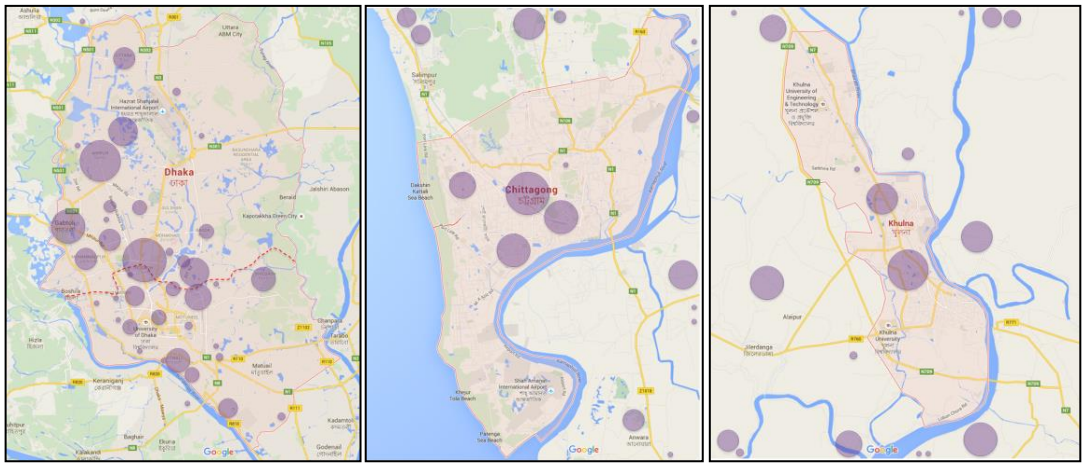

Figure 21. Geographical distribution of the respondents' residential locations in the survey

For the assessment of geographical, economic and time-based categories we use indicators aimed to reflect individual and household attributes (i.e. location, income, transport expenditure), use of time and travel behaviour. The assessment of physical and fear-based categories is based on respondents' self-assessed indicators of accessibility and safety. We hereafter summarize the parts of the survey that we are employing in this study:

- Individual and household attributes: in this part of the survey we ask the respondents their age, religion, gender, education level, occupation, residential location, monthly income, monthly expenditure for transport and food, house characteristics and household composition. The most important occupations are labour (in factories and warehouses), retail vendors and rickshaw drivers (see Figure 22). In the Figure 23 we display the distribution of educational level among the respondents of the sample in each city. It can be observed that for all the location the percentage of illiterate members of the population is considerably high.

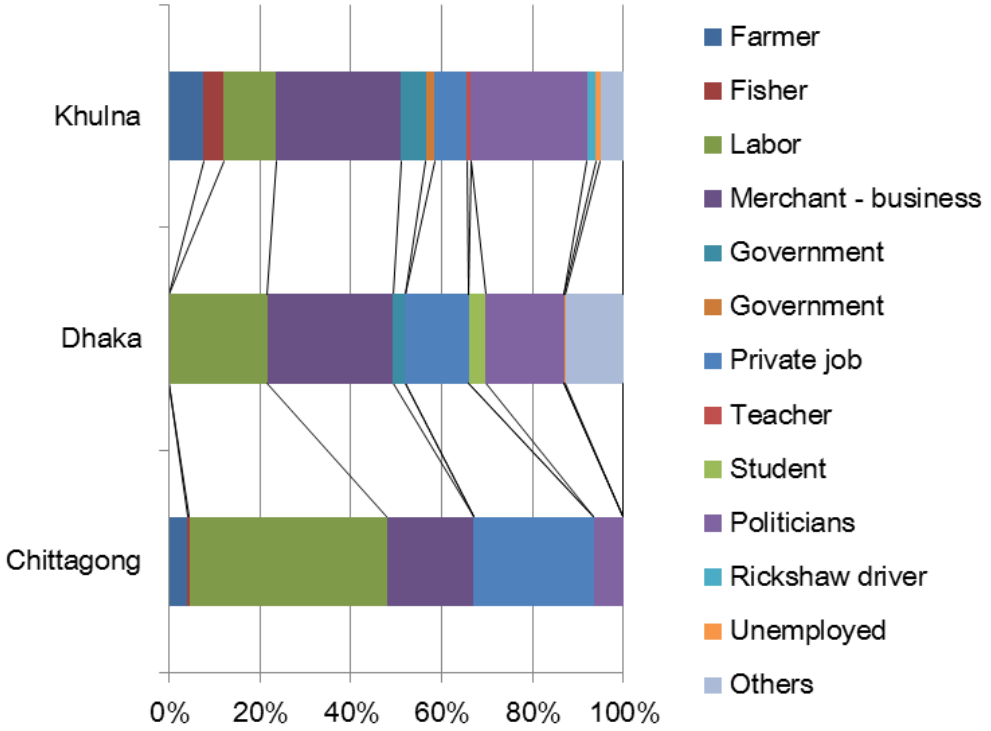

Figure 22. Occupation of the respondents in the Bangladeshi cities.

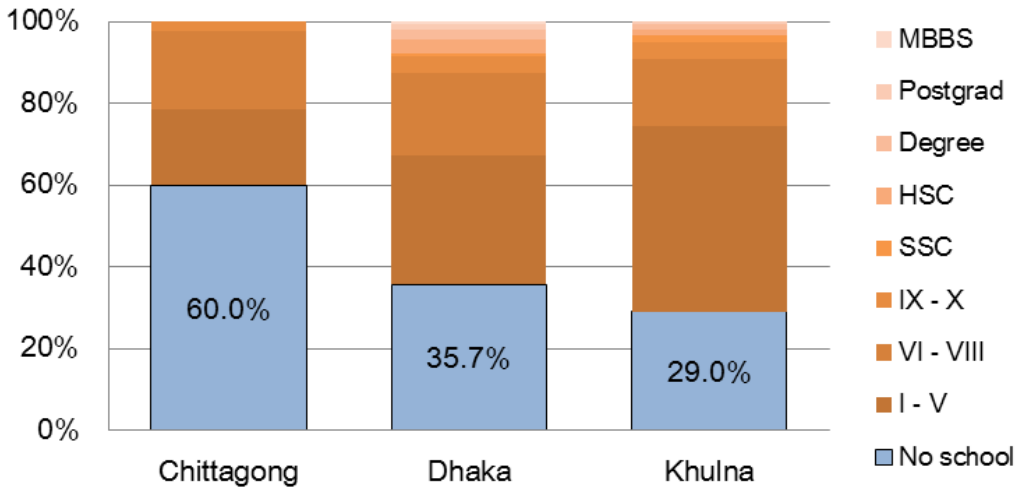

Figure 23. Education level of the respondents in the sample by city

In Chittagong, the average time of living of the respondents is 24.1 years. The times for Dhaka and Khulna are 12.7 and 5.7 years respectively Details of the cumulated frequency histograms can be observed in Figure 24.

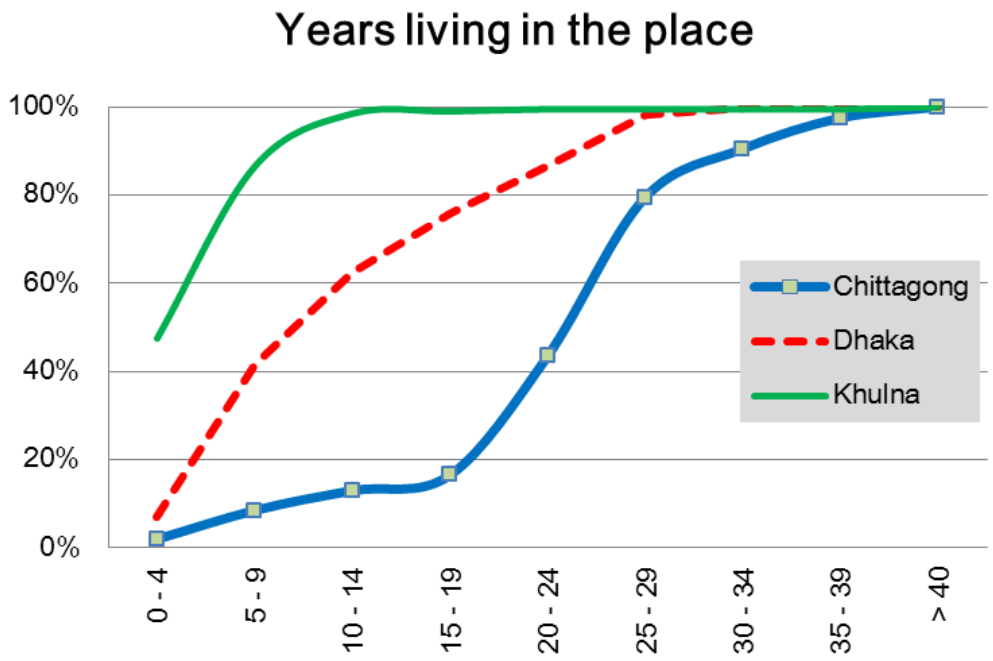

Figure 24. Cumulated frequency distribution of time of residence by city

As for housing and house type, in the questionnaire, the respondents were able to choose among 5 types of houses: reinforced concrete, bricks, bamboo, earthen and others. In Chittagong, 85% of the respondents declared to live in a bamboo house. In Dhaka, the predominant types are bricks (53%) and others. In Khulna city, the distribution among the different types of houses is more even. Details are shown in Figure 25.

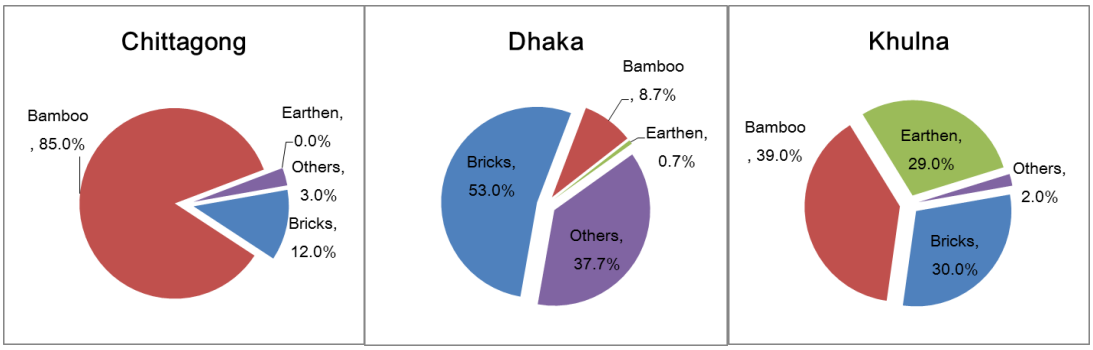

Figure 25. Housing type distribution by city

- Use of time: from a list of different possible daily activities, we inquired the respondents of the survey how they distribute their time during a typical day in both the weekdays and

the weekends among a list of activities that include indoor activities (sleep, housework, work, study, others) and outdoor activities (leisure, religious and social activities mainly) as well.

- Travel behaviour: the analysis of travel behaviour patterns includes questions to assess the frequency, modes and time duration of trips with different purposes, depending on the type of activity or destination (work, school, leisure, religious, social activities, etc.).
- Perceptions of accessibility and safety: from the literature review, we identified relevant aspects of transport-based social exclusion that could affect the well-being of citizens corresponding to the physical accessibility and for the fear-based (safety-related) dimensions of social exclusion (Church et al., 2000). They were classified in four groups: physical accessibility, vehicle-related safety, traffic-related safety and crime-related safety. For the identification of transport disadvantages in these categories, the participants of the survey were asked to rate how easy or difficult they found such issues as walking on the street, accessing public transport or feel safe while making use of public spaces or transportation services. More details can be observed in Table 1.
- Well-being indicators: in order to assess the well-being condition of the respondents, we use the following indicators: Life Satisfaction (LS), optimism for the future (OPT) and happiness (HAP). The LS score is obtained as a sum of the LS scores for the following life domains: residence (housing), family financial conditions, health conditions, family members' health conditions, neighbourhood, education, family's education, employment, family's employment, family life, leisure and recreational activities, social state (reputation), family's social state, residential location (city, town, village), national security and stability and overall life satisfaction. The variable OPT is assessed by asking the following question: "*Do you think you are very optimistic about the life of you and your family in future?*" Finally, the variable HAP is directly assessed by asking the

following question: "*In general, how happy would you say that you are?*" All the well-being indicators were assessed by using a 5-point Likert scale, which is commonly used to allow the individual to express how much they agree or disagree with a particular statement (Ory and Mokhtarian, 2005; McLeod, 2008). In consideration of the argument that people in self-report measures of happiness people might not be able to oversee their lives (Veenhoven, 2004) we included the 3 aforementioned types of well-being indicators. The variable HAP aims to capture the emotional conditions of the respondents in an undefined time horizon, while the assessment of LS encourages the respondents to think more thoroughly and comprehensively about the different aspects of their lives from the past to the present and the variable OPT aims to capture the respondents' feelings and expectations for the future.

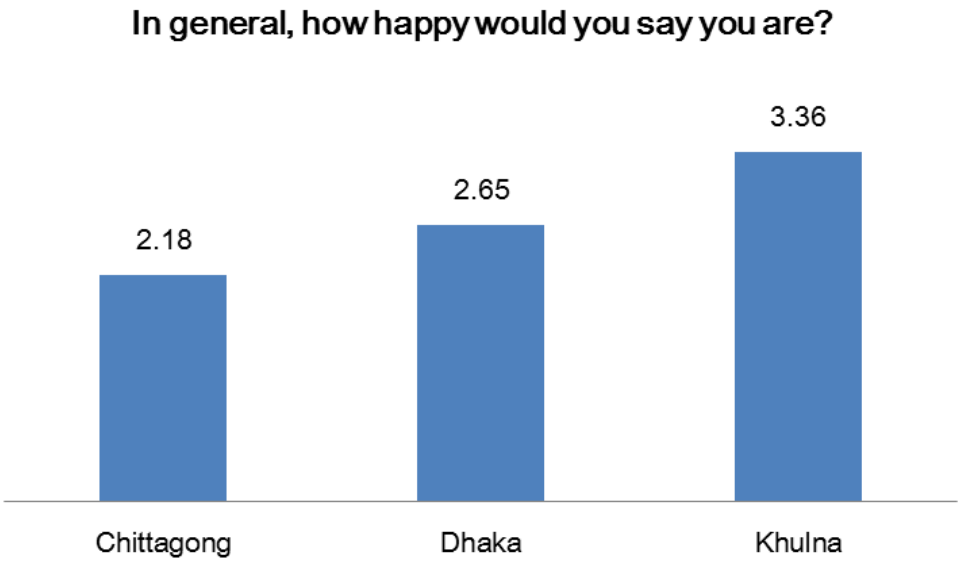

Figure 26. Average happiness in Bangladeshi cities

- Geographic location related information: we asked the respondents which is their residential location (by naming the town/village/city district where they live). The exact residential location was not asked in our questionnaire in order to protect the respondents' privacy. With the name of the residential location district we could generate a population

density variable, which was consulted by using the web tool "City Population" (Brinkoff, 2016). We consider the accuracy range of this information acceptable enough for our research purposes.

The population data that are contrasted with the sample data were consulted from the Report of the Household Income and Expenditure (Bangladesh Bureau of Statistics, 2010). Some of the most relevant indicators of the aggregate analysis are shown in the Table 6.

Table 6. Aggregate results for some of the relevant indicators

	Chittagong	**Dhaka**	**Khulna**
National population data			
Population	2,532,439	7,033,075	663,342
Monthly household nominal income	14092	13226	9569
Monthly household consumption expenditure	14360	11643	9304
Head count rates of poverty	11.8	18.0	35.8
Sample data			
Average monthly income, sample	10500	11150	11663
Average time of residence (years)	24.1	12.7	5.7
Respondents living in a formal housing	54.5%	18.3%	42.5%
Respondents living in rented houses	36.5%	92%	48%
Maximum expenditure on transport	9%	4.8%	8%
Illiterate respondents	60 %	35.7 %	29.0 %
Average travel time by walking (mins)	19.1	16.2	37
Average commuting time (mins)	20.3	16.6	37.2

3.2.1 Perceptions of accessibility and safety

For the *physical exclusion* category we included questions regarding the perceptions of accessibility, more focused on the existing pedestrian infrastructure in the residential area. The *geographical exclusion* category is reflected in the attributes of distance for different travel purposes. The *exclusion from facilities* category inquires how far different urban facilities are located from the respondents' place. For the *economic exclusion* category we included questions of expenditure on travel in association with the travel behaviour. The *time-based exclusion* category is reflected in the travel time expenditure associated to the

different use of travel modes. The *fear-based exclusion* category related questions are bases on the perceptions of safety and security. Questions related to the *space exclusion* category were not included in this survey questionnaire due to methodological considerations. We included in the questionnaire questions about happiness and life satisfaction regarding several life domains, as a way to contrast the effects that the built-environment and travel behaviour may have on the wellness and satisfaction of the urban dwellers.

3.3 Survey of future-life choices in Japanese high schools

With the main purpose of examining the future life choices and the possible influence of the depopulating environment, we conducted a survey in four different high schools of Hiroshima prefecture. Three schools are located in depopulated areas of the prefecture: Chiyoda (137 respondents), Yoshida (296 respondents) and Mukaihara (151 respondents); and the fourth place is located in Higashi-Hiroshima city (433 respondents), a non-depopulated area.

The approximate location of the schools within the prefecture can be observed in Figure 27, where the depopulating areas of Hiroshima prefecture are represented in red colour (Hiroshima Prefectural Government, 2015). In contrast with the depopulating areas of the prefecture, Higashi-Hiroshima is a dynamic small-sized city, where the population was 192,905 inhabitants in 2015 and continues currently growing, according to information from Higashi-Hiroshima City municipal government. This growing has been largely motivated by industry and educational activities along the city, where several different universities and industrial corporations are in operation. A total of 1,017 valid sample answers were collected between May and September 2016. It is important to note that interviewing high schools was the specific target of this study, thus the ages of the respondents vary between 15 to 18 years old.

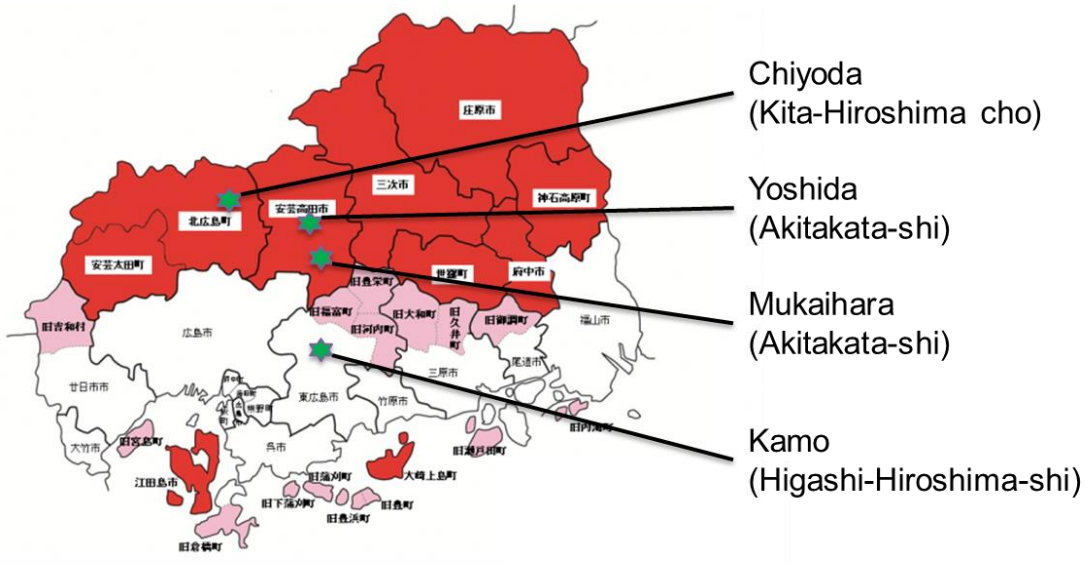

Figure 27. Locations of the survey in Hiroshima prefecture

The questionnaire consists of the following parts:

- Personal and socio-demographic information: this section includes information of the school and school year, previous experiences with change of residence or moving, household composition, and travel behaviour (travel to school).
- Time perspective inventory items: We applied the 56 questions that are included in the Zimbardo Time Perspective Inventory, as of its original version (translated into Japanese language).
- Future plans: among a list of possible future life plans, students manifest how likely they think they will be to choose each of them in a future. Among the future plans we have questions related to migration, family, career and personal goals principally.
- Social exclusion: questions related to how young respondents may face social exclusion at an early stage of life with a still limited power of decision-making. Nevertheless, we consider it is reasonable to presume they will increasingly be able to make decisions and life choices as they reach adulthood.

Table 7. Features of the targeted schools

	Chiyoda	Kamo-Saijo	Mukaihara	Yoshida
Located in a depopulating area	Yes	No	Yes	Yes
Access with railway	No	Yes	Yes	No
Special program?	Agriculture	-	-	Sports
Number of students interviewed	146	471	160	324
High school year of students interviewed	1 – 3	1 – 2	1 – 3	1 – 3

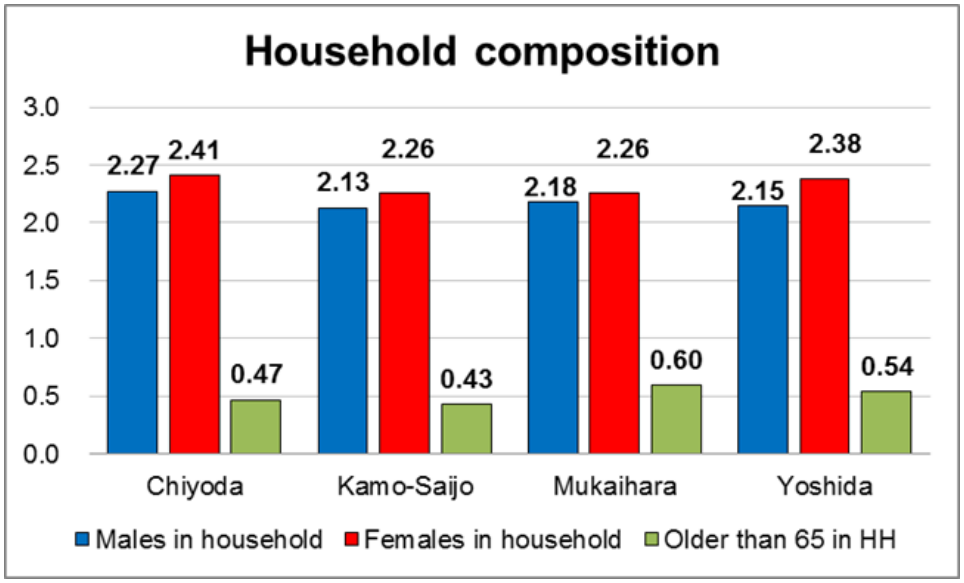

Figure 28. Household composition among targeted high schools

3.3.1 Travel behaviour of high school students

In this section we clarify the travel behaviour of the surveyed high school students. As expected, in the depopulating areas the students must travel longer distances to reach the school, thus the accessibility to daily transport is more difficult than it is for students in non-depopulating areas. In addition, 2 of the schools are located in the proximity of a train station and therefore accessible by railway (see Table 8 and Figure 29). The average travel time to each school can be observed in Figure 30.

In the Figure 30 the modal share in each school is displayed. In the survey, students were asked to describe the different stages of their trip to school. Some students use 2 modes or mode in combination to reach their respective schools, and we reflected this fact by displaying the main mode or the respective combination in the Figure 31.

The built environment is also described by students in the survey, indicating the distance from their residential location to a list of urban facilities. The aggregated results can be observed in Figure 33.

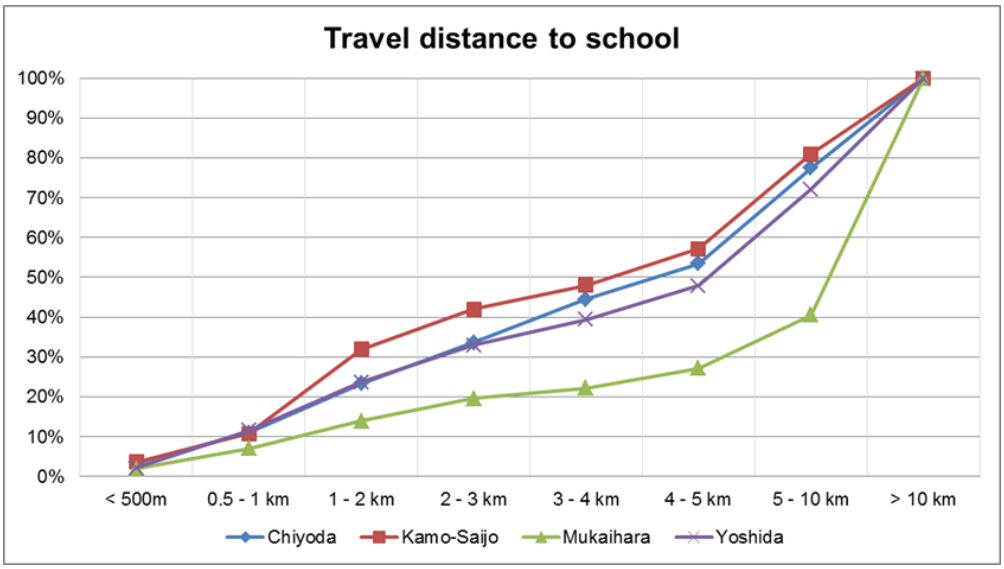

Figure 29. Cumulative frequency for travel distance to each school

Table 8. Comparative accessibility to high schools

	Chiyoda	**Kamo-Saijo**	**Mukaihara**	**Yoshida**
Number of valid samples	137	433	151	296
Travel time to school (mins)				
Min	1.0	1.0	0.0	3.0
Average	**25.9**	**25.2**	**45.4**	**24.3**
SD	21.2	14.7	27.5	15.4
Max	110	75	125	87
Distance to school (km)				
Min	0.1	0.1	0.1	0.0
Average	**7.6**	**7.0**	**13.6**	**8.5**
SD	7.6	7.5	9.3	8.4
Max	29.4	30.0	30.0	29.9

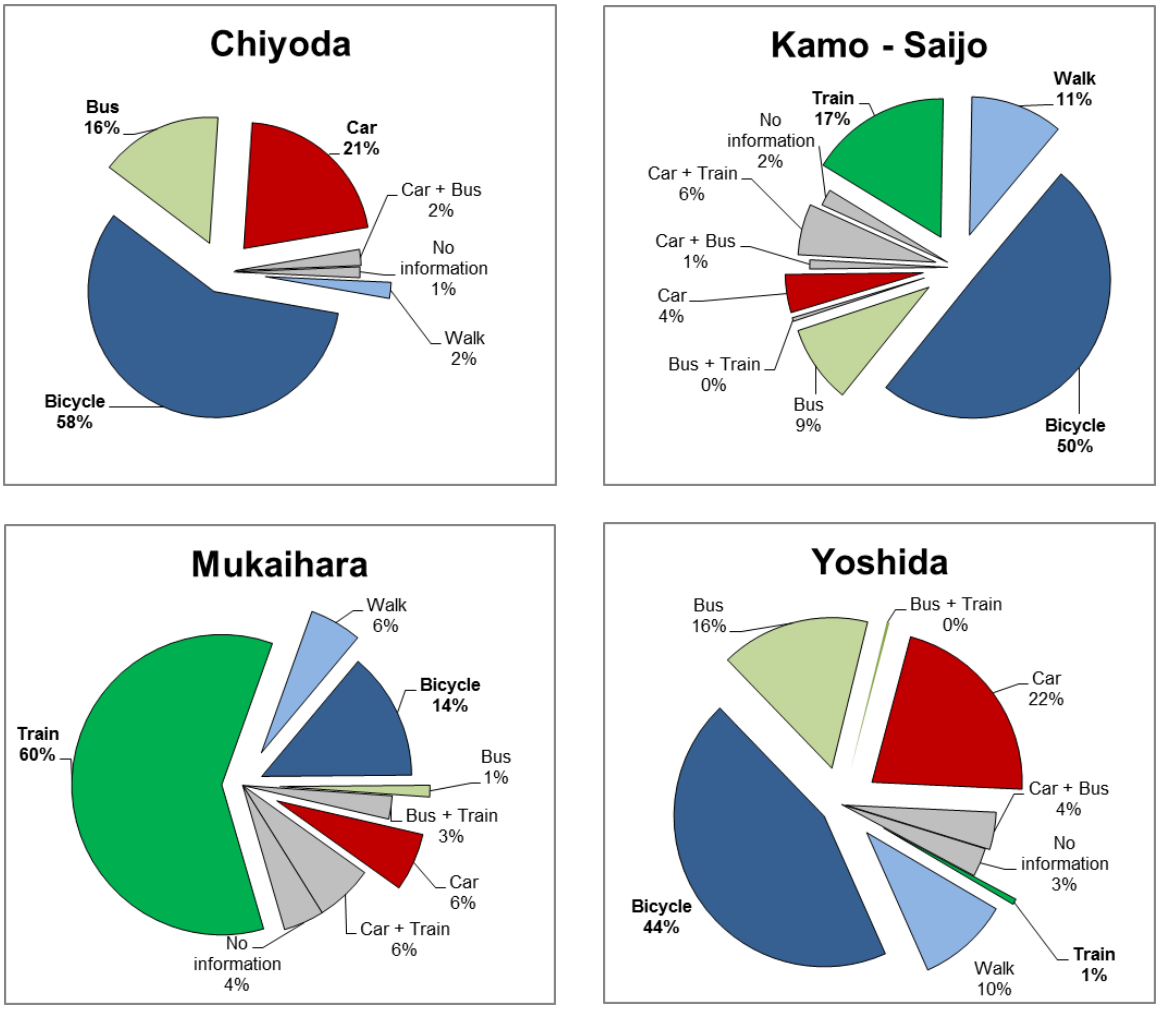

Figure 30. Modal share distribution in each high school

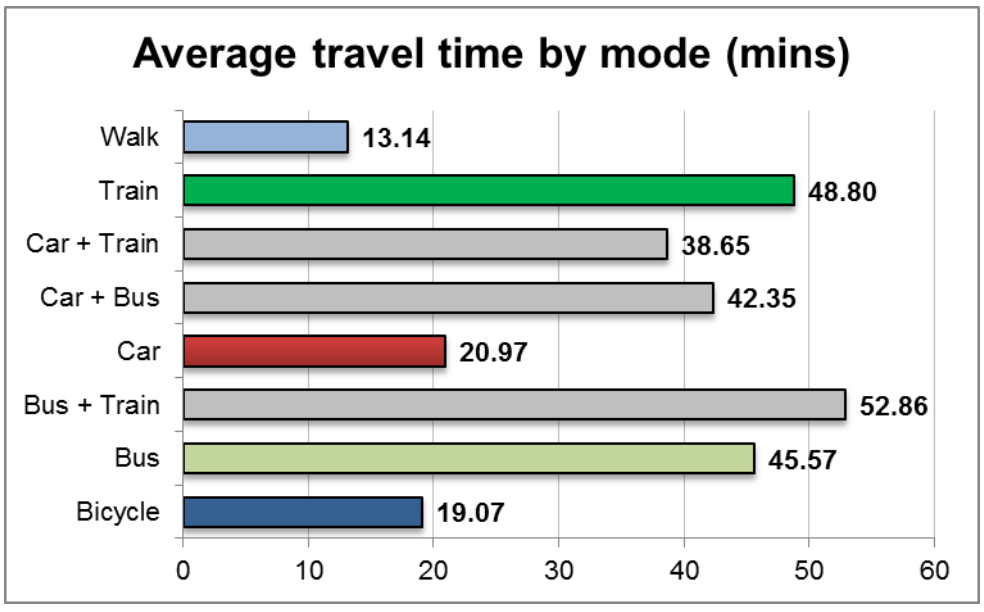

Figure 31. Average travel time by main commuting mode(s)

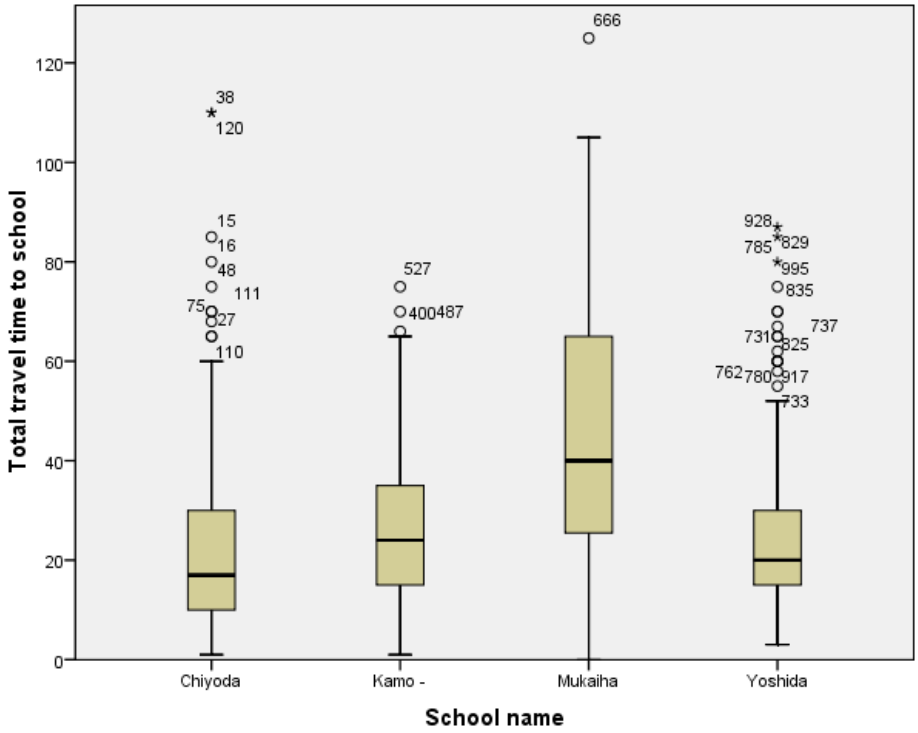

Figure 32. Distribution of average travel time by school

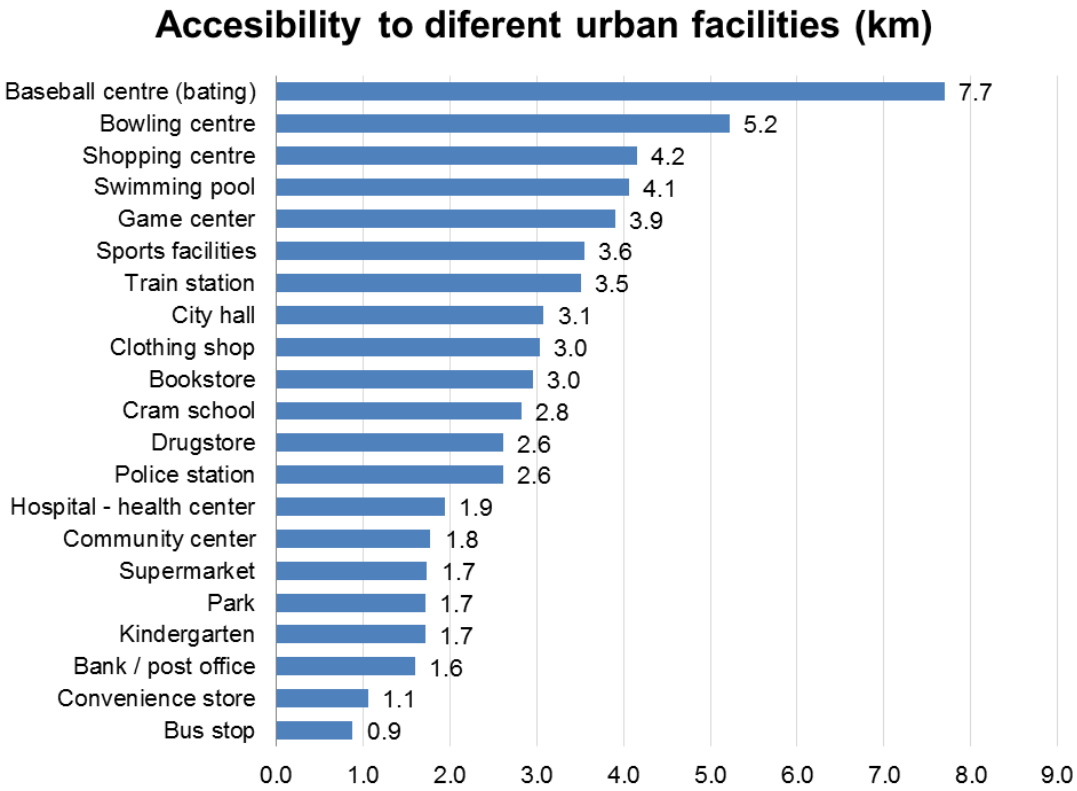

Figure 33. Average distance from residential location to urban facilities

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4. Identification of Transport-Based Social Exclusion

Chapter 4
Identification of Transport-Based Social Exclusion

In this chapter we explain in detail how the concepts exposes in the Literature review (Chapter 2) are being adapted and used to describe the phenomenon of transport-based social exclusion.

This chapter is divided in 2 main parts: in the first part, we explain in detail the difference between the concepts of transport disadvantage and transport-based social exclusion as a possible consequence of a situation of transport disadvantage suffered by an individual. In the second part, we describe the questions we applied in the three main cities of Bangladesh to characterize transport-based social exclusion related phenomena. In order to understand more in depth the potential links between the built environment, transport disadvantage and wellbeing and how they contribute to social exclusion, research must be undertaken from the bottom up, starting with individual responses. This study fills this research gap.

4.1 From Transport disadvantage to Transport-based social exclusion

Initially we can think of any situation in which users experience any problem with using vehicles or infrastructures, accessing transport systems or traveling to any desired places as a situation of transport disadvantage. The situation of transport disadvantage can affect an individual's well-being and once it occurs we can consider that the person is in a situation of transport-based social exclusion (see Figure 34).

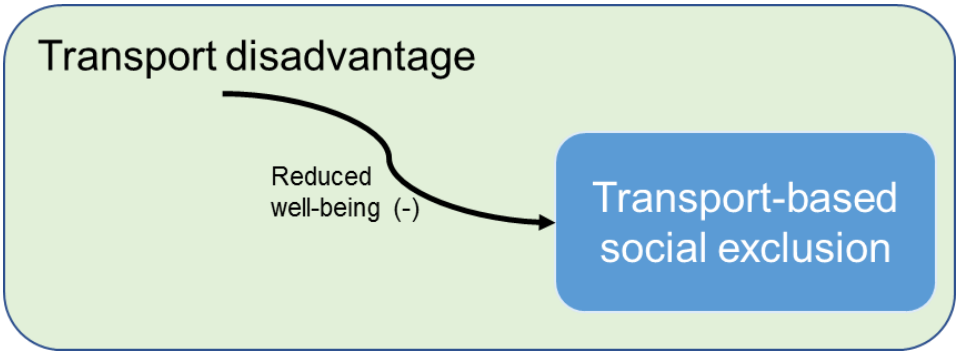

Figure 34. From Transport Disadvantage to Transport-based social exclusion

After proposing such a situation, more related questions must be arisen. We need to consider and think more specifically under which circumstances an individual can be represented out of the box – thus not a situation of disadvantage. Similarly, it is not clear which changes in well-being are necessary and to which extent to make the transition from the bigger to the smaller box – thus from being in a situation of transport disadvantage to be in a situation of transport-based social exclusion; or whether there are changes in well-being that are not serious enough to place a person in a situation of social exclusion.

This initial approach has also one considerable weakness. We could consider the situation of someone who lives in a socially excluded area - a shantytown, for instance-, does it mean they are socially excluded? Although it sounds logical to say so and it is a possibility, it must not be necessarily the case. As an example, in some of the largest Indian cities, cases of people who voluntarily decide to live in slums are very frequent. The case of Dharavi in Mumbai has become widely known: a slum area that for decades has attracted lots of migrants – i.e. people come voluntarily- , since it offers considerable access to job and education opportunities and other important advantages such as very low costs of living, where few businesses pay taxes and few residents have formal title to their land (Yardley, 2011). Therefore, even people with professional degrees make a decision to live over there; in despite of other harsh life conditions, poor sanitation and other disadvantage conditions.

Therefore people might be in a situation where a transport disadvantage condition becomes relatively not serious enough to undermine someone's well-being or quality of life, whereas other situations of further disadvantage do exist. Others could be considered socially excluded but not due to a transport disadvantage situation.

Delbosc and Currie (2011) in their study make a sound differentiation between the conditions of transport disadvantage (TD) and social exclusion (SE), and propose a methodology to determine an overall disadvantage score. When combined to a count of the number of social dimensions that a person is facing, they classify the individuals as being *transport disadvantaged*, *socially excluded*, both *transport disadvantaged* and *socially excluded* or being neither of them (see Figure 35).

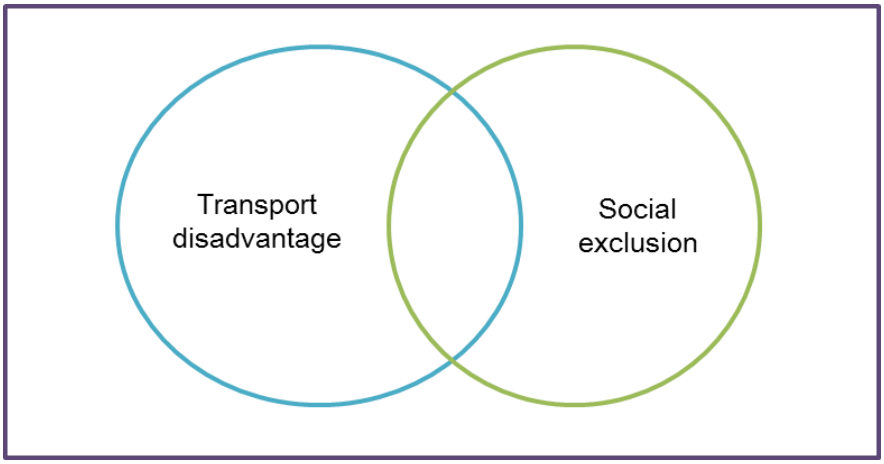

Figure 35. Transport disadvantage and social exclusion as a matter of group belonging

It has been argued that social exclusion has a strong negative impact on well-being and transport disadvantage can increase social exclusion, whereas the link between transport disadvantage and well-being was indirect and mediated by time poverty (Currie and Delbosc, 2010; Delbosc and Currie, 2011). Other authors have considered the issue of social exclusion not merely as an issue of belonging to the group or not, recognizing that it is possible to be

socially excluded but still have good access to transport or to be transport disadvantaged but highly socially included (Lucas, 2012; Currie and Delbosc, 2010). In Figure 36, we reflect how it is possible to be located in different corners of the spectrum rather than being located inside or outside a certain group according to the disadvantage or exclusion situation, if we consider well-being, social exclusion and transport disadvantage as separate but interacting dimensions of the social impacts of human mobility. The Figure 36 also reflects how a decrease in well-being may be associated with an increase in the risk of exclusion, which we can consider as transport-based when it happens from a situation of transport disadvantage.

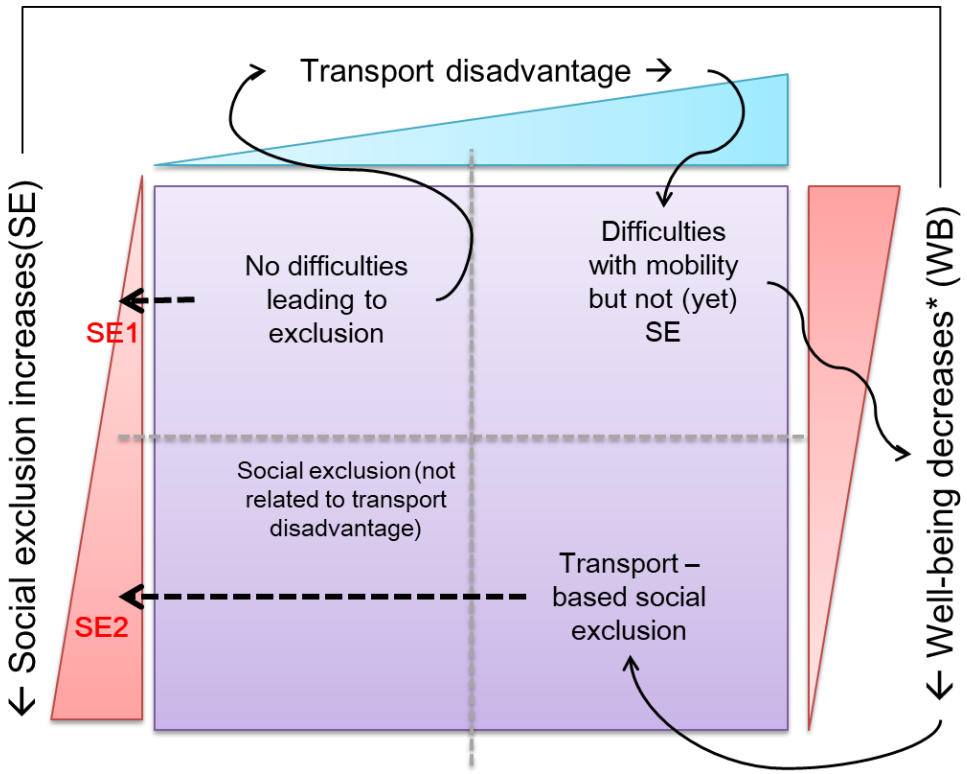

Figure 36. A two-dimensional understanding of transport-based social exclusion

For instance, not having a car or a driving license is commonly considered as a situation of transport disadvantage, yet how much the individual depends on driving to satisfy his daily needs and live a full life can be reasonably associated to the social exclusion that the individual is experiencing. As a result, individuals in a social network who experience similar

situations of transport disadvantage might at the same time be socially excluded at different levels.

Thus, (transport-based) social exclusion comes as a phenomenon induced by a situation of (transport) disadvantage (no car possession) and a set of individual factors (the need to drive, i.e. reasons for his a higher car dependence) that clearly undermine someone's well-being, also influenced by other factors such as social factors (surrounded by car-owning individuals) or the built environment (living in a car-dependent area with few or no public transport accessibility).

Such a type of social exclusion may be observed in many developing countries. Usually, people living in disadvantageous areas have a poorer level of accessibility to various facilities than other population groups. However, a poor level of accessibility does not necessarily bring an individual directly into a "socially excluded" situation. For example, if a lower level of accessibility does not lead to a serious decline of an individual's well-being, transport-based social exclusion may not occur. Then, when or under what conditions does transport disadvantage become transport-based social exclusion?

4.2 Methodology to assess transport-based social exclusion based on well-being

As previously explained in the literature review section, the term "transport-based social exclusion" refers to any situation in which experiencing any type of transport disadvantage involves negative impacts on an individual's well-being. This is one of the basic considerations for conducting the surveys that form part of this study. The impacts on well-being are mostly subjective and they may depend on many factors, including but not limited to: future intentions, future life expectations, perception and satisfaction with the current living environment, etc.

Furthermore, the social exclusion should not be considered as a binary state according to which one is excluded or included but as a dynamic process that is affected by multiple domains of everyday life (Schwanen et al., 2015), and in addition we might reasonably propose the transport-based social exclusion as a possible consequence derived from experiencing one or multiple forms of transport disadvantage situations.

We propose the concept of transport-based exclusion and its linkage to well-being as a matter of subjective evaluation, because individuals have different thresholds for what they consider "acceptable" or not, as well as different needs and expectations. Based on this, we could reasonably argue that individuals feel more dissatisfied or unhappy as a consequence of being more (transport-based) socially excluded than people with higher feelings of satisfaction, happiness and well-being in general. Much of these feelings can come not only from individual satisfaction but also from social comparison with other members within a group or social network, propensity for activity participation (Duarte et al., 2010), personality issues or other related traits.

In order to illustrate the connection, let us consider the following elements as separate dimensions: transport disadvantage (TD), social exclusion (SE) and well-being (WB). For the conceptualization, we start from the assumption that WB will likely decrease as SE and TD become higher, behaving in a similar form that a utility curve does (see Figure 37). Next, we consider a component β that accounts for the slope of (WB) curves, which represents the individual's characteristics and preferences. Based on the aforementioned assumptions, we argue that SE changes in function of TD and β, therefore $SE = f(TD, \beta)$. Next, we consider two individuals denoted by i (say person 1 and person 2) with different preferences represented by β_1 and β_2, therefore $\beta_1 \neq \beta_2$. Furthermore, we can assume that person 1 has a

bigger dependence (i.e. higher sensitivity) to changes in the operation of transportation systems that he/she uses than person 2, which can be represented by $\beta_1 > \beta_2$.

Finally, let us consider a change in a transport-related situation where a transport disadvantage situation occurs in a given location, therefore the transport disadvantage condition increases equally for our two individuals from time t to time $t+1$, therefore having $TD^1_{t+1} - TD^1_t = TD^2_{t+1} - TD^2_t$. As a consequence, we can observe that one situation of increased transport disadvantage affects negatively individual 1 more than it affects individual 2, having $[SE_t, SE_{t+1}, \Delta WB]_1 > [SE_t, SE_{t+1}, \Delta WB]_2$. In addition, we consider the transport-based social exclusion represented by the difference $SE_{t+1} - SE_t$.

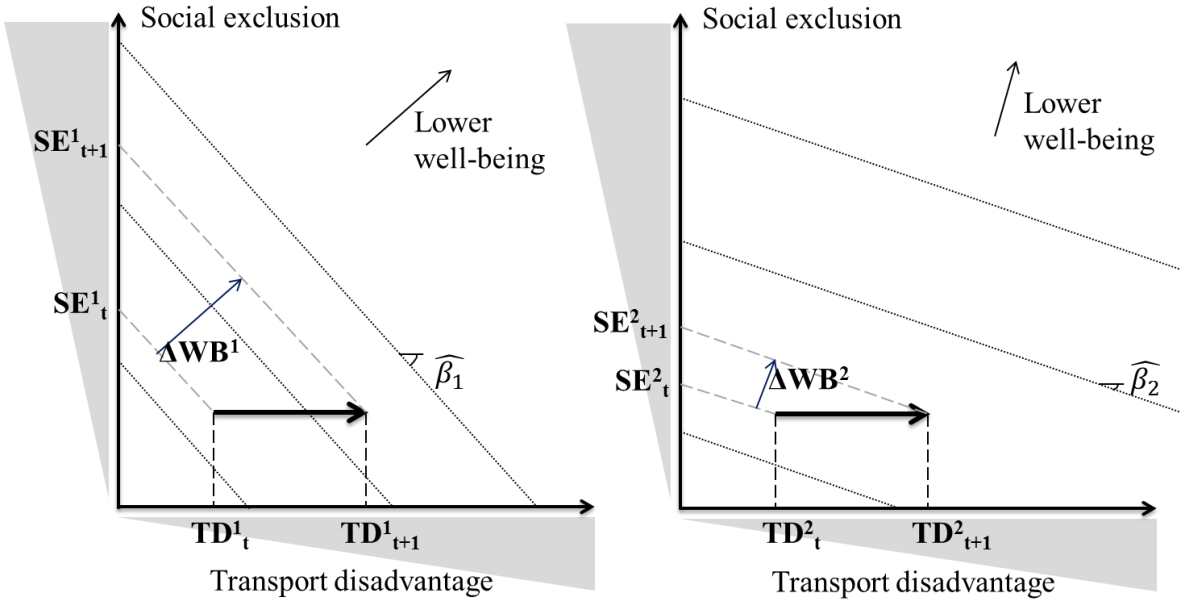

Figure 37. From transport disadvantage to transport-based social exclusion: a conceptual framework to illustrate the connection

As it can be observed from the schematic representation in Figure 37, the SE levels in different time points, as well as the changes in SE and WB caused by a similar change in TD are different for individuals 1 and 2. As a way to set an example for this situation, let us assume two neighbours, one of them takes daily a bus service with a given frequency (i.e.

more dependent on it) and the other one uses the same bus service once a week or less. For some reason, the frequency of the bus service is considerably reduced, which is in fact an increase of a transport disadvantage condition for the neighbours in that particular area. The reasonable consequence is that the first neighbour will be much more affected by this change than the second neighbour who is much less bus dependent. As a result, individuals in a social network who experience similar situations of transport disadvantage might at the same time be socially excluded at different levels when compared to each other

Hence, transport-based social exclusion comes as a phenomenon induced by a situation of transport disadvantage (bus dependence) and a set of individual characteristics and preferences (reasons for traveling by bus, not having a car, etc.) that clearly undermine someone's well-being in a unique manner, influenced by other context factors such as social factors (surrounded by car-owning individuals) or the built environment (living in a car-dependent area with little public transport accessibility).

In addition to the preferences, we need to consider the set of skills and capabilities that each individual possesses. It would be reasonable to argue that their influence would make the well-being change in a combination of linear and non-linear forms, where particular thresholds and inflexion points in the utility functions derived from the use of different transportation systems can be expected.

One of the main questions remaining here is whether the proposed situations of transport disadvantage do really represent an issue of disadvantage when examined under the influence they have on health-related QOL and well-being or not? In the Figure 38 we depict a methodological approach in which we can assess to some extent the degree of (transport-based) social exclusion that an individual is suffering when it is linked to

well-being, i.e. it is assumed that well-being changes accordingly to an experienced degree of social exclusion or inclusion condition.

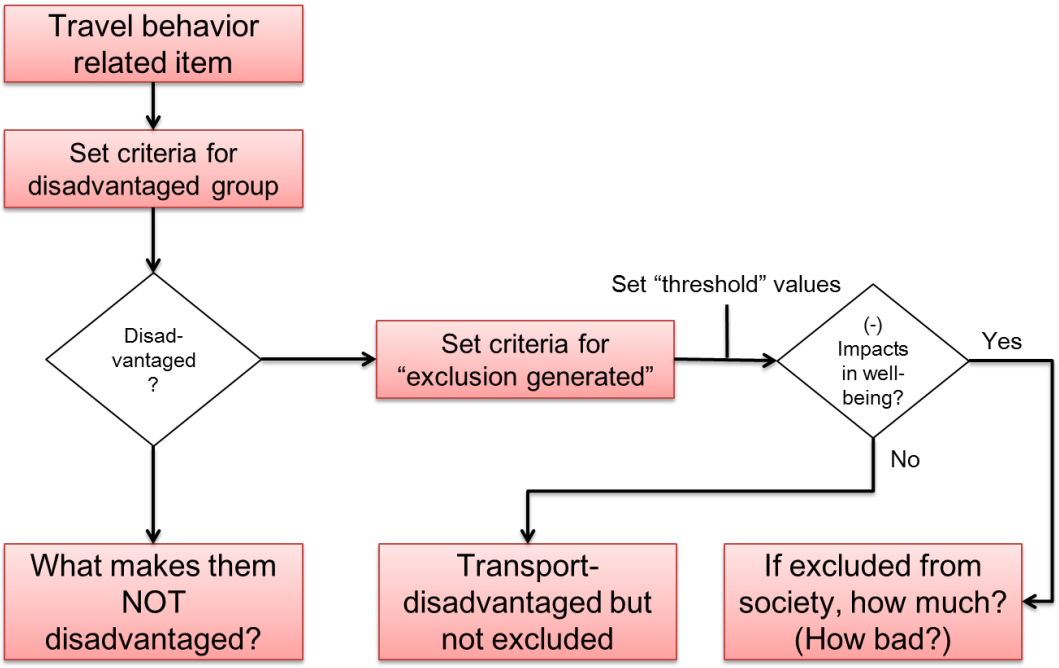

Figure 38. Proposed methodology flowchart, for assessing transport-based social exclusion based on well-being

4.3 Characterization of transport disadvantage conditions in Bangladeshi cities

From the study of the seven dimensions of transport-based social exclusion by, we designed related questions in the questionnaire survey. Some of them are based on self-assessed responses.

It has been considered that the use of self-reporting of difficulties with aspects of transport can be used to target a particularly group that is known to face transport disadvantage. According to Delbosc and Currie (2011), overall few studies have explored self-reported of transport problems in a heterogeneous population and none has related these to quantitative measures of social exclusion and well-being.

In Table 9 we list the dimensions of transport-based social exclusion and a few details of their representation in this chapter according to the adaptation of the original seven dimensions proposed by Church et al. (2000). In Table 10 we separate the indicators related to the dimensions into 2 groups depending on the type of assessment: discrete or continuous. For the *discrete* variables type, the respondents answer to the questions according to pre-defined scales, so the thresholds to identify the disadvantages groups are already set in the definition of the scales. For the *continuous* variable type, variables related to measurement of distance, money and time are used; therefore their values correspond to clearly measurement scales.

Table 9. Representation of dimensions in the survey

Type of dimension	**Brief description**	**Characterization**	**Type of variable**
Physical	Inaccessible places, services or conditions	Self-assessment of specific conditions	Ordinal
Geographical	Living in an specific area	Belonging to a specific place?	Ordinal
Facilities	Distance to facilities in urban area	Acceptable distances to the different facilities?	Continuous
Economic	Income Expenditure	Sufficient or acceptable income to travel or for a living?	Continuous / ordinal
Time-based	Travel times	Acceptable time expenditure for traveling?	Continuous
Fear-based	Perceptions of insecurity	Self-assessment of specific conditions	Ordinal
Space	Not able to access public spaces or specific facilities	Not covered	Does not apply

Table 10. Classification of type of variables according to assessment process.

Type of representative indicators	**Discrete**	**Continuous**
Dimensions	• Physical • Geographical • Fear-based	• Facilities • Economic • Time-based
Explanation	We already know how many people are "disadvantaged", this classification comes into the ordinal type answering scales.	We need to find/define what are the acceptable 'threshold' values in order to find disadvantaged groups
Next?	The threshold values are clear from the definition of the categories themselves, so we can assess whether they are associated with any impacts in well-being.	From the well-being indicators we could find certain useful indicative threshold values

4.3.1 Discrete type indicators

For the categories of transport disadvantage *physical accessibility* and *safety*, the respondents indicate in a 5-point Likert-type scale they indicate their level of agreement or disagreement with the proposed statements. The summary of the indicators can be observed in Table 11, where we consider 9 questions for accessibility and 14 questions for the *safety* dimension, which has been divided into 3 subcategories: *security in places*, *security from crime* and *safety from traffic*. In Table 11 we show the mean values and standard deviations of the survey responses to the different question items that are there listed. The responses were provided by the respondents in an ordinal scale of agreement from 1 to 5, in which the higher the values are, the more agreement there is respect to each statement. The variables assigned to the category of physical exclusion are marked with "P", and the categories related to fear-based exclusion are represented with "F" (column "Code")

Table 11.Questions and statements related to physical and fear-based exclusion.

Question / statement	Code	Mean	Std. Deviation
Accessibility			
I can do most of my shopping at local stores.	P0	**3.21**	0.86
There are sidewalks on most of the streets in my neighbourhood	P1	2.77	0.87
The sidewalks in my neighbourhood are well maintained (paved, even, and not a lot of cracks or potholes)	P2	2.75	0.84
There are bicycle or pedestrian trails in or near my neighbourhood that are easy to get to	P3	2.33	1.17
Sidewalks are separated from the road/traffic in my neighbourhood by parked cars	P4	**3.05**	0.72
People who use wheelchairs can easily circulate on the sidewalks in my neighbourhood	P5	2.24	1.15
Children and elderly people can use the streets without risk of injuries	P6	2.95	0.80
I can understand the use of the bus routes in the city	P7	2.71	1.01
Visitors in this area can easily use the bus routes in the city	P8	3.00	0.84
Security in places			
I feel safe during a walk	F1	**3.55**	0.97
I feel safe in my residential neighbourhood	F2	**3.58**	0.91
I feel safe in the place where I work / study	F3	**3.23**	0.81
I feel safe in the City centre	F4	**3.07**	0.66
I feel safe in my nearest bus centre / bus stop	F5	**3.12**	0.74
I feel safe in the Railway station	F6	2.71	1.62
I feel safe at my nearest road intersection	F7	2.70	0.88
I feel safe in my nearest sidewalk	F8	2.67	0.87
Safety from crime and traffic			
My neighbourhood streets are well lit up during night time.	F9	2.75	1.11
The crime rate within and nearby my neighbourhood is high.	F10	**3.03**	0.73
The crime rate within and nearby my neighbourhood makes me feel unsafe to walk during the day.	F11	2.89	0.66
The crime rate within and nearby my neighbourhood makes me feel unsafe to walk at night.	F12	**3.01**	0.77
The traffic conditions within and nearby my neighbourhood makes me feel unsafe to cross the streets during the day	F13	**3.29**	0.93
The traffic conditions within and nearby my neighbourhood makes me feel unsafe to cross the streets at night	F14	**3.35**	0.90
I would get worried if my kids walked alone in the streets of my neighbourhood	F15	**3.75**	1.31

Example: *I can understand the use of the bus routes in the city*

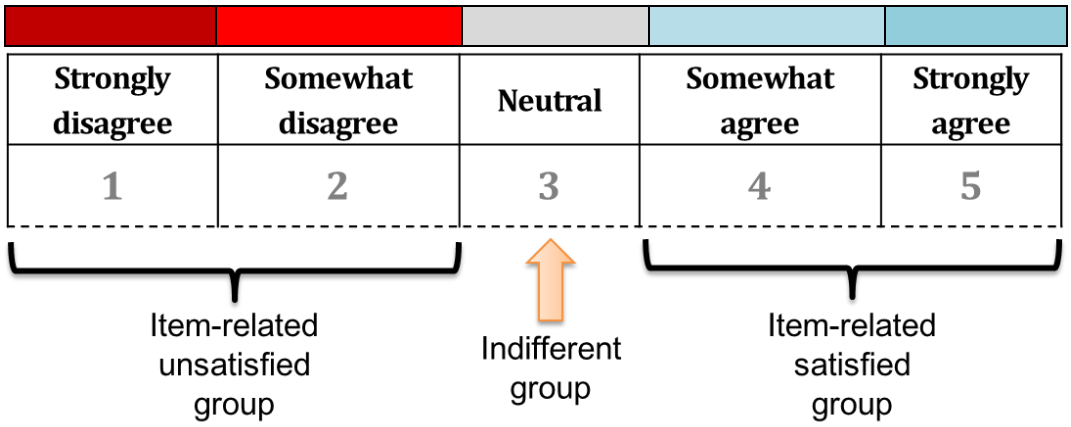

Figure 39. Association between the 5 points scale and numerical values

For the responses to each of the statements of Table 11, the respondents assess how much they agree or disagree to each one of the statements according to the 5-points scale that can be observed in Figure 39. The red tones represent a negative opinion or emotion related to the statement, which would be equivalent to the proportion of users that feel unsatisfied and therefore can be considered to be part of the "disadvantaged" group regarding each question item To see in detail the distribution of the responses, check Figure 40, Figure 41 and Figure 42. The meaning of the legends can be checked in Figure 39 and Table 11 respectively.

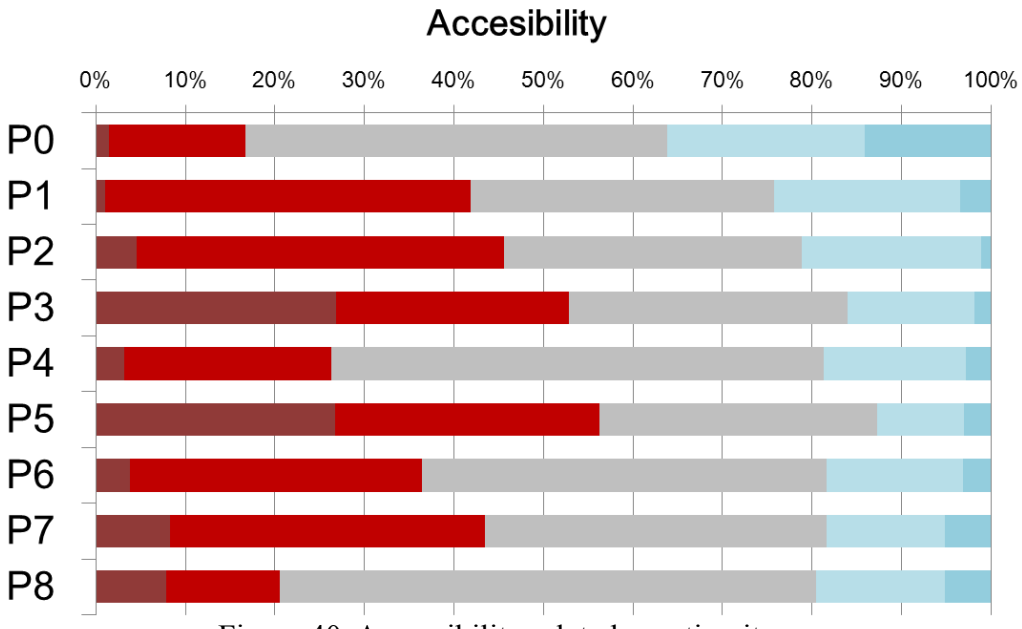

Figure 40. Accessibility related question items

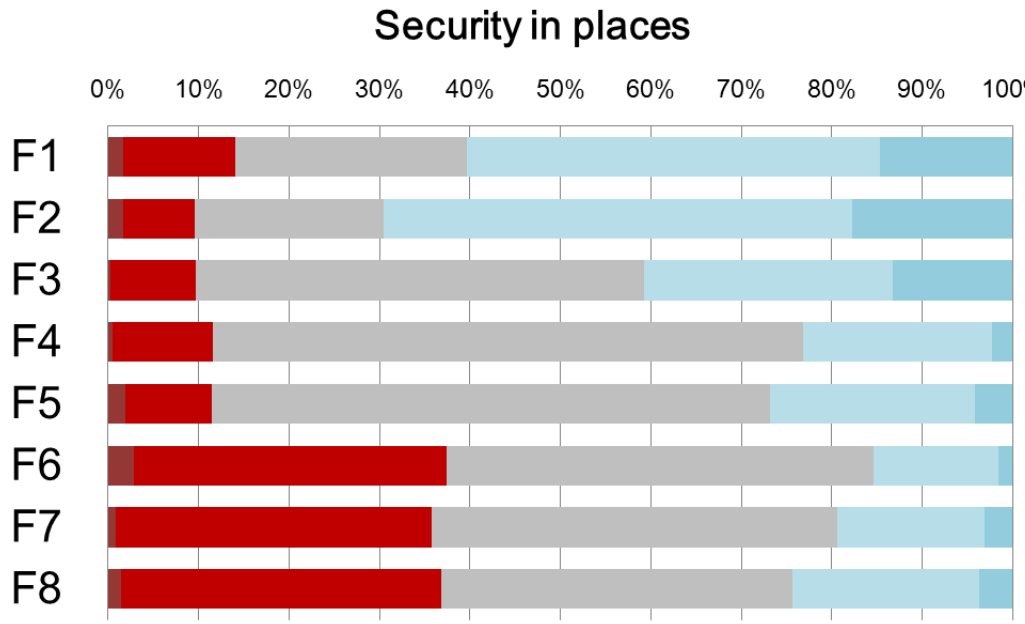

Figure 41. Security in places related items

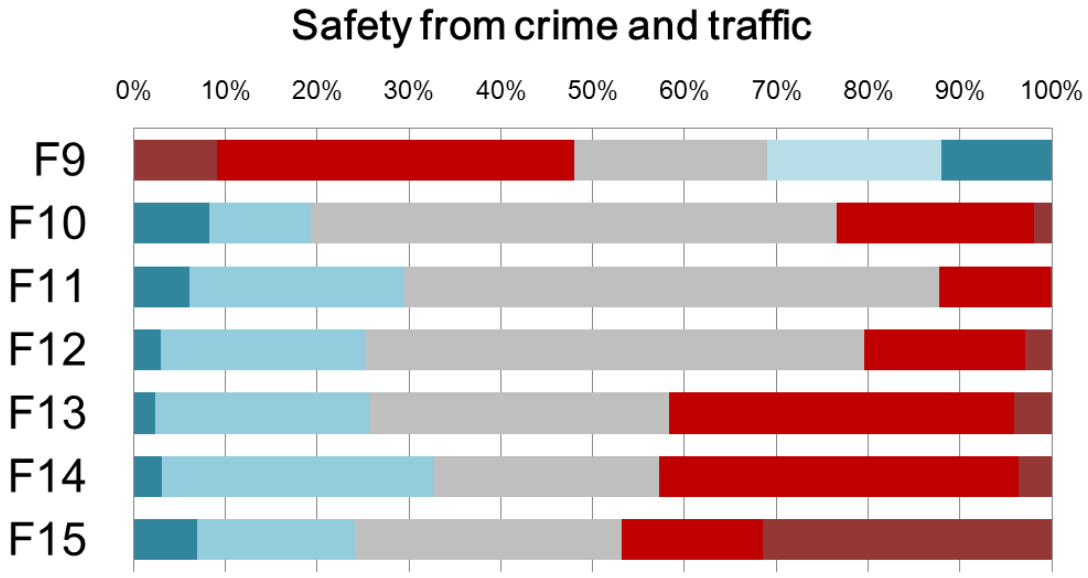

Figure 42. Self-assessed conditions of safety from crime and traffic by the respondents.[3]

4.3.2 Continuous type indicators

For the categories of *facilities*, *economic*, and *time-based* social exclusion we use continuous type variables in order to characterize those dimensions. In Table 12 the list of questions that

[3] In the case of question F9, "My neighbourhood streets are well lit up during night time", the item-related unsatisfied group

have been employed to characterize those dimensions were employed.

For the *time based* and *economic* based categories of exclusion, we found that the average travel times to work were 19 minutes in Chittagong, 16 in Dhaka and 37 in Khulna respectively, and most of those commuting trips are done by walking. The average monthly income is between 10,500 and 11,500 BDT, and the maximum average percentage of income that can be eventually spent in transport is 4.8% for Dhaka, 8% for Khulna and 9% for Chittagong. However, these values of expenditure in transport must be analysed carefully, considering the general situation of low income among the majority of respondents, many workers without a regular monthly income and the use of walking as the main commuting mode. There were no relevant results related to long or extensive travel for other activities, such as leisure, shopping or religious affairs.

Table 12. Dimensions that were characterized by continuous-type variables

Dimension	**Question**
Economic	▪ How much is your household monthly income? ▪ How much is your monthly expenditure in transport? ▪ How much is your monthly expenditure in food?
Time-based	▪ How much time do you spend on activities in a typical day? In home activities: *sleep, house work, others.* Out of home activities: *work, study, shopping, recreation / leisure / sports, religious activities, social activities, trip making, others.* ▪ How often do you make trips by travel modes and with different purposes? Which is the travel time? Trip purpose: *Work, school, shopping, recreation / leisure / sports, religious activities, other social activities, other purposes*. Travel modes: Car, motorcycle, bicycle, rickshaw, walk, and bus.
Facilities	How far from your house are the following facilities?: *bus stop, supermarket, clinic / hospital, small grocery store, drugstore / pharmacy, high school, school / work office, post office, park, city centre, secondary school, city hall, bank, elementary school, kindergarten.*

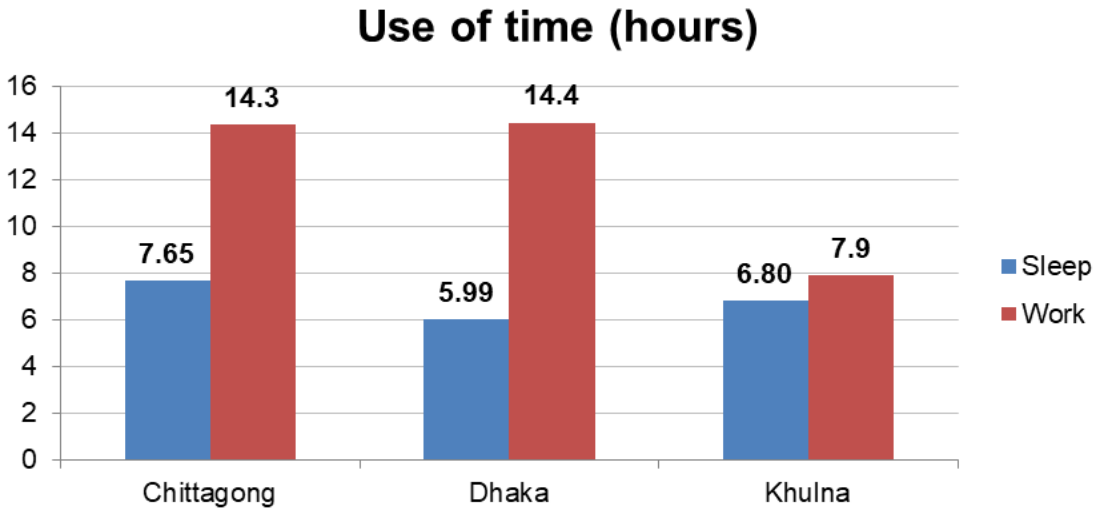

Figure 43. Average use of time during the day for different facilities

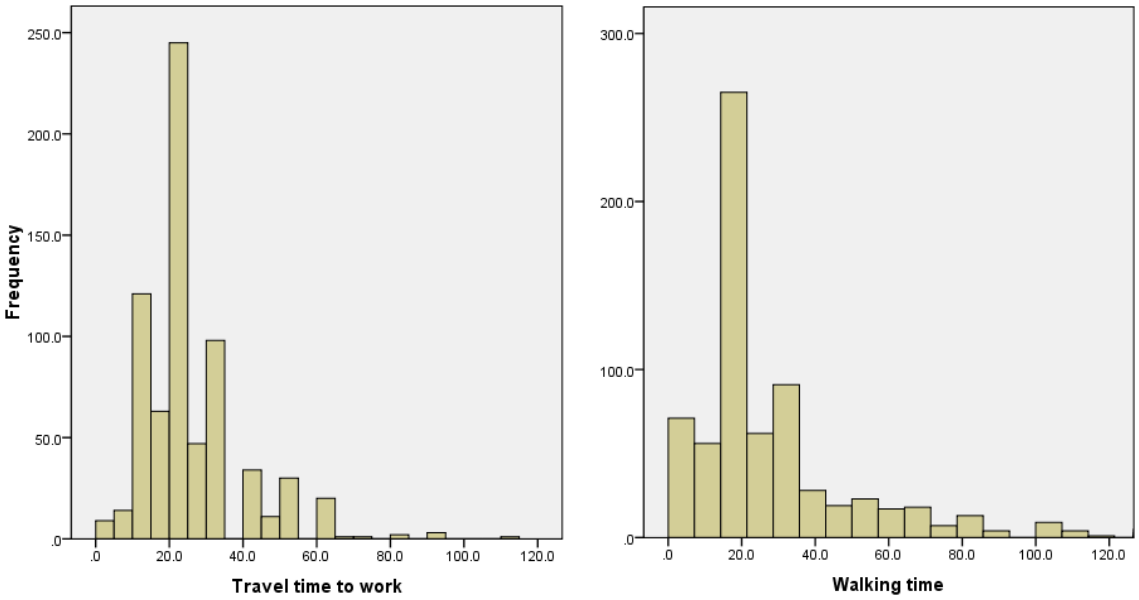

Figure 44. Distribution of travel time to work and walking time

Regarding the *exclusion from facilities* dimension of transport-based social exclusion, we can observe that in relative terms, that a minority of respondents have some acknowledgment of the facilities that surround their living environment. The most acknowledged facilities are bus stops, supermarkets, hospitals, grocery stores and drugstores (see Table 13).

Table 13. Distance from facilities in the urban area

Urban facilities	N	Distance (m)			
		Minimum	Maximum	Mean	Std. Deviation
Bus stop	201	150	12600	638.3	1077.2
Supermarket	124	250	6000	1022.8	1310.7
Clinic / hospital	97	200	2500	536.9	431.17
Small grocery store	66	200	900	383.9	137.49
Drugstore / pharmacy	48	150	6000	1008.4	1242.3
High school	38	100	3000	574.8	679.0
School / work office	33	30	1200	580.5	306.0
Post office	21	250	1300	438.8	275.0
Park	18	200	7000	1177.2	1618.1
City centre	16	600	5000	2293.8	1693.7
Secondary school	13	250	1800	472.4	405.79
City hall	10	500	7000	2550.0	2100.9
Bank	9	260	3000	1273.3	1087.4
Elementary school	8	600	5000	2050.0	1846.2
Kindergarten	2	600	800	700.0	141.42

It is worth noting that even for the most identified urban facilities, fewer than half of respondents for all the cases can answer anything about their location. This can be reflecting two current phenomena: either the presence of those facilities does not exist in the targeted areas or the due to a residents' limited mobility or due to a very limited use the respondents of the survey do not acknowledge them properly.

On the other hand, the income and transport network constraints on accessing labour market information can limit the geographical extent of job search and on work travel patterns (Church et al., 2000). We intended to search and inquire for this situation in the survey, so the respondents were asked about their monthly income and their approximate monthly expenditure in transport. In the Table 14 the distribution by percentile of the income and expenditure values is displayed. In addition, in the Figure 45 and Figure 46 the distribution of income and average income and transport expenditure values by level of happiness are displayed. It should be noted how reduced the average transport expenditure is in comparison with the monthly income. This can be explained because of low consumption of motorized

transport services, and by the fact that most of the household income must be allocated for food, which is characteristic of population under poverty and with unsatisfied basic needs.

Table 14. Percentile distribution of economic indicators of the survey

Percentile	Monthly income (BDT)	Transport expenditure	Food expenditure
10	6051.6	200	3000
20	7777.4	400	4000
25	8354.25	500	5000
30	9097.5	500	5000
40	10331.2	500	6000
50	11308	700	7000
60	12023.4	1000	8000
70	13045.1	1000	9000
75	13454.5	1000	10000
80	13905.2	1000	10000
90	14813.5	1500	12000

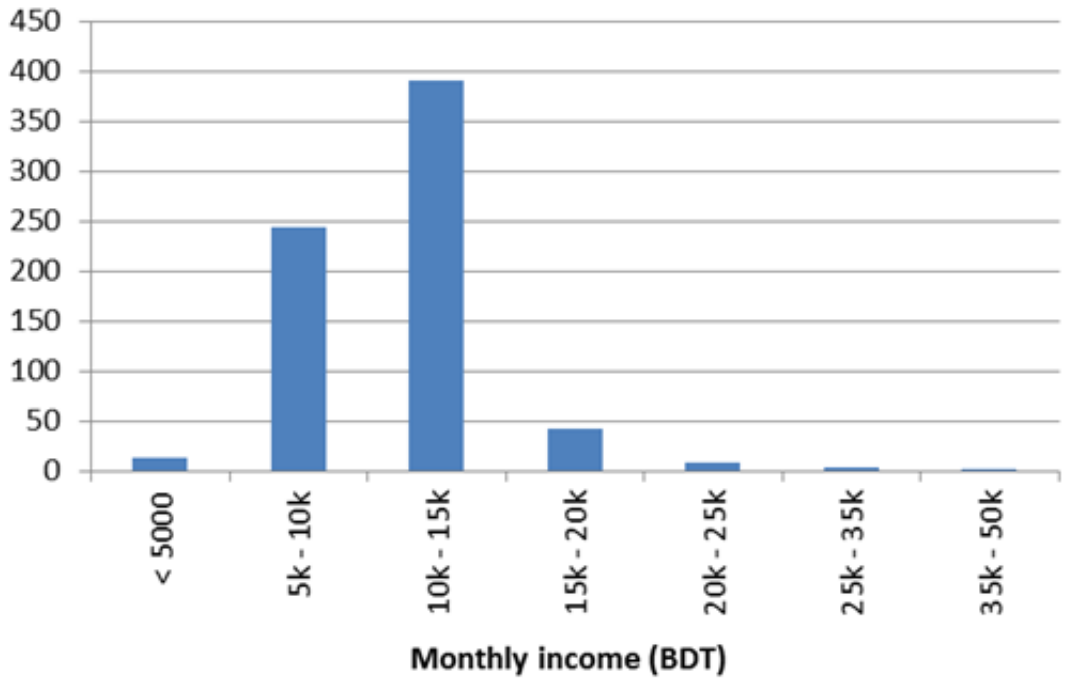

Figure 45. Distribution of monthly income

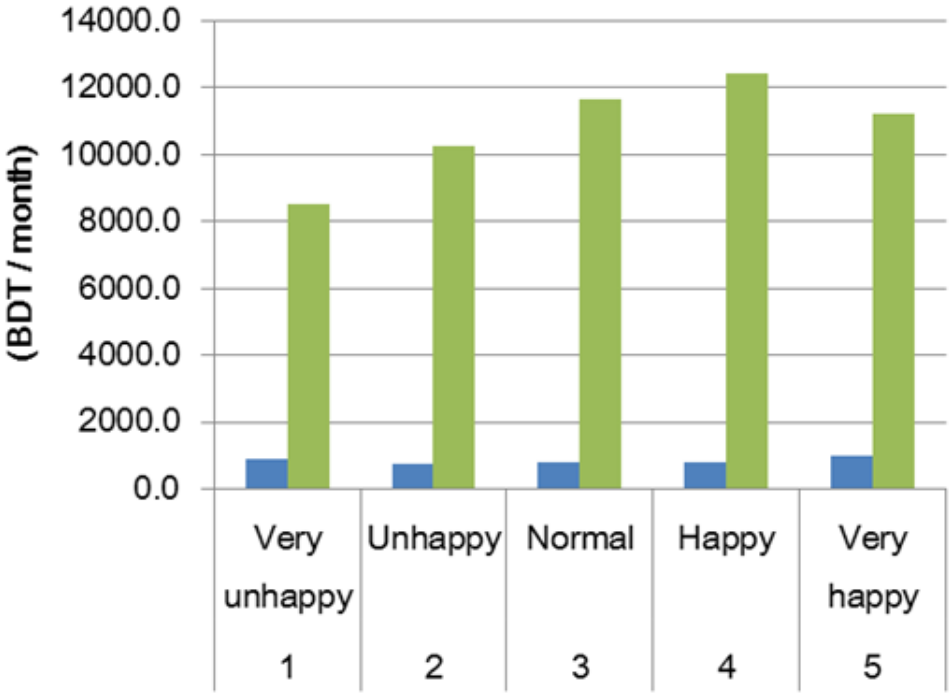

Figure 46. Relation between monthly income and transport expenditure by happiness level

4.4 Finding transport-disadvantage related factors

In this section, we make use of exploratory factor analysis (EFA) to uncover the underlying structure of the discrete-type variables of transport disadvantage that were explained in section 4.3.1, where we have a relatively large set of variables to be reduced into a more reduced number of categories, which is easier for interpretation. The overarching goal of the Factor analysis techniques is to identify the underlying relationships between measured variables. In addition, we can check for all the selected structure of underlying factors and order them by relevance according to how much of the total variance can be explained by each one of them.

We applied the factor analysis using the Principal Component Analysis (PCA) technique. However, after a first run we found only one variable not clear enough to be included into the analysis (F6) due to the small number of respondents, so we performed the analysis once

again excluding that variable related to the railway station and we found a satisfactory result leading to 6 components, which is shown in the Table 15. A Kaiser-Meyer Olkin measure of sampling adequacy was conducted with a resulting value of 0.783, something that can be considered fairly acceptable. The values of Bartlett's Test of Sphericity are Chi-Square (253) = 5283.23 with significance $p < 0.001$.

Table 15. Principal component analysis factor solution.

	Initial Eigenvalues		Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings	
Component	**Total**	**% of Variance explained**	**Total**	**% of Variance explained**	**Total**	**% of Variance explained**
1	5.546	24.112	5.546	24.112	5.348	23.253
2	3.721	16.179	3.721	16.179	2.74	11.913
3	2.457	10.681	2.457	10.681	2.362	10.269
4	1.476	6.416	1.476	6.416	1.904	8.278
5	1.136	4.941	1.136	4.941	1.646	7.155
6	1.101	4.785	1.101	4.785	1.436	6.245

In Table 16 we can observe the rotated factor solution and the communalities for each variable. For the rotation a Varimax rotation solution was considered the most appropriate. The communalities measure the percent of variance in each variable that is explained by all the factors jointly.

From the results of PCA - Principal Components Analysis- , we can observe a clear tendency that defines the six different factors, as follows: use of public spaces and accessibility, traffic-related unsafety, crime-related unsafety, use of public transportation, safety of remote places and others. Hereafter, we explain them more in detail.

- Factor 1: **Use of public spaces and accessibility**. This factor is mostly associated with the living environment and its accessibility, accounting for 23% of the total variance approximately. The poor conditions of the sidewalks (sometimes inexistent), insufficient

or inadequate street lighting, surfaces who make difficult to walk, use bicycles or carts, and the difficulties for using the public spaces caused by traffic contribute for this factor to be the most significant for transport-based social exclusion.

- Factor 2: **Traffic-related unsafety.** Shopping, work and home trip: This factor can be associated to the poor perception of traffic-related safety while walking out of home, in the neighbourhood, in the workplace and its surroundings, and in the places that are visited for shopping.
- Factor 3: **Crime-related unsafety:** This is related to the crime perception and how it makes respondents feel unsafe during walking.
- Factor 4: **Use of public transportation**. Basically, since in all the cities the public urban transportation is highly dependent on buses, the (lack of) clarity for using public transport services may limit the possibilities of respondents to travel to other places within the urban area.
- Factor 5: **The safety of remote places** (factor 5) is something that may concern residents, although it could be also associated with the uncertainty of a non-visited or faraway unknown destination.
- Factor 6: Others – on-road obstructions. The cars that are parked in the street space and other factors related to irregular and risky surfaces to walk (factor 6) create disruption, increase the difficulties for using the street space, and creating concerns among residents when kids play or do other activities by themselves in the neighbourhood.

From the distribution of the factor loadings, we can clearly observe the relative relevance of the fear-based and physical categories of social exclusion, reflected in several items and the 6 factors we found from the PCA calculations.

Table 16. Rotated factor loadings from the principal component analysis.

Component	Factor						Communalities
	1	2	3	4	5	6	
P3	0.809						0.786
F15	-0.789						0.726
P5	0.74						0.734
F13	-0.696						0.621
P1	0.688						0.804
F7	0.68						0.562
F14	-0.68						0.550
P2	0.672						0.693
F8	0.632						0.475
F9	0.55						0.732
F2		0.749					0.686
P0		0.742					0.722
F3		0.736					0.743
F1		0.694					0.677
F11			0.781				0.643
F12			0.765				0.617
F10			0.632	-0.427			0.691
P8				0.794			0.680
P7				0.648			0.698
F4					0.834		0.725
F5					0.792		0.660
P4						0.829	0.731
P6						0.573	0.479

4.5 How are they correlated?

The correlation matrix among relevant variables related to social exclusion dimensions and built-environment are shown in the Table 17. The selected variables are: *income (I), transport expenditure (TE), happiness (H), time of walking to work (TW), sidewalks are well maintained (SM), sidewalks are easy to use (SE)*, *people with disabilities can circulate in the sidewalks of the area (DI)*, *children and elderly people can use the streets without risk of injuries (CH), I understand the use of bus routes in my area (B)* and *I feel safe when walking at night (S)*.

Table 17. Correlation matrix among selected variables

I	TE	H	TW	SM	SE	DI	CH	B	S
1	.396**	.222**	-.098*	-.021	.055	.041	-.055	.000	-.073
	1	.034	-.027	-.045	-.002	-.098*	-.016	.075	-.067
		1	-.381**	.139**	.330**	.402**	.172**	.125**	-.104**
			1	-.262**	-.357**	-.309**	-.209**	-.292**	-.073
				1	.667**	.411**	.093*	.142**	.312**
					1	.588**	.068	.217**	.155**
						1	.273**	.271**	-.030
							1	.229**	.077*
								1	.060
									1

**: 99% significant level, *: 95% significant level

Some of the social exclusion dimensions were reflected in the results of the survey, especially the physical exclusion, fear-based and exclusion from facilities dimensions. On the other hand, we found several transport-related issues that affect the quality of life of urban dwellers in Bangladesh that do not fit in any of the transport-based social exclusion categories, yet they should be considered in future studies. Among the different cities, differences in urban structure and population that are important to explain social exclusion aspects were found. As an example, migrants to Dhaka and Chittagong argue that their main reasons to migrate to the cities are the poverty or unemployment. A large proportion of interviewees in Khulna (~70%) mention that the occurrence of natural disasters was one of the reasons that made them move to the place.

Since the most part of the respondent are daily walkers, the physical exclusion is reflected in aspects such as the poor quality of sidewalks, no existence of sidewalks, and unease to use them; which is specially observed among the respondents in Chittagong. At the same time, respondents in Chittagong register the lowest scores for: citizens' happiness, life satisfaction, perceived safety for the use of motorcycles, sidewalks, road intersections and sidewalks, street lighting, crime, health conditions and education. At the same time they have the highest

proportion of income expenditure in transport services. We can observe a clear association among poor safety conditions, low education, and monetary poverty reflected in lower incomes and lower scores in the self-declared happiness.

We can observe in the Table 17 that the variations of income or transport expenditure cannot be in a significant association with the perceptions of the built-environment, but higher happiness and life satisfaction levels are in contrast significantly associated with better characteristics of the living environment, such as sidewalks in god condition, that are easy and accessible, neighbourhoods with access to bus services that can be understood and where safety in the night time is proper.

The *fear-based* dimensions of social exclusion are more intensively reflected in Chittagong as well. The poor street lighting, the bad traffic conditions and feeling of worriedness for children walking alone in the street are aspects where especially the sample respondents in Chittagong find much more consensus than in the other two cities. The poorest perceptions on the security of sidewalks, road intersections were also found in Chittagong. It is recognised by the respondents that proper transportation services can help to decrease insecurity and the harassment of women on public transport, for example.

With respect to the *exclusion from facilities* dimension, the interviewees mentioned in general that the city centre is far from their residential location. In the urban areas, no nearby schools seem to be identified by the respondents in the sample. In Dhaka city, the bus stop location and the grocery stores are the most acknowledged facilities. In Khulna, people acknowledge the total number listed facilities in the survey questionnaires such as parks, city hall, post office or banks, etc. more than respondents in the larger urban areas do, albeit there longer travel distances to find these facilities than in the metropolitan areas, for example, 2km to the supermarket in contrast to a 400m – 500m distance in Dhaka or Chittagong. People living in the urban agglomerations tend much less to identify the locations or acknowledge the

existence of leisure, sports or alternative shopping facilities.

The average travel times found were 19 minutes in Chittagong, 16 in Dhaka and 37 in Khulna respectively, and most of those commuting trips are done by walking. A low expenditure in transport must reflect an economic exclusion that affects universally most of this population of walkers, so improving the walkability should be one of the most relevant needs from the point of view of transport-based social exclusion, since so many activities for the people will continue depending on walking for a long time, as poor capacities to afford motorized travel will persist for many years. Most of the expenditure in the interviewed households is still to buy food, so an increased dependency on motorized transport services will impact negatively the quality of life and create burden itself. Higher travel times can be associated to worse perceptions of physical exclusion, according to the results of the Table 17.

5. Links between transport disadvantage and transport-based social exclusion in Bangladeshi cities

Chapter 5
Links between transport disadvantage and transport-based social exclusion in Bangladeshi cities

In this chapter we attempt to empirically confirm the existence of causal links from transport disadvantage to transport-based social exclusion, which are reflected in the decline of well-being, in the context of developing countries. For this research purpose, we use the data of the conducted questionnaire survey in three major cities of Bangladesh: Dhaka, Chittagong and Khulna in March to May, 2015 and use the 700 valid questionnaire survey answers. In this survey we asked respondents to report their socioeconomic conditions, life activities, time use, travel behaviour patterns, and self-assessment of well-being (i.e. happiness, optimism for the future, and life satisfaction with respect to a set of life domains), etc.

Table 19 shows a list of the independent variables used for the analysis. Based on the responses received through the survey questionnaires we can assess the following aspects of daily life in the Bangladeshi cities – for the respondents in our sample – that must be taken into account for having a clearer idea of the context in which the results take place:

- In Dhaka, 92% of the respondents live in a rented house. The percentages are 36.5% and 48%, respectively, in Chittagong and Khulna. Similarly, Dhaka has the lowest percentage of respondents living in a formal housing settlement (18.3%), while the percentages are 54.5% and 42.5% in Chittagong and Khulna, respectively. Thus, the majority of the respondents in Dhaka city are living in informal temporary settlements. More than 90% of the respondents in Dhaka and Khulna manifest they moved from another place, i.e.,

they migrated to the city. Poverty and unemployment appear as the main reasons that caused migration from other places. The food expenditure is between 90 – 100% of the total income. Therefore, money expenditure in any transport services is not high in comparison, and it takes places on a very occasional basis.

- The most common occupations among the respondents are as labour, merchant and rickshaw driver.
- Approximately 40% of the respondents in our sample have never attended school.
- The main travel purpose of the respondents was solely for working activities. Although trips for other purposes were considered in the survey questionnaire (shopping, leisure, religious activities, social activities, etc.), they are rarely undertaken by the respondents. Consequently, the individual's times for sleeping and working will be employed as explanatory variables for describing the use of time during the day.
- From the responses in the survey, we have observed that walking is largely the most used travel mode in the three cities, especially Dhaka and Chittagong. Among the respondents in Khulna we observed a more diverse modal share, where trips by rickshaw and bicycle are a little more frequent. No trips by other private modes (i.e. car, motorcycle) were recorded in our sample.
- The physical accessibility and traffic-related safety generate more dissatisfaction than the crime- or vehicle-related perceived safety do (see Table 1).
- For the happiness condition assessment, in our sample of 700 respondents, only 18 people answered "very unhappy" and 6 people answered "very happy". For the subsequent analyses, they will be grouped in 3 categories: "very happy / happy" (48.9% of respondents), "neutral" (29%) and "unhappy / very unhappy" (22.1%) respectively.

From this analysis, we will group the explanatory variables into four categories: *transport disadvantage* (physical, safety, economic, geographical and time-based), socio-demographic

attributes, travel behaviour, and use of time. In the Table 18 we list all the variables by each category in a descriptive aggregate analysis.

Table 18. Self-assessed transport-disadvantage question items

Physical accessibility (Disadvantage condition: captured by the share of respondents who answered "strongly disagree" or "somewhat disagree") – (Cronbach's Alpha = 0.715)	
People who use wheelchairs can easily circulate on the sidewalks in my neighbourhood	56.3%
There are bicycle or pedestrian trails in or near my neighbourhood that are easy to get to	52.9%
The sidewalks in my neighbourhood are well maintained (paved, even, and not a lot of cracks or potholes)	45.6%
I can understand the use of the bus routes in the city	43.4%
There are sidewalks on most of the streets in my neighbourhood	41.9%
Children and elderly people can use the streets without risk of injuries	36.4%
Sidewalks are separated from the road/traffic in my neighbourhood by parked cars	26.3%
Visitors in this area can easily use the bus routes in the city	20.6%
I can do most of my shopping at local stores	16.7%
Safety - Vehicle (Disadvantage condition: captured by the share of respondents who answered "very unsafe" or "unsafe to some extent" to the question "*how safe would you feel by using the following modes in your residence city/town/village?*") – (Cronbach's Alpha = 0.703)	
Motorcycle	28.7%
Walk	14.0%
Use a rickshaw	9.9%
Use an auto-rickshaw	9.9%
Drive car	8.9%
Use a bus	7.1%
Bicycle	6.3%
Safety - Crime (Disadvantage condition: captured by the share of respondents who answered "somewhat agree" or "strongly agree" to the following statements) – (Cronbach's Alpha = 0.710)	
My neighbourhood streets are well lit up during night time (*)	48.0%
The crime rate within and nearby my neighbourhood is high	23.4%
The crime rate within and nearby my neighbourhood make me feel unsafe to walk at night	20.4%
The crime rate within and nearby my neighbourhood make me feel unsafe to walk during the day	12.3%
Safety - Traffic (Disadvantage condition: captured by respondents who answered "*somewhat agree"* or "*strongly agree"* to the following statements) - (Cronbach's Alpha = 0.788)	
I would get worried if my kids walked alone in the streets of my neighbourhood	46.9%
The traffic conditions within and nearby my neighbourhood make me feel unsafe to cross the streets at night	42.7%
The traffic conditions within and nearby my neighbourhood make me feel unsafe to cross the streets during the day	41.7%

(*) Regarding this question item, the disadvantage condition is for respondents who answered "somewhat disagree" or "strongly disagree"

Table 19. Description of the variables used

Variable name	Description	Min	Max	Dhaka		Chittagong		Khulna	
				Average	SD	Average	SD	Average	SD
Well-being indicators									
Happy	How happy do you feel?	1	5	2.65	0.81	2.18	0.41	3.36	0.84
Optimistic	How optimistic are you about the future?	1	5	2.43	0.97	2.99	0.10	3.34	0.73
Life Satisfaction	Life satisfaction score (considering all life domains)	20	63	36.26	7.17	36.93	0.96	48.07	6.35
Socio-demographic attributes									
Age	Age (years old)	15	72	31.8	9.3	26.8	6.1	37.7	8.7
Gender	Percentage of women in the sample (%)	-	-	5	-	7.3	-	7.5	-
Members_HH	Number of members in the household	1	9	3.67	1.56	4.43	1.42	4.26	1.49
Time_living	Time living (years)	0	55	12.85	7.57	24.11	8.45	5.97	3.99
Income	Monthly income (BDT)	830	47496	11054.4	4587.8	10464.7	3160.6	11796.3	3809.3
Food_exp	Monthly food expenditure (BDT)	600	90000	5040.0	2346.4	10145.0	3765.0	8298.5	6380.8
Travel behaviour and use of time									
Bicycle_f	Number of trips in a week by bicycle	0	13	0.00	0.00	0.00	0.00	1.75	3.06
Rick_f	Number of trips in a week by rickshaw	0	18	0.47	1.73	0.00	0.00	4.77	4.41
Walk_f	Number of trips in a week by walking	0	24	11.01	3.28	6.23	2.20	6.96	5.25
Bus_f	Number of trips in a week by bus	0	20	2.18	0.91	0.77	2.20	4.17	4.26
Sleep_time	Time for sleep (hours/day)	4	10	6.0	0.6	7.7	1.1	6.8	0.3
Work_time	Time for work (hours/day)	0	18	14.3	2.0	14.3	1.1	7.9	1.3
Walking_time	Average time spent walking (mins/day)	0	200	23.68	11.10	17.04	6.60	50.69	40.49

Table 19. Description of the variables used

Variable name	Description	Min	Max	Dhaka		Chittagong		Khulna	
				Average	SD	Average	SD	Average	SD
Transport disadvantage									
Physical exclusion [a)]									
Accessibility	Number of items with declared dissatisfaction	0	9	3.5	2.04	4.4	1.05	2.2	1.45
Safety (fear-based) [a)]									
Vehicle	Number of items with declared dissatisfaction	0	6	0.2	0.45	0.8	0.37	1.9	1.38
Crime	Number of items with declared dissatisfaction	0	3	0.9	0.76	1.0	0.00	1.3	0.97
Traffic	Number of items with declared dissatisfaction	0	3	0.6	0.96	2.5	1.10	1.1	0.84
Economic									
Transp_exp	Monthly transport expenditure (BDT)	0	10000	606.4	791.1	988.2	534.5	798.8	370.6
Geographic									
Density	Population density - urban area (persons/km2)	93	168151.4	58033.12	20560.35	22647.6	10221.3	22619.5	1951.5
	Population density - rural area (persons/km2)	-	-	-	-	1524.1	656.6	628.2	501.5
Rural population [b)]	Respondents living outside the main urban area (%)	-	-	0.0%	-	35.0%	-	65.5%	-
Time-based									
Work_TT	Travel time to work (mins)	0	110	16.26	7.06	20.34	4.37	37.85	17.20
Times_out	Times/day going outside the residential area	1	8	0.79	0.71	0.40	0.24	2.62	1.80

a) According to the information displayed in Table 18 , b) Not used in the regression models, since it is reflected in the Population Density

5.1 Impact of transport disadvantage on well-being

If an individual is experiencing a situation of social exclusion produced by the negative impacts of a given situation of transport disadvantage, it should be reflected in a diminished well-being condition as a consequence. Based on this idea, we grouped individuals by categories of happiness according to the level as previously explained in order to observe how different types of travel behaviour and transport disadvantage can become transport-based social exclusion by negatively affecting the well-being of respondents.

In

Table 20, we can observe how the mean values of the explanatory variables change among the groups with different levels of happiness and which variables have statically significant differences among these groups based on the results of the two-way ANOVA test. While a longer time of residence and a longer time spent at working activities are associated with a decrease in happiness, the happiness of the respondents seems to increase with higher values of age, income, trips outside the residential location, rickshaw and bus use frequency, walking time, and travel time to work respectively. The values for Optimism and Life Satisfaction also increase as the happiness condition increases. In addition, from the information of

Table 20 we cannot infer the effect that other variables may have on happiness.

Considering this, we conduct a more detailed assessment of well-being to clarify the influence of *transport-disadvantage, socio-demographic attributes, use of time* and *travel behaviour* on the well-being descriptive variables. The results can be observed in Table 21 and Table 22.

Table 20. Cross-tabulation of explanatory variables according to the happiness condition

Variable	Unhappy (48.9%)	Neutral (29%)	Happy (22.1%)	F value[a]	
Optimistic	2.7	2.8	3.2	17.614	***
LS	37.6	40.6	43.7	36.744	***
Income	10180.2	11678.6	12362.3	19.603	***
Age	29.2	33.2	37.0	44.403	***
Members_HH	3.8	4.5	4.1	12.998	***
Time_living	16.5	13.8	9.3	31.208	***
Food_exp	7180.7	8006.4	7223.2	2.101	
Accessibility	4.1	2.7	2.8	54.391	***
Vehicle	0.8	0.5	1.4	30.572	***
Crime	1.0	1.1	1.0	0.099	
Traffic	1.9	0.7	0.8	84.593	***
Transp_exp	766.3	791.1	821.6	0.387	
Density	31486.7	37989.1	23378.2	12.203	***
Work_TT	20.9	22.8	30.7	29.176	***
Times_out	0.6	1.2	2.2	82.04	***
Bicycle_f	0.2	1.0	0.6	15.305	***
Rick_f	0.7	1.5	3.6	44.96	***
Walk_f	8.0	9.1	8.7	4.005	
Bus_f	1.9	2.5	3.2	12.409	***
Sleep_time	7.0	6.3	6.6	35.757	***
Work_time	13.4	12.6	10.2	60.533	***
Walking_time	21.9	34.2	40.2	31.821	***

[a] One-way ANOVA Test
Statistical significance is expressed by * p<0.10, **p<0.05, *** p<0.01

We used the different travel behaviour and use of time, transport disadvantage and socioeconomic variables questions as independent variables in three forward hierarchical regressions. In the first model, we control for socio-demographic attributes, in the second model we add the *transport disadvantage* descriptive variables as predictors and finally, in Model 3 we add the variables related to use of time and travel behaviour. In those estimations, all the aforementioned well-being variables are taken as dependent variables and the effects of all our previously chosen independent variables are evaluated, as follows:

1. Life satisfaction: A multiple linear regression has estimated, where the overall Life Satisfaction is treated as the dependent variable (see Section 5.2). This

analysis is done step by step for confirming the effects of different groups of explanatory variables.

$$
\begin{aligned}
LS_1 &= \left[\hat{\beta}_{SD}\right]_1 X_{SD\,i} + \varepsilon_{i1} \\
LS_2 &= \left[\hat{\beta}_{SD}\right]_2 X_{SD\,i} + \left[\hat{\beta}_{TD}\right]_2 X_{TD\,i} + \varepsilon_2 \\
LS_3 &= \left[\hat{\beta}_{SD}\right]_3 X_{SD\,i} + \left[\hat{\beta}_{TD}\right]_3 X_{TD\,i} + \left[\hat{\beta}_{TBUT}\right]_3 X_{TBUT\,i}^{\;T} + \varepsilon_3
\end{aligned}
\tag{1}
$$

where,

LS_j: Estimated life satisfaction for estimation j

X_i: Column vector for explanatory variables related to socio-demographic attributes (X_{SD}), transport disadvantage (X_{TD}) and travel behaviour and use of time (X_{TBUT}) respectively

β Predicted coefficients of the model

2. Optimism: we treat this dependent variable as an ordinal type variable (with values from 1 for "fully disagree" to 5 for "fully agree"). As a first attempt we used a logit type ordinal regression in order to check the effects of the independent variables, but actually using a hierarchical multiple linear regression model resulted in a much better model fit (R-square coefficients were 0.112 and 0.274 respectively with 1% significant F and Chi^2 values). Therefore, in the regression models the dependent variable Optimism is treated similarly as Life Satisfaction.
3. Happiness: We divided happiness into 2 different binary-type dependent variables: *Happy* and *Unhappy*. This allows us to take into account the different predictors that might influence the happiness condition either both positively and negatively, or just in one single direction. For the *Happy* direction, some factors might improve the well-being without generating exclusion if they do not occur. For the *Unhappy* direction, some factors might deteriorate the well-being and hence generate exclusion if they occur. For the binary logit model, it is also

estimated step by step in the same way like equation (1).

$$\Pr(Y_1 = 1 \mid X_i{}^T) = \frac{\exp\left(X_{SDi1}{}^T \left[\hat{\beta}_{SD}\right]_{i1}\right)}{1 + \exp\left(X_{SDi1}{}^T \left[\hat{\beta}_{SD}\right]_{i1}\right)}$$
$$\Pr(Y_2 = 1 \mid X_i{}^T) = \frac{\exp\left(X_{SDi2}{}^T \left[\hat{\beta}_{SD}\right]_{i2} + X_{TDi2}{}^T \left[\hat{\beta}_{TD}\right]_{i2}\right)}{1 + \exp\left(X_{SDi2}{}^T \left[\hat{\beta}_{SD}\right]_{i2} + X_{TDi2}{}^T \left[\hat{\beta}_{TD}\right]_{i2}\right)} \quad (2)$$
$$\Pr(Y_3 = 1 \mid X_i{}^T) = \frac{\exp\left(X_{SDi3}{}^T \left[\hat{\beta}_{SD}\right]_{i3} + X_{TDi3}{}^T \left[\hat{\beta}_{TD}\right]_{i3} + X_{TBUTi3}{}^T \left[\hat{\beta}_{TBUT}\right]_{i3}\right)}{1 + \exp\left(X_{SDi3}{}^T \left[\hat{\beta}_{SD}\right]_{i3} + X_{TDi3}{}^T \left[\hat{\beta}_{TD}\right]_{i3} + X_{TBUTi3}{}^T \left[\hat{\beta}_{TBUT}\right]_{i3}\right)}$$

Here, Y is a binary response variable corresponding to happiness self-assessment. For the *Happy* model, $Y = 1$ if the individual considers himself happy or very happy and $Y = 0$ otherwise. For the *Unhappy* model, $Y = 1$ if the individual i considers himself unhappy or very unhappy and $Y = 0$ otherwise (see Table 22).

5.2 Analysis of modelling results

According to the results of the ANOVA test and the regression models based on our proposed approach from the well-being perspective, we can summarize the incidence of the different theoretical aspects of the influence transport-based disadvantage on transport-based social exclusion for the respondents in our sample. Particularly for Life Satisfaction and Happiness (together with Unhappiness) as observed well-being variables, the model fit variables can be considered satisfactory.

5.2.1 Influence of transport disadvantage

From all the models we can observe that an important proportion of the changes in well-being can be explained by transport disadvantage conditions. We also can observe how certain dimensions of transport disadvantage such as the perceived safety (or unsafety) of vehicles and the economic dimension reflected in transport expenditure have very limited or no significant impacts in well-being.

Among the transport disadvantage categories under study, the physical category (poor accessibility impacts on all the life well-being indicators), the geographical (well-being is negatively impacted in locations with the highest population densities) and time-related affect Life Satisfaction and Optimism. The fear-based (the traffic-related unsafety impacts happiness and some effects of crime can be observed on optimism) generate social exclusion as they are able to undermine the respondents well-being reflected in the effects on Happiness.

The effect of dimensions of transport-based social exclusion such as the time-related have effects that need to be examined with more detail. For the time-based category, surprisingly, longer travel times to work affect positively well-being (the opposite is usually expected), thus the issues related to the utility and frequency of trips out of the neighbourhood should be further examined.

Table 21. Results of multiple linear regression models

	Life satisfaction									Optimism								
Model	1			2			3			1			2			3		
	Coef,	t-value		Coef,	t-value		Coef,	t-value		Coef,	t-value		Coef,	t-value		Coef,	t-value	
1st: SD																		
Income	-1.88E-05	-0.25		5.85E-05	0.85		6.97E-05	1.04		1.02E-05	1.21		**2.39E-05**	**2.75**	***	**2.54E-05**	**2.92**	***
Age	**.171**	**5.17**	***	**.095**	**3.33**	***	**.054**	**1.87**	*	**.012**	**3.21**	***	**.010**	**2.87**	***	**.007**	**1.88**	*
Gender (1=Male)	1.670	1.36		**2.025**	**2.03**	**	1.568	1.60		-.080	-0.58		-.078	-0.62		-.119	-0.94	
Members_HH	**.745**	**3.39**	***	**.554**	**2.95**	***	**.371**	**2.02**	**	**.049**	**1.98**	**	.020	0.85		.007	0.31	
Time_living	**-.275**	**-8.79**	***	**-.114**	**-3.70**	***	-.019	-0.55		-.005	-1.57		-.001	-0.27		.006	1.29	
Food_exp	**-1.82E-04**	**2.76**	***	**-1.18E-04**	**-2.05**	**	**-1.46E-04**	**-2.61**	***	**2.92E-05**	**3.96**	***	7.44E-06	1.03		5.45E-06	0.76	
2nd: TD																		
Accessibility				**-1.213**	**-8.01**	***	**-.918**	**-5.91**	***				**-.053**	**-2.77**	***	**-.036**	**-1.80**	*
Safety - Vehicle				.343	1.30		-.124	-0.42					.031	0.92		-.005	-0.12	
Safety - Crime				.467	1.41		.038	0.12					**-.097**	**-2.31**	**	**-.136**	**-3.17**	***
Safety - Traffic				.313	1.34		.082	0.34					**.058**	**1.97**	*	.031	1.00	
Transp_exp				.000	-0.72		.000	-0.85					-9.12E-05	-1.61		**-9.64E-05**	**-1.71**	*
Density				**-7.48E-05**	**-6.42**	***	**-6.19E-05**	**-5.19**	***				**-8.31E-06**	**-5.65**	***	**-6.47E-06**	**-4.19**	***
Time - Work_TT				**.094**	**4.62**	***	**.068**	**3.16**	***				**.009**	**3.65**	***	**.006**	**2.24**	**
Time - Times_out				**.400**	**2.00**	**	.005	0.02					**-.051**	**-2.02**	**	**-.086**	**-3.17**	***
3rd: TBUT																		
Bicycle_f							**.453**	**3.14**	***							.027	1.42	
Rick_f							**.278**	**3.06**	***							.002	0.17	
Walk_f							**-.154**	**-2.24**	**							-.014	-1.57	
Bus_f							.059	0.64								-.008	-0.64	
Sleep_time							-.477	-1.48								-.003	-0.06	
Work_time							**-.438**	**-2.88**	***							**-.058**	**-2.92**	***
Walking_time							-.001	-0.06								.001	0.69	
Constant term	32.3			36.99			48.28			2.12			2.56			3.61		
Initial LL																		
Final LL																		
R2 - McFaddenR2	0.194			0.479			0.520			0.086			0.249			0.274		

Notes: Coefficients are statistically significant at 1%***, 5%**, 10%*; Predictors grouped as follows: socio-demographic attributes (SD), transport disadvantage (TD), travel behaviour and use of time (TBUT)

Table 22. Results of binary logit models

	Happiness (Binary logit)									Unhappiness (Binary logit)								
Model	1			2			3			1			2			3		
	Coef.	z-value		Coef.	z-value		Coef.	z-value		Coef.	z-value		Coef.	z-value		Coef.	z-value	
1st: SD																		
Income	**9.41E-05**	**3.44**	***	**1.12E-04**	**3.50**	***	**1.01E-04**	**3.05**	***	**-9.18E-05**	**-3.66**	***	**-1.13E-04**	**-3.85**	***	**-1.09E-04**	**-3.66**	***
Age	**0.071**	**6.18**	***	**.054**	**4.32**	***	**.060**	**4.35**	***	**-.060**	**-5.70**	***	**-.037**	**-3.02**	***	**-.025**	**-1.88**	*
Gender (1=Male)	**1.465**	**2.60**	***	**1.521**	**2.54**	**	**1.582**	**2.63**	***	.076	.19		.191	0.45		-.209	-0.47	
Members_HH	-.096	-1.27		-.068	-0.78		-.121	-1.32		**-.158**	**-2.33**	**	**-.176**	**-2.10**	**	-.141	-1.62	
Time_living	**-.079**	**-6.04**	***	**-.027**	**-1.70**	*	-.016	-0.88		**.063**	**6.52**	***	-.003	-0.24		**-.036**	**-2.26**	**
Food_exp	-2.65E-06	-0.12		-7.27E-05	-1.57		-7.52E-05	-1.54		-2.81E-05	-1.06		-3.47E-05	-0.79		-3.32E-05	-0.69	
2nd: TD																		
Accessibility				-.057	-0.93		-.047	-0.71					**.309**	**5.48**	***	**0.253**	**4.22**	***
Safety - Vehicle				**.178**	**1.70**	*	-.068	-0.54					**.179**	**1.69**	*	**0.325**	**2.58**	**
Safety - Crime				**-.302**	**-2.20**	**	**-.338**	**-2.35**	**				.162	1.24		0.176	1.29	
Safety - Traffic				**-.451**	**-3.70**	***	**-.476**	**-3.51**	***				**.785**	**7.67**	***	**0.839**	**7.23**	***
Transp_exp				-1.87E-04	-0.93		-1.67E-04	-0.76					2.91E-04	1.49		2.36E-04	1.14	
Density				**-1.21E-05**	**-2.09**	**	**-1.17E-05**	**-1.85**	*				3.36E-06	0.69		8.60E-07	0.17	
Time - Work_TT				.012	1.48		.013	1.39					**-.018**	**-1.89**	**	0.001	0.13	
Time - Times_out				**.300**	**3.64**	***	**.257**	**2.72**	***				**-.413**	**-3.75**	***	**-0.266**	**-2.40**	**
3rd: TBUT																		
Bicycle_f							**-.234**	**-3.21**	***							-.056	-0.70	
Rick_f							**.100**	**2.69**	***							**-0.094**	**-2.18**	**
Walk_f							.030	1.01								.006	0.20	
Bus_f							**-.089**	**-2.11**	**							.046	1.07	
Sleep_time							-.159	-0.79								**.286**	**1.84**	*
Work_time							**-.164**	**-2.92**	***							**0.153**	**2.92**	***
Walking_time							.001	0.21								**-0.019**	**-3.24**	***
Constant term																		
Initial LL	-370.10			-370.10			-370.10			-485.02			-485.02			-485.02		
Final LL	-307.91			-272.75			-256.55			-414.72			-325.81			-307.65		
R2 - McFaddenR2	0.168			0.263			0.307			0.145			0.328			0.366		

Notes: Coefficients are statistically significant at 1%***, 5%**, 10%*; Predictors grouped as follows: socio-demographic attributes (SD), transport disadvantage (TD), travel behaviour and use of time (TBUT)

5.2.2 **Effects of socio-demographic attributes, travel behaviour and use of time**

According to our results, higher ages and a reduced duration of working time in the day affect positively all the well-being indicators. Increased frequencies of use of rickshaws induce increases in Life Satisfaction and Happiness suggesting a very important impact for general well-being, together with reduced walking frequencies and reduced bus usage (and dependence we may assume). In addition, it is observed that the use of rickshaws and reduced working times influence strongly the happiness condition, in the sense that it can bring respondents both to a happier or an unhappier condition. It is also observed that a bigger household size has positive effects on life satisfaction.

As for happiness condition, it should be noted that income and age are good predictors of happiness condition, whereas male members of the household tend to feel happier and a shorter time living in the neighbourhood together with a shorter time of walking tends to make people feel unhappier without making them happy if the contrary would occur.

5.3 Additional remarks

Based on the statistical significance of independent variables related to the socio-demographic attributes such as age, gender, we can easily identify women, the young

and to some extent recent migrants as vulnerable groups with higher risks of social exclusion. We found that higher travel times to work are also associated with increasing well-being for the respondents in our sample. Regarding walking as the main mode choice, we can observe impacts of reduced walking frequencies on life satisfaction. Curiously, higher walking times do not have a significant effect for increasing well-being, but short walking times are likely to induce unhappiness. For instance, we can observe that respondents who walk less than 20 minutes in a day are more likely to feel unhappy than respondents walking longer times during the day.

From our results, we confirmed the negative impact that a low income has on well-being, while transport expenditure does not have any significant impacts on well-being. This can be justifiable since the daily use of different modes than walking seems to be strongly restricted not only by financial resources but also by the physical characteristics and dimensions of public spaces in densely populated districts, in which it is not feasible to employ different travel modes than walking. We can similarly assume that the vehicle-safety related perceptions do not impact the well-being due to a very little or no utilization of vehicles for daily trips among the respondents in the sample.

The use of rickshaws has a notorious significant effect in all the variables of well-being that we evaluated, and the higher the frequency of use, the higher well-being the respondents of the survey are reporting. Similarly, the frequency of trips outside the

neighbourhood has also a consistent effect on happiness. Residents that make trips outside their residential location neighbourhood experience high happiness feelings while residents with little or no daily trips outside the neighbourhood are more likely to experience unhappiness.

At the same time, we can observe unclear effects from bicycle and bus usage, as well as little or no effects from transport expenditure, and sleeping time, and limited effects on well-being from walking time, gender and household members. The effects of use of other modes need to be examined more in detail in future studies order to understand the utility of diverse actions and related trips.

6. Influence of Social Exclusion on future life and migration choices: a case of Study of high schools in rural areas of Japan

Chapter 6
Influence of Social Exclusion on future life and migration choices: a case of Study of high schools in rural areas of Japan

In this section we explore the phenomenon of transport-based social exclusion from a perspective that has been quite unexplored in the existing studies: how the currently existing transport-based social exclusion mechanisms affect young people and what implications it has for their future life choices. The latter specially becomes a relevant question considering the perspective of Japan as a depopulating country.

In this chapter we inquire over two main research questions: 1) the influence of travel behaviour and transport disadvantage on social exclusion, and 2) how social exclusion affects future life choices and migration plans of high school students in Japan.

6.1 Introduction

The depopulation of Japan has recently a serious concern for stakeholders and policy makers, increasingly becoming one of the most important problems in current society. The population of the country is shrinking by an average estimate decline of half a million

people per year for the next forty years. In addition, as the country is getting older and the ratio of dependents to active workers is expected to approach 1:1 by around 2030 (Matanle and Rausch, 2011).

As a consequence of this, the Government of Japan is considering policies in order to tackle the depopulation problem now affecting the entire country. Although the decline of the population in Japan started just in the previous decade (JFS Newsletter No.142), it is worth mentioning that the problem of rural depopulation has been a major problem in in many rural municipalities in Japan since the post-war era (Thompson, 2003). Due to the exaggerated degree of agglomeration in the manufacturing sector in South Japan (from Tokyo to Kyushu island) and lack of economic and educational in rural areas, the rural out-migration has been demographically selective affecting the group 15 – 19 years old (Barrett and Okudaira, 1995).

In consideration of this, we conducted a survey among high school students in Hiroshima prefecture, which has a notorious amount of officially designated depopulating areas in mountainous villages principally. The survey was aimed to understand more comprehensively the current future intention migrations of high school students in depopulating regions of Japan and the factors that motivate those choices.

Based on the life-oriented approach, it is important to consider that people's life choices are closely linked with their quality of life (Zhang and Xiong, 2015; Zhang, 2017), that

decisions on various life domains are interdependent of each other and that in the case of urban policy, people's various life aspects need to be reflected into the policy decision-making process simultaneously (Zhang, 2014). In other words, taking into account the possible relevance of activates in different life domains and the interactions among them constitutes a way to better understand future life choices, which in this case includes future migration decisions.

In this paper we aim to clarify which are the current migration preferences of high school students, as well as their preference for a set of future life plans, how social exclusion is experienced in the depopulated areas and to which extent social exclusion and perception of time can influence the preferred future migration preferences in depopulated and non-depopulated areas of Hiroshima prefecture, Japan. In addition, we include in this study concepts of social exclusion and time-perspective profiles in order to test whether they are useful to predict future migration behaviour or not. The concept of "Time perspective" has been originally proposed as a psychological concept used to understand what motivates decisions (Boyd and Zimbardo, 2008). In addition, the links among various life choices and future migration decisions are hereby explored.

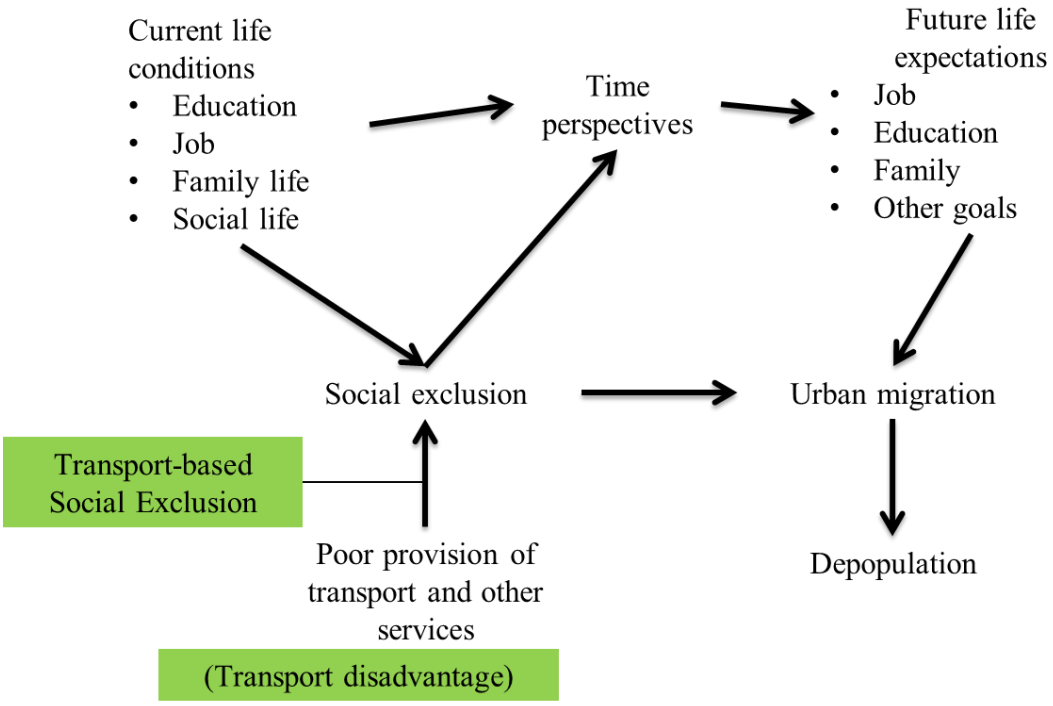

Figure 47. Framework for analysis and understanding of rural depopulation

6.2 Preliminary information

In this section we describe some parts of the information related to high school students' future migration plans and characterization of social exclusion.

6.2.1 Future migration plans of high school students

One section of the questionnaire survey was dedicated to understand the future preferences for migration of the respondents. It should be noted that the term "migration preferences" is used, which must not be understood as (future) migration choices, since in fact a large proportion of the respondents are not able to make such decision due to a considerable number or factors, principally the lack of autonomy that being underage involves.

In Figure 48 we can observe the distribution of the respondents according to their future migration preferences. In red tones we grouped those who will be more likely to migrate and in blue tones we grouped those students who will be more likely to stay in their current place of residence, either by their explicit will or because of a lack of resolution to move somewhere else. In addition, we asked the following questions: *Do you want to return to where you live now* (in a case of future migration)*?* And *In affirmative case, when would you like to return?*

From a total of 1,017 responses, 574 students (52.1 %) have responded that they have not considered future residence or that they want to continue living in their current place, i.e. 52.1% of the students would be likely to not consider migration in the future (blue group in Figure 3). The other 527 students (47.9%) would consider options related to future migration (see Figure 49).

From the respondents, 208 have manifested that after migrating they do not want to come back to the place where they are currently living while 225 respondents responded they would return to their current place of residence after a time. The responses regarding the period of time in which those respondents would return are almost equally distributed.

In addition, in Table 23 we compare the future migration preferences of respondents according to the type of area and use Chi2 test to confirm whether the differences of each migration intention are significant between depopulating and non-depopulating areas.

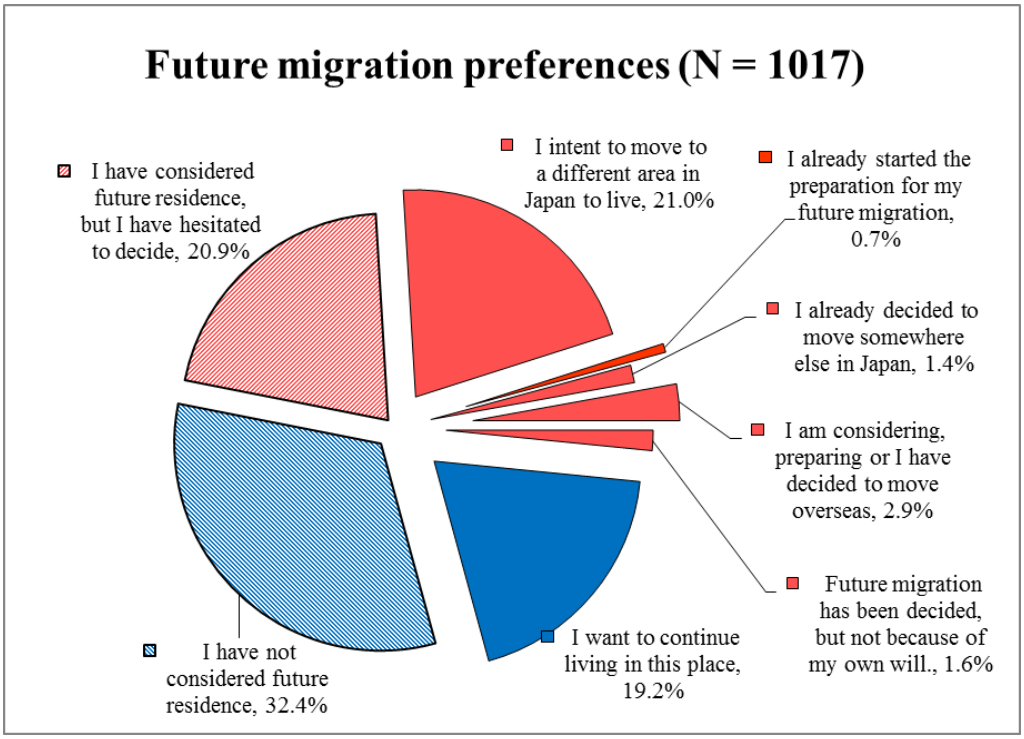

Figure 48. Ideas of future migration preferences of students

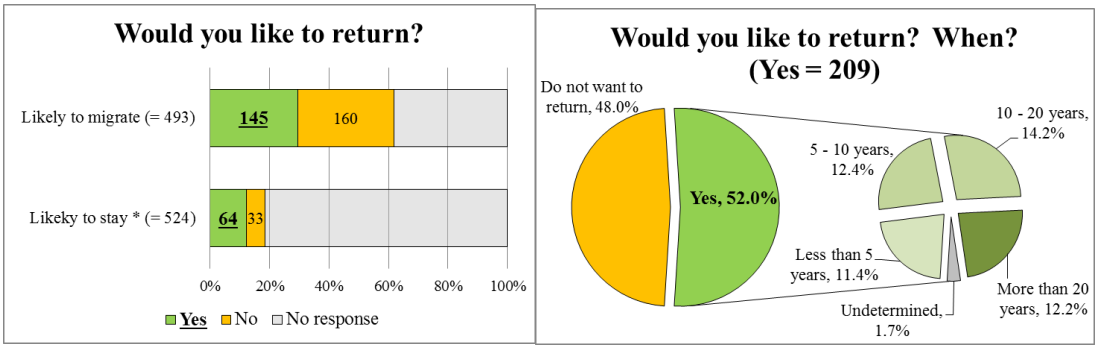

Figure 49. Ideas of future return preferences of students[4]

Table 23. Participants sorted by type of area and future migration intentions

Type of area	N	Future migration intentions		
		Migrate	Return	Migrate permanently
Depopulating	584	302 (51.7%)	124 (21.2%)	130 (22.3%)
Non-Depopulating	433	191 (44.1%)	85 (19.6%)	63 (14.5%)

[4] This applies in a hypothetical case of migration

Pearson Chi-2 test	5.75*	0.39	9.61*

* Significant at 95% level

6.2.2 Characterization of Social Exclusion

From the survey, the respondents in our survey evaluated how they face social exclusion based on their own perceptions over a list of 21 question items. The main question was "*How much do you agree with …?*" and for each question item the respondents assess in a Likert-type scale as follows[5]: 1: not at all, 2: few times, 3: several times, 4: totally agree. By applying a factor analysis method with the use of SPSS software, the 21 question items (see Table 25) can be summarized in a rotated factor solution of 7 components which are shown in Table 24. The factor loadings were extracted by using Principal Components Analysis (PCA) method, which is a standard extraction method and therefore commonly used in social science studies.

Table 24. Social exclusion related components

Components	**N**	Initial Eigenvalues			Rotation Sums of Squared Loadings		
		Total	%V	%C	Total	%V	%C
Social support	5	6.55	31.19	31.19	2.81	13.40	13.40
Participation	4	1.54	7.34	38.53	2.58	12.32	25.72
Health condition	3	1.48	7.03	45.56	2.27	10.80	36.51
Natural environment	3	1.38	6.58	52.14	2.02	9.61	46.12
Safety	2	1.19	5.68	57.83	1.79	8.54	54.66
Accessibility	2	1.06	5.06	62.89	1.53	7.30	61.97
Lifestyle	2	1.03	4.92	67.81	1.29	5.84	67.81

N: Number of components for each factor, %V: Percentage of Variance explained, %C: Cumulative percentage of variance explained

[5] Only four scales were used to avoid neutral positions in this very particular case

Table 25. Rotated component matrix for social exclusion related-factors

	Social exclusion related question items	Component						
		1	2	3	4	5	6	7
SE1	I feel safe with the traffic in my neighbourhood	0.12	0.10	0.13	0.09	**0.90**	0.07	0.02
SE2	I feel safe during my daily travel	0.11	0.12	0.17	0.08	**0.89**	0.10	0.07
SE3	I feel in good physical health condition	0.19	0.11	**0.79**	0.12	0.14	0.13	0.04
SE4	I feel in good mental health condition	0.13	0.18	**0.78**	0.04	0.16	0.14	0.03
SE5	I feel in good bodily shape	0.09	0.39	**0.59**	0.14	0.06	-0.01	0.07
SE6	I can participate in community activities	0.33	**0.67**	0.33	0.16	0.12	-0.08	0.09
SE7	I can participate in community decision-Making	0.28	**0.73**	0.30	0.08	0.12	0.00	0.13
SE8	I can express myself as I wish (identity)	0.15	**0.69**	0.27	0.09	-0.01	0.22	0.16
SE9	I like volunteering for various activities	0.07	**0.64**	-0.07	0.31	0.15	0.20	-0.07
SE10	Often access green spaces and natural environment	0.06	0.28	0.03	**0.80**	0.04	0.04	0.22
SE11	I enjoy the places with a rich natural environment	0.16	0.16	0.14	**0.85**	0.06	0.04	0.07
SE12	I like the lifestyle in my current residential place	0.28	-0.01	0.29	**0.58**	0.18	0.21	-0.34
SE13	Want to have a very different lifestyle in the future	-0.02	0.20	0.02	0.04	0.03	0.08	**0.85**
SE14	I can rely on public transport to go to the places I need	0.34	-0.06	0.23	0.21	0.11	0.04	**0.48**
SE15	I live close enough to the places I like to go frequently	0.02	0.24	0.06	0.10	0.11	**0.78**	0.00
SE16	My daily travel to school is affordable for me and my family	0.27	-0.16	0.29	0.03	0.03	**0.59**	0.16
SE17	I can get help from my close family when I need it	**0.78**	0.04	0.10	0.20	0.11	-0.01	0.07
SE18	I can get help from my extended family when I need it	**0.59**	0.24	0.05	-0.06	0.09	0.38	0.02
SE19	I can get help from my friends when I need it	**0.76**	0.15	0.27	0.10	0.06	-0.04	0.05
SE20	I can get help from my neighbours when I need it	**0.67**	0.29	0.11	0.09	0.06	0.23	-0.02
SE21	People in my community can get support from the local government for some of the daily life difficulties	**0.48**	0.31	-0.01	0.15	0.08	0.41	0.02

The PCA method extracts uncorrelated linear combinations of the variables called factors where the first factor has a maximum variance, all the following factors explain

smaller and smaller portions of the variance and are all uncorrelated with each other. Once the factors were extracted, a Varimax rotation method was selected in order to increase the interpretability of the factors.

Based on the results of the exploratory factor analysis and the PCA extraction, 7 components related to social exclusion were found – as experienced from the high schools students' perspective – and for the purposes of this study they are named as follows: social support, participation, health condition, natural environment, safety, accessibility and lifestyle (see Table 24).

6.3 Transport-based social exclusion (TBSE) among high school students

In this section we aim to understand to which extent the social exclusion that high school students might be experiencing can be attributed to situations of transport disadvantage that they are experiencing as a result of their main commuting activity (i.e. to school) and other associated features of their travel and surrounding environment.

We can reasonably presume that high-school students in rural areas of Japan must travel relatively long distances in order to get to their respective institutions. Additionally, the distance to facilities such as a train station, a bus stop, a medical institution or a post office have been included as criteria to calculate the degree of remoteness and isolation of the schools in mountainous areas in Japan (NIER, 2012). These types of issues are

considered transport disadvantage. Whereas there are negative impacts on well-being that are to any extent attributable to a condition of transport-disadvantage, we may reasonably argue the existence of transport-based social exclusion, assuming that for an individual higher levels of well-being are linked to lower levels of social exclusion and vice versa. Considering this, in this section we explain how transport disadvantage and well-being are being characterized and measured. In the Figure 50 we expose the proposed framework. Basically, we explore two main factors might be contributing to a situation of transport disadvantage: the residential location and commuting behaviour (i.e. travel to school). In Figure 50 the concept behind the transport-based social exclusion as students might experience it and reflect in our survey is illustrated.

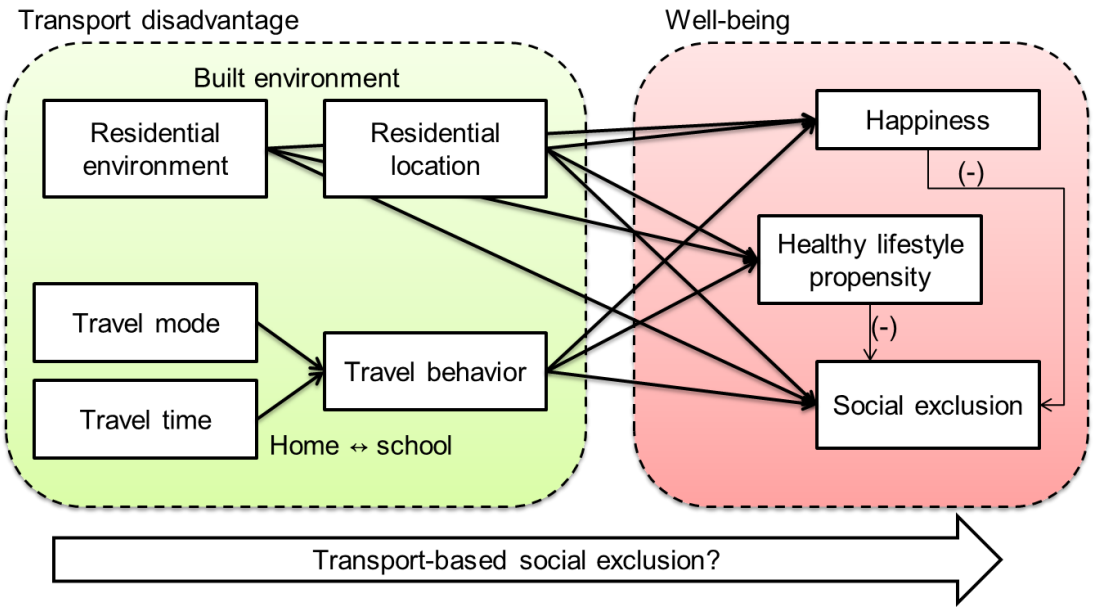

Figure 50. Study case of TBSE for high school students of Hiroshima prefecture

6.3.1 Transport disadvantage

Some conditions of transport disadvantage already exist inherently to the targeted group (i.e., high school students). For example, they are not able to drive to school themselves and therefore they have to depend on non-motorized modes (walking, bicycle), public transport (bus, train), being taken by others (car), or a combination of them. With this in consideration, we aim to observe the effects of two main types of disadvantages: one related to residential location and the other to schooling behaviour.

From the information collected in the questionnaire survey there is information we use to describe the built environment and the commuting behaviour, in order to examine whether they represent a condition of disadvantage or not. With respect to the built environment, the possible effects of distance of the urban facilities to home are here examined. In addition, we make a distinction of whether the students are located or not in a depopulating area, which is a distinction strictly conferred by the national government.

In the questionnaire survey, students were asked about how their commuting trip to school is, by describing the used travel modes and the duration of trip for each one of the stages in their commuting trip from home to school. Usually, a trip to school involves the use of more than one single travel mode, as is the case of commuters who use bicycle to access the nearest train station, then ride a train to the station of destination and from that train station walk to their final destination (school in this case). In the Table 26 and Figure

51 an example of how the travel behaviour related data were input in the questionnaire is shown. Additionally, Figure 52 describes the responses for modal distribution from the questionnaire.

Table 26. Description of daily travel to school

Student name:	*Name (abc)*	
Trip stage	**Travel mode used**	**Duration of trip (mins)**
1	*Walk*	*5*
2	*Bus*	*25*
3	*Train*	*15*
4	*Walk*	*10*

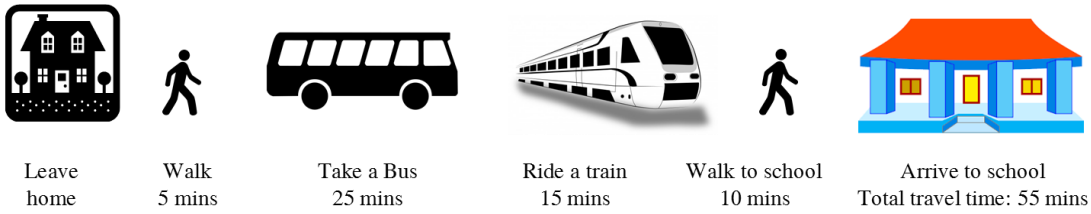

Figure 51. Description of the daily trip to school

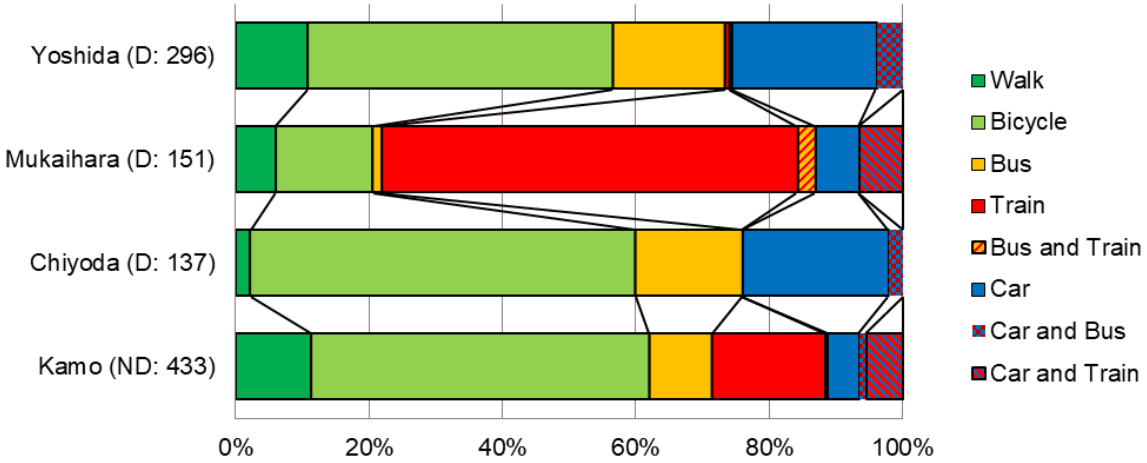

Figure 52. Modal distribution of trips to school by school

Due to privacy protection concerns, we did not register in the survey neither the respondents' name nor the exact residential location of the respondents. Voluntarily, some of the respondents agreed to write their post code, which allows knowing the area where

residential location is, at the town or district level. It made possible to clarify details of the trip between the residential location and the corresponding school in the case of unclear, confusing or omitted responses in the survey questionnaire.

In Table 27 we describe the variables that are employed to identify transport disadvantage. The initial hypotheses related to transport disadvantage conditions are: students living in depopulating areas and in location far away from certain key facilities (i.e. less accessible) in the urban area will experience a more reduced well-being than students who live in non-depopulating urban areas with easier access to facilities that matter for young people's lifestyle and social interactions. In addition, we can reasonably expect that students with longer travel times to school will be worse off than students who do not spend long times for commuting to school, who will experience a higher quality of life.

Table 27. Variables used to identify transport disadvantage

Category	Variable	Description / measurement
Built environment	Residential environment	Distance from student's home to a group of facilities in the urban area
	Residential location	The student is located in a depopulating area (Yes / No)
Commuting behaviour	Travel mode	Which is the dominant travel mode (combination) for commuting to school?
	Travel time	Total travel time to school

6.3.2 Well-being measurements

We use three main basic measurements of well-being (see Figure 50): happiness, healthy lifestyle propensity and social exclusion. In this point it is worth recalling one of the basic assumptions: any negative impacts from a situation of transport disadvantage may be reflected in a decrease of well-being indicators; or a decrease in well-being indicators which can be associated to specific features of transport systems may be indicator of a situation of transport disadvantage. The latter approach is what we are trying to explore in this chapter of the dissertation. In Table 28 we describe the measurements of well-being that are being employed in this section.

Table 28. Measurements of well-being

Well-being categories	Observed variables	Measurement
Happiness	Family, finances, health, social life, family life, education, safety, achievements, life standard	Self-assessment (from 1 = very unhappy to 10 = very happy)
Healthy lifestyle	Eat breakfast every morning (LH1), Get enough sleep (LH2), Eat balanced and healthy food (LH3), Not smoke (LH4), Do physical activity (LH5), Living in a peaceful environment (LH6), Go to a park (LH7), Play sports (LH8), Participate in club activities (LH9), Other social activities (Volunteering) (LH10), Get to know your neighbours (LH11), Regular access to cultural facilities (museums, cinema, libraries) (LH12), Participation is various activities (LH13), Spend time with family (LH14), Spend time / going out with friends (LH15).	Self-assessment (from 1= not important at all to 5 = very important)
Social exclusion	SE1 – SE21 (Social support, participation, health condition, natural environment, safety, accessibility, lifestyle)	Self-assessment (From 1= not agree to 4 = fully agree for given statements)

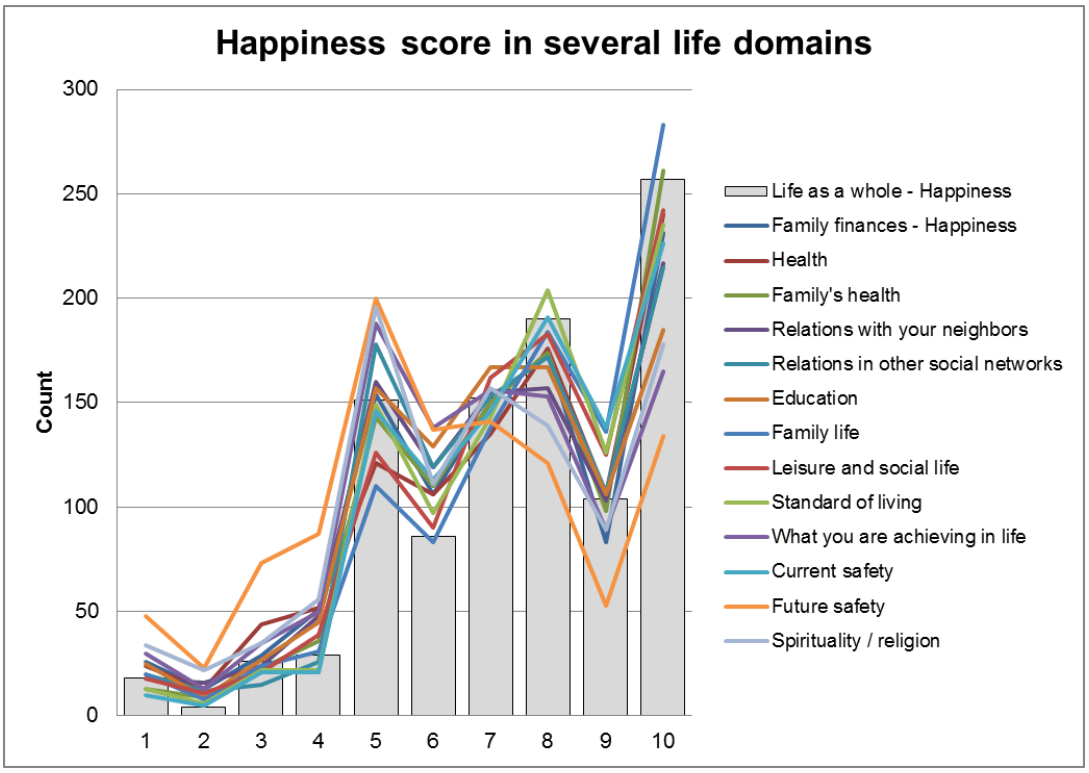

Figure 53. Measurements of happiness

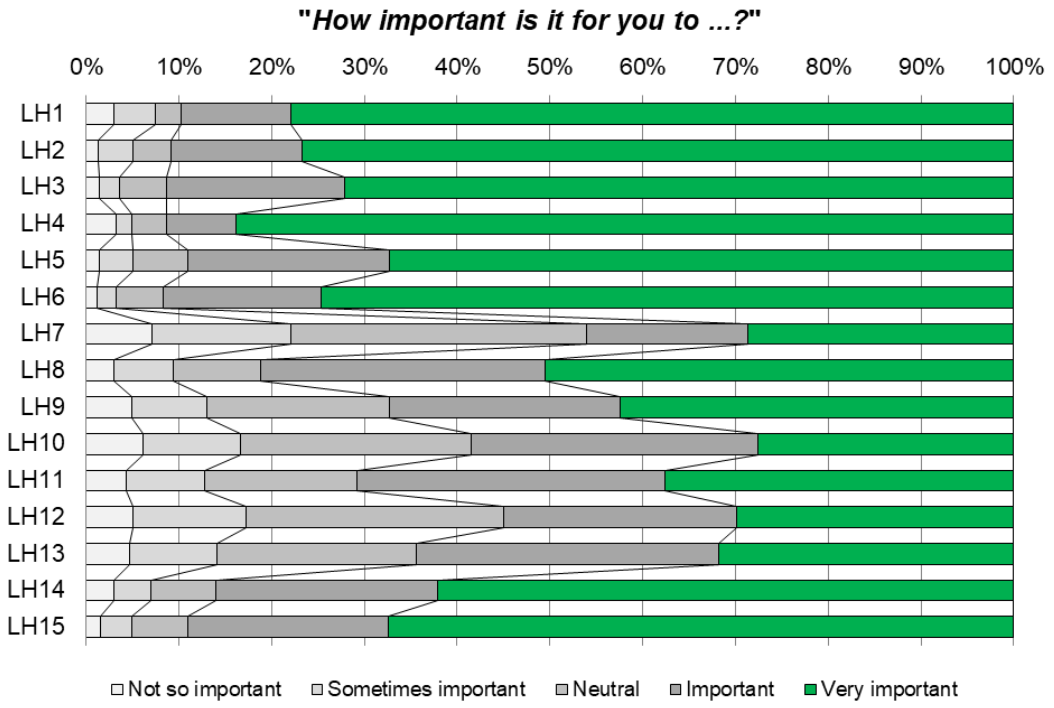

Figure 54. Students' responses regarding healthy life habits

Note for figure: Eat breakfast every morning (LH1), Get enough sleep (LH2), Eat balanced and healthy food (LH3), Not smoke (LH4), Do physical activity (LH5), Living in a peaceful environment (LH6), Go to a park (LH7), Play sports (LH8), Participate in club activities (LH9), Other social activities (Volunteering) (LH10), Get to know your neighbours (LH11), Regular access to cultural facilities (museums, cinema, libraries)

(LH12), Participation is various activities (LH13), Spend time with family (LH14), Spend time / going out with friends (LH15).

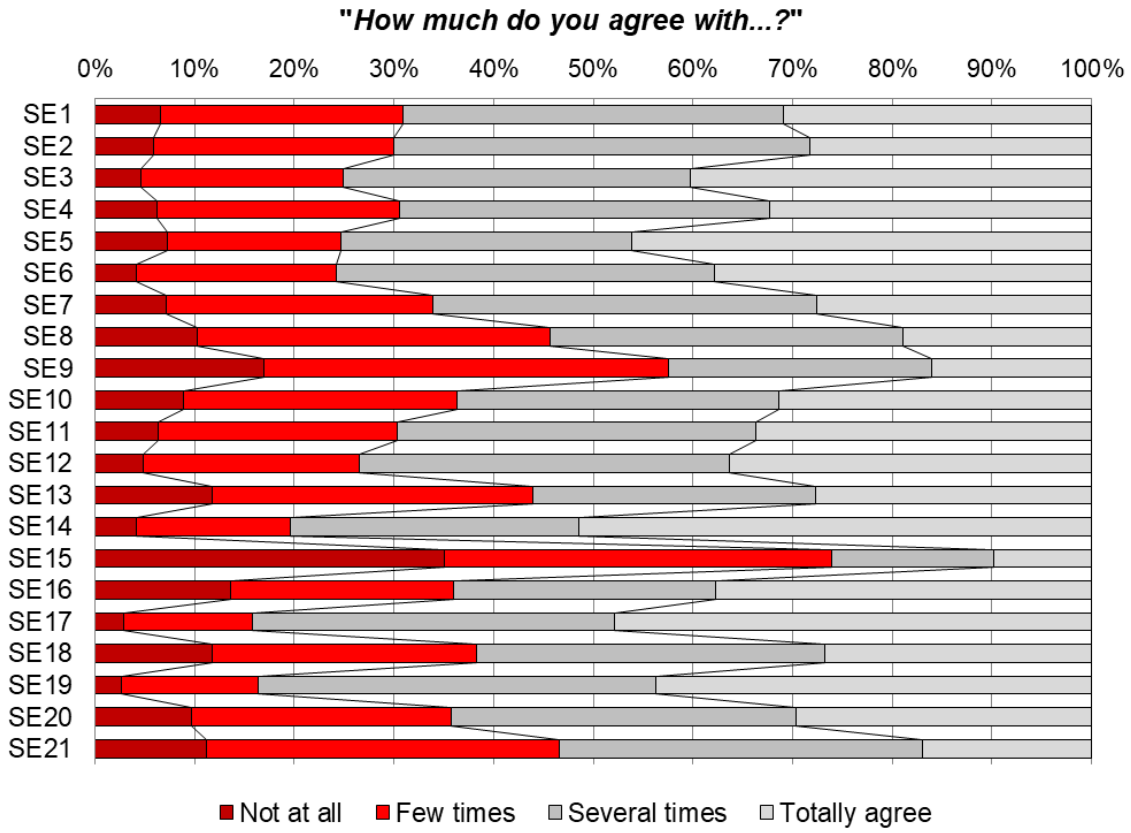

Figure 55. Social exclusion measurement responses

Note for Figure: I feel safe with the traffic in my neighbourhood (SE1), I feel safe during my daily travel (SE2), I feel in good physical health condition (SE3), I feel in good mental health condition (SE4), I feel in good bodily shape (SE5), I can participate in community activities (SE6), I can participate in community decision-Making processes (SE7), I am able to express myself as I wish (expression of identity) (SE8), I like volunteering for various activities (SE9), I can often access green spaces and the natural environment (SE10), I enjoy the places with a rich natural environment (SE11), I like the lifestyle in my current residential place (SE12), I want to have a very different lifestyle in the future (SE13), I can rely on public transport to go to the places I need (SE14), I live close enough to the places I like to go frequently (SE15), My daily travel to school is affordable to me and my family (SE16), I can get help from my close family when I need it (SE17), I can get help from my extended family when I need it (SE18), I can get help from my friends when I need it (SE19), I can get help from my neighbours when I need it (SE20), People in my community can get support from the local government for some of the daily life difficulties (SE21).

6.3.3 Influence of depopulating area on well-being

The variations of the different well-being indicators are compared between depopulating and non-depopulating areas.

Based on the responses for the questions related to social exclusion (SE1 – SE21), we can distinguish two main groups: the first group reflects a big (or total) agreement whereas the second group reflects little (or no) agreement. Then, the percentage of individuals that agree within each type of zone (depopulating and non-depopulating) is compared, and the Pearson Chi-Squared test is employed for testing which differences are statistically significant. Thus, the difference in well-being between students in depopulating areas (rural) and in non-depopulating areas (urban), we compare the happiness, social exclusion and lifestyle scores between both areas is assessed. For the social exclusion we count the percentage of students who can be considered in low exclusion (students who answered several times or totally agree, see Figure 55). For the healthy life habits, we count the students who valued as very important (students who answered very important, see bars in colour green in Figure 54). For happiness, the summation of happiness in all life domains was considered as an only happiness score.

The comparison of results among depopulating and non-depopulating areas is summarized in Table 29 and Figure 56.

Regarding happiness with all the aforementioned life domains, as well as for all the

aspects of healthy lifestyle propensity that were assessed, higher scores were found for non-depopulating areas in comparison with depopulating areas. However, some mixed results can be observed regarding social exclusion. Additionally, we found that the social exclusion items can be grouped into seven bigger categories: safety, health, participation, nature, lifestyle, accessibility, and social support. This was confirmed by the results of factor analysis (KMO = 0.864, 67.8% of variance explained). For aspects of social exclusion related issues, such as safety (SE1, SE2), obesity (SE5), participation in community activities (SE6), access to green areas and social support from neighbours and community (SE20, SE21), no significant differences were found between depopulating and non-depopulating areas.

Table 29. Comparison of well-being indicators between rural and urban areas

Well-being measurement	Depopulating area? Yes (Rural)	No (Urban)	ANOVA table F-value	Significance	
SE – Safety: (% of students who answered *several times / totally agree*)					
I feel safe with the traffic in my neighbourhood (SE1)	70.7%	67.0%	1.63	0.202	
I feel safe during my daily travel (SE2)	71.2%	68.4%	0.98	0.323	
SE - Health condition: (% of students who answered *several times / totally agree*)					
I feel in good physical health condition (SE3)	70.9%	**80.8%**	13.29	**0.000**	***
I feel in good mental health condition (SE4)	66.6%	**73.2%**	5.12	**0.024**	**
I feel in good bodily shape (SE5)	74.3%	76.7%	0.74	0.389	
SE - Participation: (% of students who answered *several times / totally agree*)					
I can participate in community activities (SE6)	75.2%	76.7%	0.31	0.580	
I can participate in community Decision-Making processes (SE7)	63.0%	**70.2%**	5.76	**0.017**	**
I am able to express myself as I wish (expression of identity) (SE8)	51.2%	**58.7%**	5.60	**0.018**	**

Table 29. Comparison of well-being indicators between rural and urban areas

Well-being measurement	Depopulating area? Yes (Rural)	No (Urban)	ANOVA table F-value	Significance	
I like volunteering for various activities (SE9)	45.9%	**37.9%**	6.57	**0.011**	**
SE - Natural environment: (% of students who answered *several times / totally agree*)					
I can often access green spaces and the natural environment (SE10)	65.1%	61.7%	1.25	0.265	
I enjoy the places with a rich natural environment (SE11)	**72.4%**	65.8%	5.15	**0.023**	**
I like the lifestyle in my current residential place (SE12)	71.4%	**76.2%**	2.95	**0.086**	*
SE - Lifestyle: (% of students who answered *several times / totally agree*)					
I want to have a very different lifestyle in the future (SE13)	**59.2%**	51.7%	5.72	**0.017**	**
I can rely on public transport to go to the places I need (SE14)	77.9%	**83.6%**	5.11	**0.024**	**
SE - Accessibility: (% of students who answered *several times / totally agree*)					
I live close enough to the places I like to go frequently (SE15)	23.6%	**29.3%**	4.20	**0.041**	**
My daily travel to school is affordable for me and my family (SE16)	61.0%	**68.1%**	5.57	**0.018**	**
SE - Social support: (% of students who answered *several times / totally agree*)					
I can get help from my close family when I need it (SE17)	80.5%	**89.1%**	14.18	**0.000**	***
I can get help from my extended family when I need it (SE18)	58.6%	**65.8%**	5.56	**0.019**	**
I can get help from my friends when I need it (SE19)	81.3%	**86.6%**	5.05	**0.025**	**
I can get help from my neighbours when I need it (SE20)	64.2%	64.2%	0.00	0.998	
People in my community can get support from the local government for some of the daily life difficulties (SE21)	51.5%	55.9%	1.89	0.170	
Health habits - individual: (% of students who answered *very important*)					
Eat breakfast every morning (LH1)	72.4%	**85.2%**	24.11	**0.000**	***
Get enough sleep (LH2)	71.1%	**84.3%**	24.91	**0.000**	***
Eat balanced and healthy food (LH3)	64.7%	**82.2%**	39.26	**0.000**	***
Not smoke (LH4)	81.0%	**87.8%**	8.47	**0.004**	***
Do physical activity (LH5)	63.2%	**72.7%**	10.41	**0.001**	***
Living in a peaceful environment (LH6)	70.9%	**79.7%**	10.22	**0.001**	***
Go to a park (LH7)	26.5%	**31.4%**	2.89	**0.090**	*
Health habits – group: (% of students who answered *very important*)					
Play sports (LH8)	46.2%	**56.4%**	10.27	**0.001**	***
Participate in club activities (LH9)	39.6%	**46.2%**	4.49	**0.034**	**

Table 29. Comparison of well-being indicators between rural and urban areas

Well-being measurement	Depopulating area? Yes (Rural)	No (Urban)	ANOVA table F-value	Significance	
Other social activities (Volunteering) (LH10)	26.5%	28.9%	0.67	0.412	
Get to know your neighbours (LH11)	34.6%	**41.6%**	5.18	**0.023**	**
Regular access to cultural facilities (museums, cinema, libraries) (LH12)	29.8%	30.0%	0.01	0.937	
Participation is various activities (LH13)	27.4%	**37.9%**	12.71	**0.000**	***
Spend time with family (LH14)	56.8%	**69.3%**	16.58	**0.000**	***
Spend time / going out with friends (LH15)	62.8%	**73.7%**	13.43	**0.000**	***
Happiness (score)					
Happiness (all life domains)	97.10	**104.85**	26.14	**0.000**	***

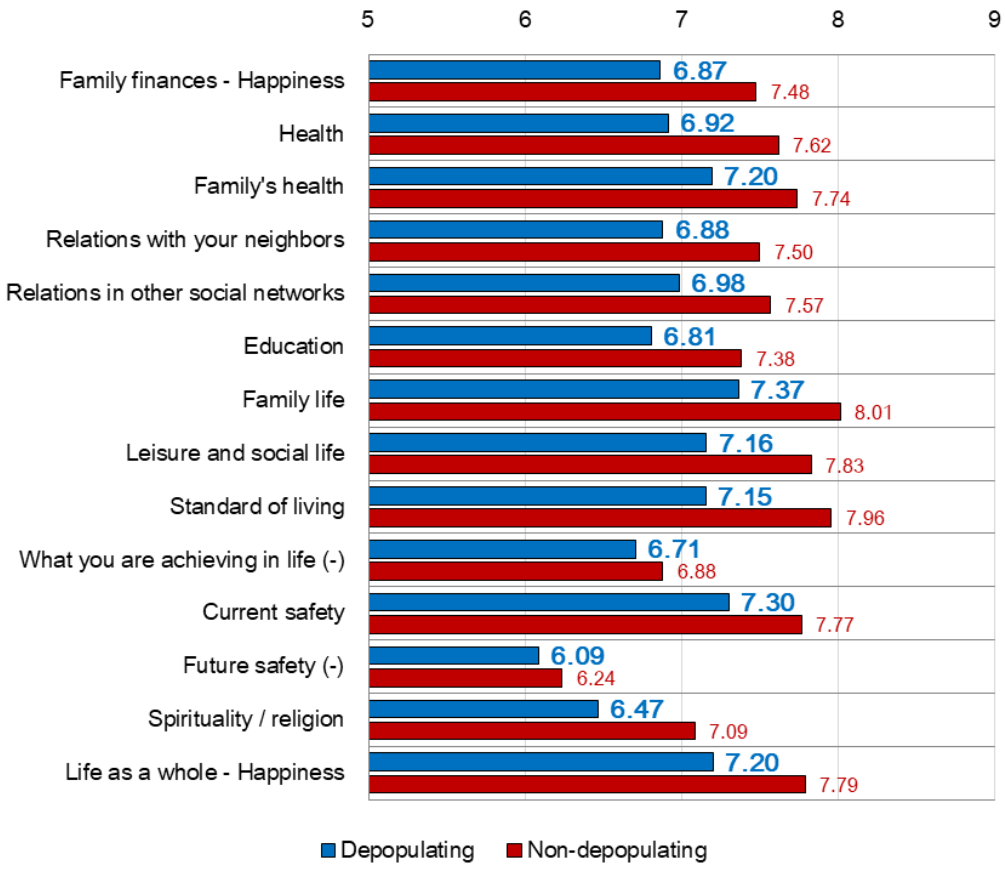

Figure 56. Average happiness scores regarding different life domains for depopulating and non-depopulating areas

6.3.4 Influence of travel time on well-being

The average happiness by travel mode and the correlation values between travel time in minutes (total and by mode) and the happiness values can be observed in Table 30. Furthermore, we compare the total travel time to school (in minutes) between students who are in a high level of exclusion and students who are in low level of exclusion. The results are shown in detail in Table 31 and Table 32. Finally, in Figure 57 and Figure 58 the variation of average travel time among different levels of happiness can be observed as a complement for the information provided in Table 30.

From the information in Table 30 it can be noted that long travel times to school in general, and among walking and train users in particular have negative effects on the students' well-being.

Table 30. Happiness by employed travel modes

	Travel time	Walk	Bicycle	Train	Bus	Car
Average Happiness score (SD)		7.49 (2.06)	7.66 (2.08)	7.22 (2.29)	7.30 (2.18)	7.33 (2.23)
Pearson Correlation Time by mode (in mins)	**-0.103*** **	**-0.113*** **	0.020	**-0.086*** **	-0.020	-0.018
p-value	**0.001**	**0.000**	.529	**0.006**	.529	.577

***: Significant at 99% level

Table 31. Travel time to school and social exclusion

Average travel time to school (mins)	SE group		ANOVA table		
	Several times / agree	*Do not agree / little*	F value	p-value	
Safety					
SE1	**29.56**	27.36	2.75	**0.098**	*
SE2	**29.62**	27.36	2.84	**0.092**	*
Health condition					
SE3	**30.67**	27.17	6.09	**0.014**	**
SE4	**30.24**	27.07	5.68	**0.017**	**
SE5	**30.1**	27.36	3.70	**0.055**	*
Participation					
SE6	27.55	28.19	0.20	0.656	
SE7	28.68	27.71	0.56	0.455	
SE8	28.12	27.97	0.01	0.903	
SE9	27.54	28.71	0.87	0.350	
Natural environment					
SE10	27	28.63	1.63	0.202	
SE11	27.02	28.48	1.20	0.273	
SE12	28.54	27.86	0.24	0.626	
Lifestyle					
SE13	28.09	27.98	0.01	0.928	
SE14	28.04	28.03	0.00	0.995	
Accessibility					
SE15	27.85	28.11	0.03	0.855	
SE16	23.41	**36.27**	111.32	**0.000**	***
Social support					
SE17	27.82	29.19	0.66	0.416	
SE18	27.59	28.76	0.86	0.353	
SE19	27.60	30.26	2.56	0.110	
SE20	27.13	**29.66**	3.90	**0.048**	**
SE21	26.68	**29.59**	5.58	**0.018**	**

Table 32. Travel time to school and health habits

Average travel time to school (mins)	Health habits opinion		ANOVA table		
	Important or less	*Very important*	F value	p-value	
Health habits - individual:					
Eat breakfast every morning (LH1)	**31.8**	27	10.66	**0.001**	***
Get enough sleep (LH2)	**31.1**	27.1	7.76	**0.005**	***
Eat balanced and healthy food (LH3)	**31.3**	26.8	10.62	**0.001**	***
Not smoke (LH4)	**30.8**	27.5	3.98	**0.046**	**
Do physical activity (LH5)	28.9	27.6	0.93	0.335	
Living in a peaceful environment (LH6)	28.8	27.8	0.46	0.499	
Go to a park (LH7)	28.3	27.4	0.50	0.482	
Health habits – group:					
Play sports (LH8)	28.8	27.3	1.37	0.243	
Participate in club activities (LH9)	28	28.1	0.02	0.896	
Other social activities (Volunteering) (LH10)	28.5	26.9	1.40	0.237	
Get to know your neighbours (LH11)	28.2	27.8	0.08	0.775	
Regular access to cultural facilities (museums, cinema, libraries) (LH12)	28.3	27.3	0.56	0.454	
Participation is various activities (LH13)	28.5	27	1.46	0.227	
Spend time with family (LH14)	28	28.1	0.00	0.956	
Spend time / going out with friends (LH15)	28.8	27.7	0.70	0.403	

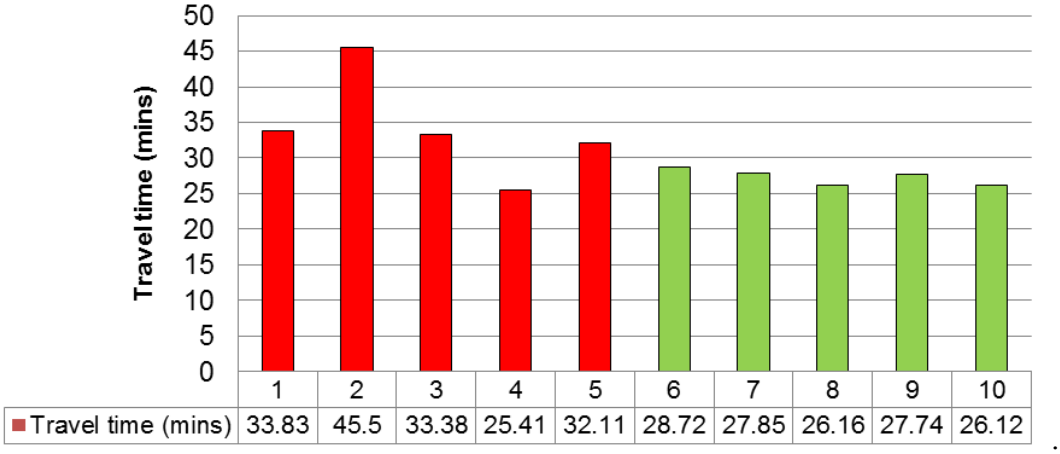

Figure 57. Travel time to school by happiness level

Note: Happiness level changes from 1 to 10.

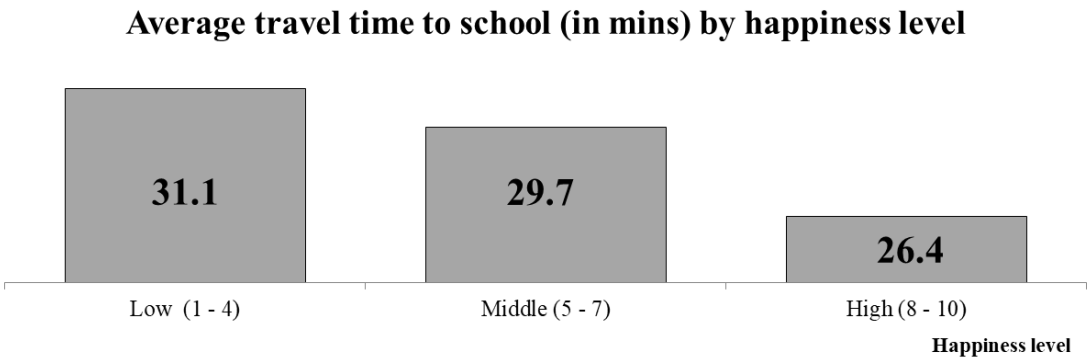

Figure 58. Happiness level and average travel time to school (in mins)

6.3.5 Influence of travel mode on well-being

In Table 33 we compare the changes in social exclusion and health habits assessment among users of different travel modes to school. For this purpose, we compare among the use of main modes without distinction of their combination. For the *walk* category we count students who exclusively walk to school. A person who uses bicycle and train will therefore appear counted as follows: in the column *Yes* for the modes *Bicycle* and *Train*, in the column *No* for the modes *Walk, Bus* and *Car*. The discrete-type measurements of well-being are compared between students who use and do not use the different travel modes.

It can be noted that cyclists experience a better health condition than non-cyclists. Similarly, cycling is very useful to improve the perception of social support, since among cyclists the percentage of people who think they can get social support from their social environment is higher for cyclists than for non-cyclists. With respect to happiness, bicycle

users experience in average higher happiness than non-bicycle users, and bus users tend to experience lower happiness than non-bus users. Train users tend to experience worse mental health. Walkers tend less to participate in community activities, whereas cyclists tend to participate more. Non-motorized, train and car users experience more accessibility than non-users, and at the same time the bus users have a significantly worse accessibility in comparison. is much more limited. It is also notorious that train users seem to value the importance of good sleep and eat breakfast daily less than other mode users.

6.3.6 Influence of built environment on well-being

In order to clarify whether there are urban facilities that are especially important for young people's interactions, we compared the average distance of those facilities between advantaged and disadvantaged groups according to their well-being category. In Figure 59 the summarized results of the influence of the listed facilities can be observed. On the upper side we can observe the charts depicting how many facilities have an influential effect on each one of the well-being constructs. On the lower side of Figure 59 it can be observed how many well-being constructs are being influenced by each one of the facilities.

The proximity of game centres, sports facilities, supermarket, train station, school and park is influential to reduce the self-perceived social exclusion. The proximity of

sports facilities such as bowling centres, park, swimming pool and sports parks are very influential to improve the health habits specially related to social interactions. On the other hand, the proximity of shopping centres, supermarkets, parks, community centres and convenience stores is influential for improving happiness, specially related to finances, standard of living and life achievements.

Table 33. Influence of travel mode to school on well-being

Use of travel mode	Walk			Bicycle			Train			Bus			Car		
	924	**93**		**562**	**455**		**807**	**210**		**875**	**142**		**839**	**178**	
	No	**Yes**	**p-value**	**No**	**Yes**	**p-value**	**No**	**Yes**	**p-value**	**No**	**Yes**	**p-value**	**No**	**Yes**	**p-value**
SE – Safety: (% of students who answered *several times / totally agree*)															
SE1	69.5%	65.6%	0.440	69.2%	69.0%	0.944	69.1%	69.0%	0.978	68.8%	71.1%	0.578	69.6%	66.9%	0.471
SE2	69.3%	77.4%	0.102	71.9%	67.7%	0.147	69.9%	70.5%	0.869	69.7%	71.8%	0.610	70.7%	66.9%	0.312
SE - Health condition: (% of students who answered *several times / totally agree*)															
SE3	75.2%	74.2%	0.828	**71.9%**	**79.1%**	**0.008*****	76.0%	71.9%	0.226	75.4%	73.2%	0.576	**76.2%**	**70.2%**	**0.096***
SE4	69.3%	71.0%	0.734	67.6%	71.6%	0.165	**70.9%**	**63.8%**	**0.048****	69.0%	71.8%	0.502	70.3%	65.2%	0.176
SE5	75.8%	71.0%	0.308	**71.9%**	**79.6%**	**0.005*****	75.7%	73.8%	0.569	**76.9%**	**65.5%**	**0.003*****	75.4%	74.7%	0.838
SE - Participation: (% of students who answered *several times / totally agree*)															
SE6	**76.5%**	**68.8%**	**0.099***	**73.5%**	**78.7%**	**0.055***	76.6%	72.9%	0.262	75.3%	78.9%	0.359	76.3%	73.6%	0.448
SE7	66.1%	65.6%	0.918	64.2%	68.4%	0.168	66.7%	63.8%	0.436	66.6%	62.7%	0.357	66.0%	66.3%	0.947
SE8	54.0%	58.1%	0.454	53.4%	55.6%	0.479	53.5%	57.6%	0.290	55.3%	48.6%	0.136	54.9%	51.7%	0.428
SE9	43.1%	36.6%	0.226	40.6%	44.8%	0.172	42.8%	41.4%	0.730	42.9%	40.1%	0.544	42.8%	41.0%	0.663
SE - Natural environment: (% of students who answered *several times / totally agree*)															
SE10	64.4%	55.9%	0.105	62.8%	64.6%	0.553	63.9%	62.4%	0.676	**62.3%**	**71.8%**	**0.028****	64.2%	60.7%	0.369
SE11	**71.1%**	**54.8%**	**0.001*****	69.2%	70.1%	0.759	69.4%	70.5%	0.761	69.0%	73.2%	0.312	69.1%	71.9%	0.464
SE12	73.6%	72.0%	0.747	72.1%	75.2%	0.266	73.5%	73.3%	0.965	73.6%	72.5%	0.790	73.9%	71.3%	0.485
SE - Lifestyle: (% of students who answered *several times / totally agree*)															
SE13	56.3%	53.8%	0.642	54.6%	57.8%	0.311	55.9%	56.7%	0.839	55.7%	58.5%	0.534	57.1%	51.1%	0.145
SE14	80.6%	77.4%	0.459	80.2%	80.4%	0.940	**78.7%**	**86.7%**	**0.010****	80.6%	78.9%	0.637	81.2%	76.4%	0.147
SE - Accessibility: (% of students who answered *several times / totally agree*)															
SE15	26.6%	20.4%	0.195	24.9%	27.5%	0.355	**24.3%**	**32.9%**	**0.012****	**27.2%**	**19.0%**	**0.039****	26.5%	24.2%	0.525
SE16	**61.3%**	**91.4%**	**0.000*****	**55.2%**	**74.9%**	**0.000*****	**66.5%**	**54.3%**	**0.001*****	**67.2%**	**44.4%**	**0.000*****	**68.9%**	**41.0%**	**0.000*****
SE - Social support: (% of students who answered *several times / totally agree*)															
SE17	84.0%	86.0%	0.608	**82.2%**	**86.6%**	**0.057***	84.3%	83.8%	0.873	84.5%	82.4%	0.533	**85.5%**	**78.1%**	**0.014****
SE18	61.6%	62.4%	0.882	**56.9%**	**67.5%**	**0.001*****	60.7%	65.2%	0.231	**63.8%**	**48.6%**	**0.001*****	**64.1%**	**50.0%**	**0.000*****
SE19	83.5%	83.9%	0.937	**81.0%**	**86.8%**	**0.012***	84.0%	81.9%	0.463	84.2%	79.6%	0.166	84.4%	79.8%	0.132

Use of travel mode	Walk			Bicycle			Train			Bus			Car		
	924	**93**		**562**	**455**		**807**	**210**		**875**	**142**		**839**	**178**	
	No	**Yes**	**p-value**	**No**	**Yes**	**p-value**	**No**	**Yes**	**p-value**	**No**	**Yes**	**p-value**	**No**	**Yes**	**p-value**
SE20	64.9%	57.0%	0.128	**59.8%**	**69.7%**	**0.001*****	64.2%	64.3%	0.979	64.6%	62.0%	0.549	**66.4%**	**53.9%**	**0.002*****
SE21	53.5%	52.7%	0.887	**48.8%**	**59.1%**	**0.001*****	54.5%	49.0%	0.157	54.4%	47.2%	0.110	**54.9%**	**46.1%**	**0.031****
Health habits - individual: (% of students who answered *very important*)															
LH1	77.8%	78.5%	0.880	**74.7%**	**81.8%**	**0.007*****	**79.1%**	**73.3%**	**0.075***	78.4%	74.6%	0.318	78.5%	74.7%	0.264
LH2	76.4%	79.6%	0.492	74.9%	78.9%	0.135	**77.9%**	**71.9%**	**0.065***	76.9%	75.4%	0.683	77.1%	74.7%	0.493
LH3	71.5%	78.5%	0.154	**69.8%**	**75.2%**	**0.055***	73.0%	69.0%	0.257	73.0%	66.9%	0.131	72.9%	68.5%	0.234
LH4	83.5%	87.1%	0.376	**81.1%**	**87.3%**	**0.008*****	84.6%	81.0%	0.197	**84.9%**	**77.5%**	**0.025****	84.3%	82.0%	0.460
LH5	67.3%	66.7%	0.899	**64.1%**	**71.2%**	**0.016****	67.8%	65.2%	0.485	67.9%	63.4%	0.289	68.1%	63.5%	0.238
LH6	74.1%	79.6%	0.251	74.2%	75.2%	0.725	74.5%	75.2%	0.821	75.2%	71.1%	0.301	75.1%	72.5%	0.467
LH7	28.8%	26.9%	0.699	**26.2%**	**31.6%**	**0.054***	28.4%	29.5%	0.743	**30.1%**	**19.7%**	**0.011****	29.6%	24.2%	0.148
Health habits – group: (% of students who answered *very important*)															
LH8	51.0%	46.2%	0.384	**45.4%**	**56.9%**	**0.000*****	50.9%	49.0%	0.627	**51.8%**	**43.0%**	**0.051***	**51.8%**	**44.4%**	**0.071***
LH9	42.5%	40.9%	0.756	**38.4%**	**47.3%**	**0.005*****	42.8%	41.0%	0.639	**44.2%**	**31.0%**	**0.003*****	42.9%	39.9%	0.459
LH10	27.4%	29.0%	0.734	**24.2%**	**31.6%**	**0.008*****	28.1%	25.2%	0.404	**28.9%**	**19.0%**	**0.014****	28.4%	23.6%	0.196
LH11	37.6%	37.6%	0.988	36.5%	38.9%	0.428	37.7%	37.1%	0.888	37.9%	35.2%	0.533	37.9%	36.0%	0.626
LH12	29.7%	32.3%	0.601	27.9%	32.3%	0.130	30.9%	26.2%	0.189	30.4%	26.8%	0.380	30.4%	27.5%	0.449
LH13	32.1%	29.0%	0.540	**28.6%**	**35.8%**	**0.015****	32.2%	30.5%	0.630	32.7%	26.8%	0.160	32.5%	28.7%	0.313
LH14	61.9%	64.5%	0.621	61.9%	62.4%	0.871	62.1%	62.4%	0.937	63.0%	57.0%	0.177	62.2%	61.8%	0.917
LH15	67.5%	66.7%	0.865	66.7%	68.4%	0.583	67.2%	68.6%	0.698	68.1%	63.4%	0.265	67.3%	68.0%	0.870
Happiness (score)															
Happiness	100.2	102.1	0.473	**98.1**	**103.3**	**0.001*****	101.0	98.0	0.113	**101.2**	**95.5**	**0.009*****	100.8	98.3	0.199

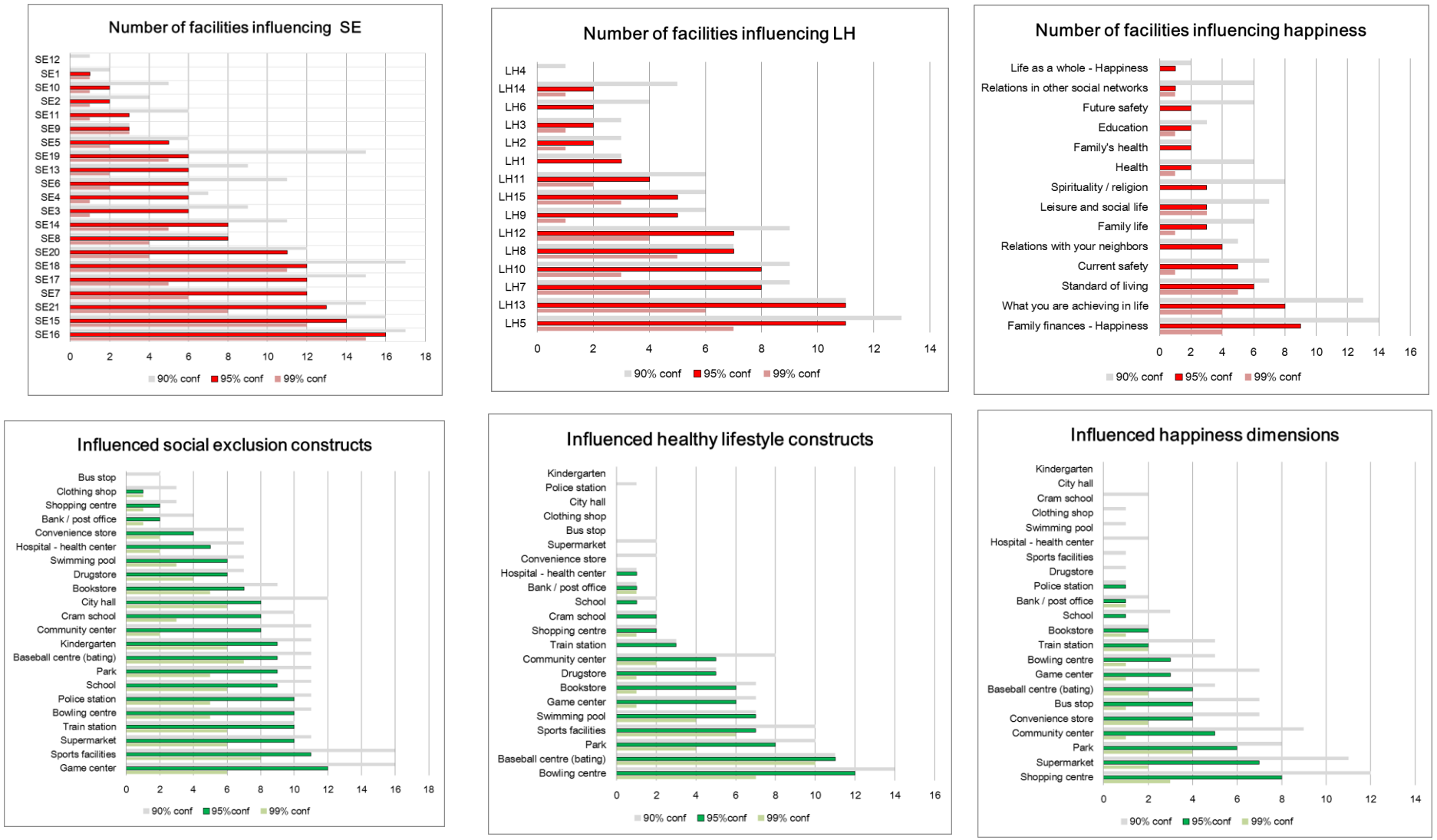

Figure 59. Impact quantification of built environment elements on well-being

6.4 Social exclusion and future migration preferences

In order to understand how social exclusion can affect future migration intentions of the high school students in Japan, we consider that they can be influenced by future life choices, individual attributes and time perspective also considered as part of a special set of individual attributes that influence people's decisions on life. In Figure 60 the proposed framework for this section of the chapter is considered.

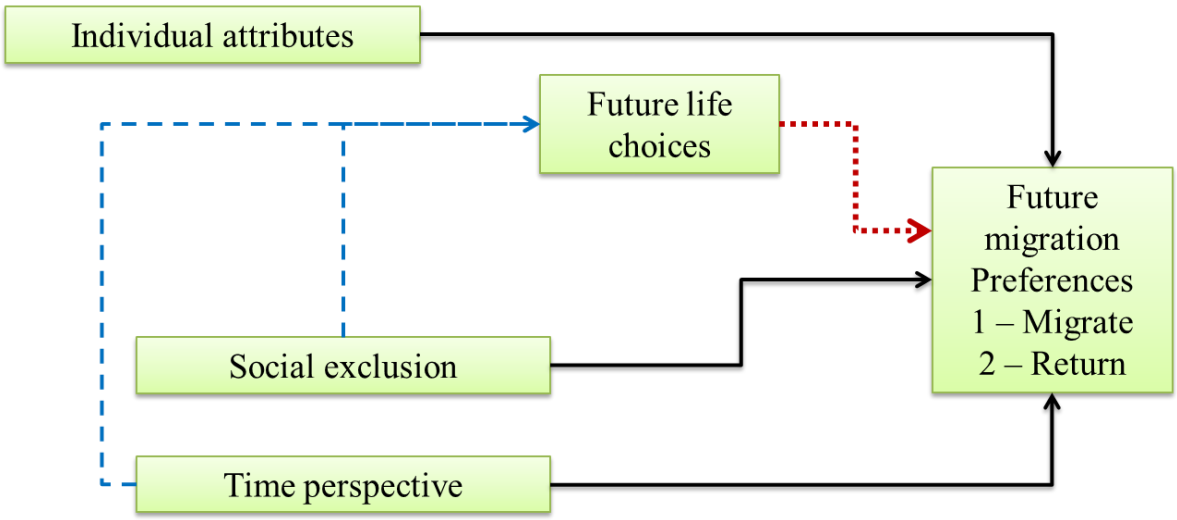

Figure 60. Analysis framework for influence of social exclusion on future migration preferences

From the framework we can observe that future life choices is a key element influencing future migration preferences and at the same time can be influenced by time perspective profiles and current perceptions on social exclusion. In Table 34 the responses of the surveyed students with respect to each possible future life choices can be observed in detail.

Table 34. Opinion of respondents about possible future life choices

Life choice	Do not want	Have not considered	Indifferent	Would probably do	Seriously consider
Study at a university	10.13	10.42	11.70	18.78	48.97
Have a good car	3.15	18.88	27.53	31.47	18.98
Being famous	16.62	38.15	19.08	15.44	10.72
Personal achievement	16.42	38.35	16.91	17.70	10.62
Traveling to faraway destination	5.31	9.24	17.01	37.95	30.48
Earning a lot of money	0.69	4.03	13.57	39.13	42.58
Having a job in a corporation	2.16	3.15	14.16	31.27	49.26
Working in a family business	25.17	46.21	17.90	4.72	6.00
Own business project	26.06	42.67	17.31	9.05	4.92
Have a partner / be married	4.52	7.57	22.42	30.88	34.61
Have one child	8.26	12.78	27.63	27.83	23.50
Have 2 children or more	6.69	12.78	26.55	25.66	28.32
Have a pet(s)	6.69	11.60	21.04	35.59	25.07

In order to better understand the future life choices, we apply Confirmatory Factor Analysis (CFA) to the responses regarding life choices. As a result, there are three main factors that can summarize them: family plans, career plans and individual plans. The results of CFA can be observed in Figure 61.

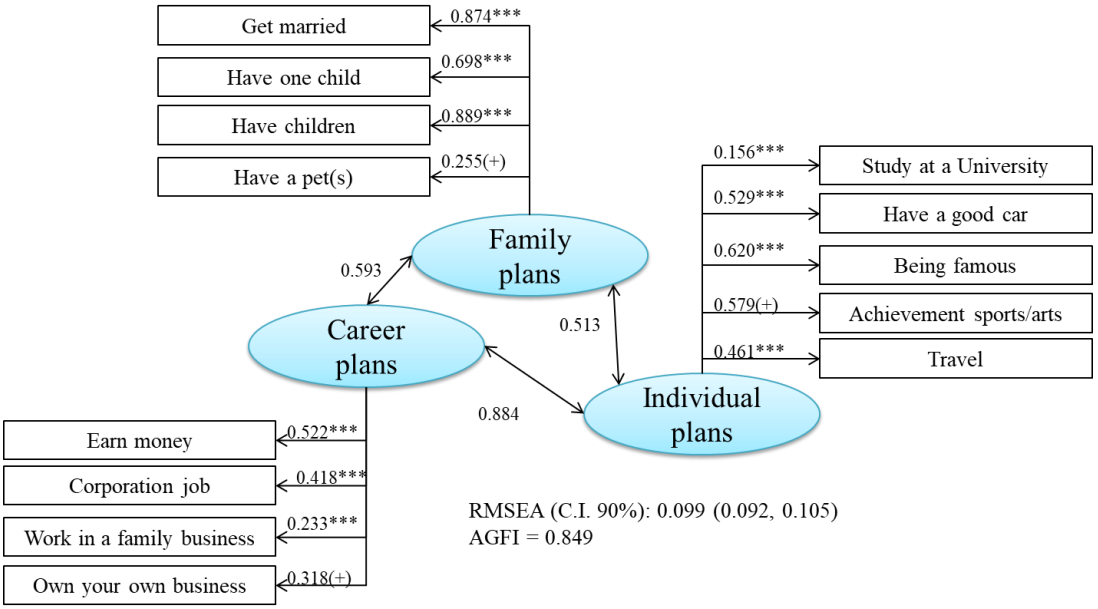

Figure 61. Results of Confirmatory Factor Analysis for future life choices

6.4.1 Influence of social exclusion on future life choices

A Structural Equation model has been applied to understand which categories of self-perceived transport-based social exclusion can have an impact on future life plans. The results of the model can be observed in Figure 62 and Table 35. From the results it can be told that the influence of social exclusion on future family plans is very moderate, with participation, safety and lifestyle as the only social exclusion factors that influence future life choices.

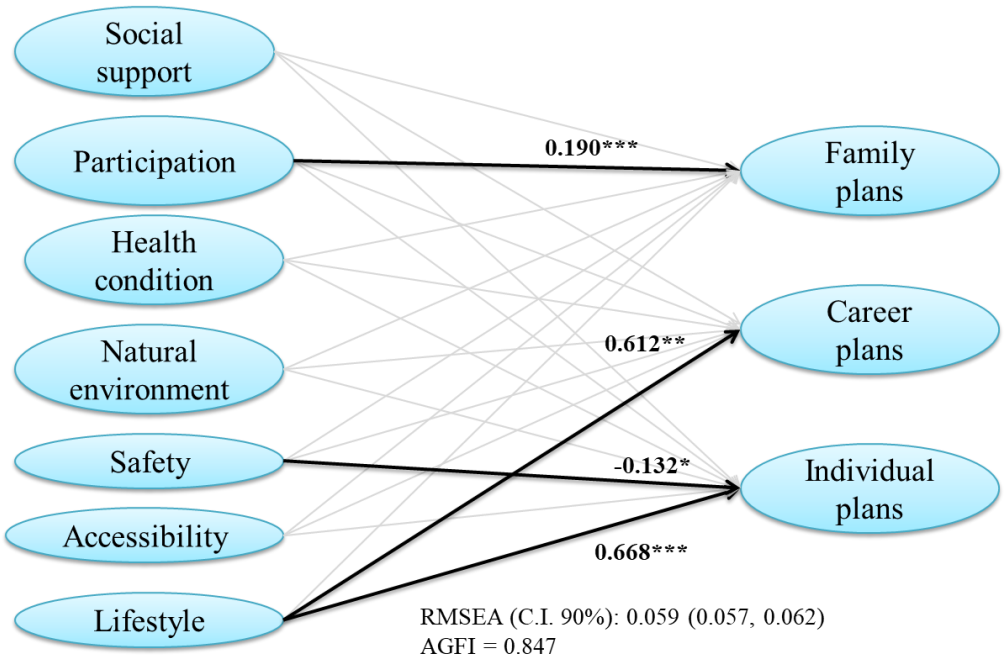

Figure 62. SEM model for influence of Social Exclusion on Future Life Choices

Table 35. Results of SEM model for influence of Social Exclusion on Future Life Choices

Variable		Estimate	P-value	
Social support				
	Career plans	-0.017	0.9	
	Individual plans	-0.106	0.378	
	Family plans	0.043	0.621	
Participation				
	Career plans	0.024	0.826	
	Individual plans	0.027	0.779	
	Family plans	0.19	0.007	***
Health condition				
	Career plans	0.054	0.603	
	Individual plans	0.018	0.843	
	Family plans	0.09	0.171	
Natural environment				
	Career plans	0.006	0.942	
	Individual plans	-0.035	0.625	
	Family plans	-0.035	0.473	
Safety				
	Career plans	-0.019	0.791	
	Individual plans	-0.132	0.034	**
	Family plans	-0.003	0.938	
Accessibility				
	Career plans	-0.273	0.117	
	Individual plans	-0.033	0.821	
	Family plans	-0.179	0.109	
Lifestyle				
	Career plans	0.612	0.011	**
	Individual plans	0.668	0.005	***
	Family plans	0.211	0.104	
Safety				
I feel safe with the traffic in my neighbourhood		0.831		(+)
I feel safe during my daily travel		0.89	0.000	***
Health condition				
I feel in good physical health condition		0.801		(+)
I feel in good mental health condition		0.77	0.000	***
I feel in good bodily shape		0.586	0.000	***
Participation				
I can participate in community activities		0.84		(+)
I can participate in community decision-Making		0.874	0.000	***
I can express myself as I wish (identity)		0.692	0.000	***
I like volunteering for various activities		0.49	0.000	***
Natural environment				
Often access green spaces and natural environment		0.738		(+)

Table 35. Results of SEM model for influence of Social Exclusion on Future Life Choices

Variable	Estimate	P-value	
I enjoy the places with a rich natural environment	0.907	0.000	***
I like the lifestyle in my current residential place	0.522	0.000	***
Lifestyle			
Want to have a very different lifestyle in the future	0.381		(+)
I can rely on public transport to go to the places I need	0.5	0.000	***
Accessibility			
I live close enough to the places I like to go frequently	0.503		(+)
My daily travel to school is affordable for me and my family	0.541	0.000	***
Social support			
I can get help from my close family when I need it	0.653		(+)
I can get help from my extended family when I need it	0.616	0.000	***
I can get help from my friends when I need it	0.7	0.000	***
I can get help from my neighbours when I need it	0.744	0.000	***
People in my community can get support from the local government for some of the daily life difficulties	0.611	0.000	***

Note: (+) parameter fixed for model estimation

6.4.2 Influence of Time perspective on Future life choices

A Simultaneous Equation Regression Model has been applied in order to clarify the influence of Time Perspective profile scores on Future Life Choices. The results of the model can be observed in Table 36, Figure 63 and Figure 64.

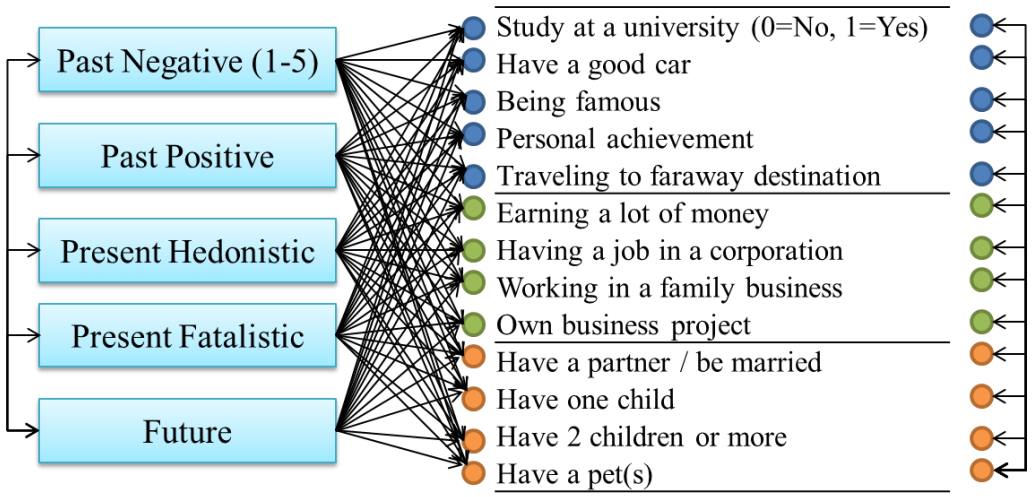

Figure 63. Structure of the Simultaneous Equation Regression Model

Table 36. Results of the Simultaneous Equation Regression Model

Future life choice		**PN**		**PP**		**PH**		**PF**		**F**	
I1	Study at a university	**0.122**	***	**0.068**	***	-0.022		**-0.158**	***	-0.008	
I2	Have a good car	-0.005		-0.012		**0.162**	***	0.029		0.038	
I3	Being famous	-0.025		0.01		**0.158**	***	0.004		0.022	
I4	Personal achievement	-0.018		0.004		**0.177**	***	0.007		**0.062**	**
I5	Traveling to faraway destination	0.008		**0.09**	***	**0.124**	***	-0.027		0.028	
C1	Earning a lot of money	0.026		0.017		**0.065**	***	0.013		0.008	
C2	Having a job in a corporation	**0.057**	***	**0.058**	***	**0.043**	*	**-0.08**	***	**0.10**	***
C3	Working in a family business	-0.015		0.015		0.009		**0.048**	***	**0.05**	**
C4	Own business project	**-0.047**	***	-0.009		**0.074**	***	0.015		**0.04**	**
F1	Have a partner / be married	-0.03		**0.144**	***	**0.153**	***	**-0.054**	**	0.045	
F2	Have one child	**-0.064**	***	**0.129**	***	**0.112**	***	0.008		**0.05**	*
F3	Have 2 children or more	-0.024		**0.166**	***	**0.103**	***	-0.04		0.022	
F4	Have a pet(s)	-0.012		0.01		**0.086**	***	-0.005		-0.002	

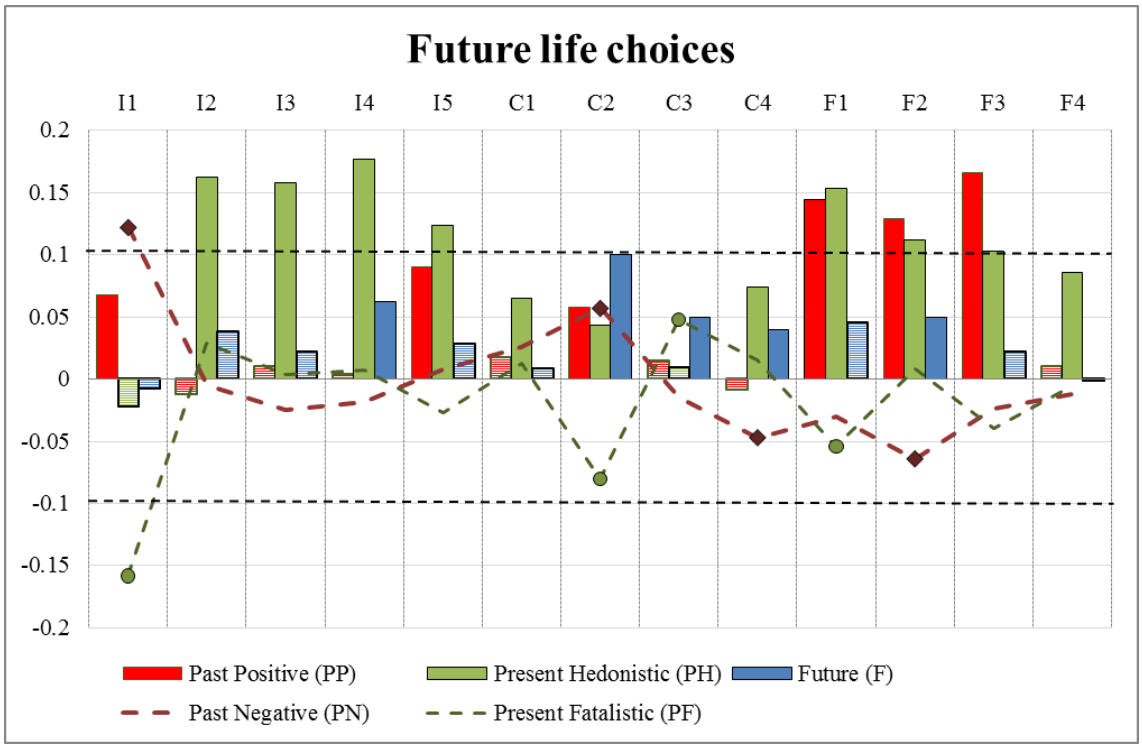

Figure 64. Visualization of the effects of TP profiles on Future Life Choices

In the chart we can have an idea of the magnitude of the influence of each type of time profile score over each life choice. For coefficients that are statistically significant we use darker tones for the bars and markers for the lines at the location of the corresponding life choice (check Table 36). Surprisingly, the option I1 – *Study at a University* is considerably influenced (can increase the influence in more than 10%) by PN and PF scores, which are associated to more negative features of personality. We can also observe the coefficients of Present Hedonistic (PH) score have strong influence over the individual and family types of plans, whereas Past Positive (PP) scores have strong influence over most of the family-type future life choices.

In addition, in Table 37 it can be confirmed that there is a degree of interdependence

all the time perspective categories that are being analysed, and in Table 38 the correlation matrix among life choices can be observed, which evidences a similar high degree of significant interdependent relationships.

Table 37. Covariance matrix among time profiles when influencing life choices

	PN	**PP**	**PH**	**PF**	**F**
PN	1	0.062	0.157	0.167	0.056
PP		1	0.126	0.034	0.086
PH			1	0.15	0.05
PF				1	0.022
F					1

Note: All the coefficients are statistically significant at a 95% level.

6.4.3 Relation between future life choices and migration plans

In a different section of the questionnaire survey, we make questions regarding how would you consider a set of future plans with answer choices ranking in a Likert scale from 1 representing "I do not want to do it" to 5 representing "I am considering it seriously". The descriptive results for future life plans can be observed in Figure 65.

Table 38. Covariance matrix among life choices

	I1	I2	I3	I4	I5	C1	C2	C3	C4	F1	F2	F3	F4
I1	**1**	**0.02**	0.008	**0.054**	**0.069**	**0.055**	**0.075**	-0.006	**-0.034**	**0.033**	**0.028**	0.015	-0.024
I2		**1**	**0.116**	**0.093**	**0.117**	**0.116**	**0.081**	**0.038**	**0.055**	**0.115**	**0.096**	**0.127**	**0.072**
I3			**1**	**0.799**	**0.19**	**0.214**	**0.103**	**0.171**	**0.379**	**0.261**	**0.162**	**0.285**	0.071
I4				**1**	**0.208**	**0.143**	**0.1**	**0.164**	**0.212**	**0.151**	**0.108**	**0.147**	**0.102**
I5					**1**	**0.222**	**0.21**	0.049	**0.061**	**0.346**	**0.256**	**0.338**	**0.28**
C1						**1**	**0.257**	-0.007	**0.053**	**0.235**	**0.149**	**0.244**	**0.176**
C2							**1**	0.026	0.027	**0.219**	**0.178**	**0.22**	**0.141**
C3								**1**	**0.411**	**0.068**	**0.147**	**0.096**	0.013
C4									**1**	**0.114**	**0.141**	**0.124**	0.002
F1										**1**	**0.718**	**0.944**	**0.208**
F2											**1**	**0.82**	**0.223**
F3												**1**	**0.299**
F4													**1**

Life choices:

I1: Study at a University, I2: Have a good car, I3: Being famous, I4: Personal achievement in sports or arts, I5: Traveling to faraway destination

C1: Earning a lot of money, C2: Having a job in a corporation, C3: Working in a family business, C4: Own business project

F1: Have a partner / be married, F2: Have one child, F3: Have 2 children or more F4: Have a pet(s)

Coefficients in **bold** are statistically significant at least at 90% level.

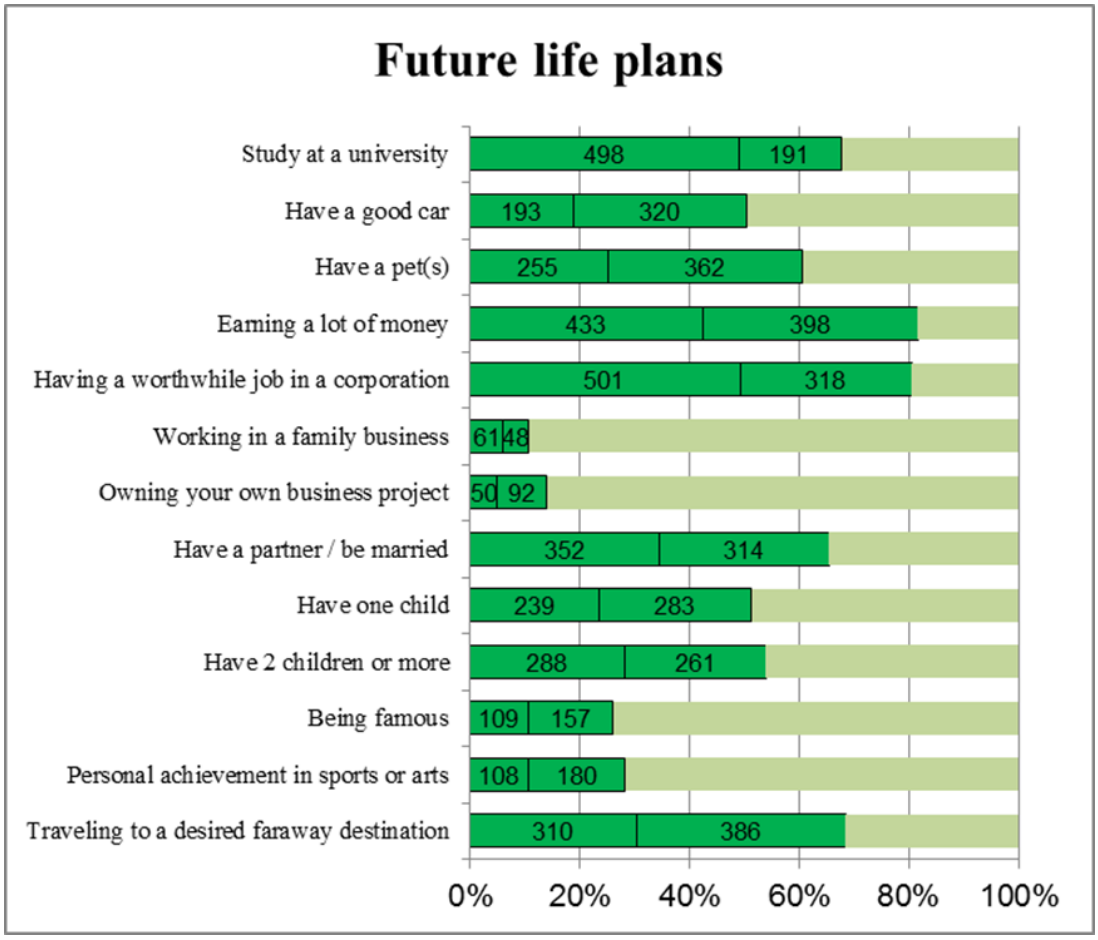

Figure 65. Future life plans according to students who responded "would possibly do" and "seriously consider" to each one of them

The cross-tabulation of respondents for each one life choices and the number of respondents that are choosing in the future the related migration option separated by depopulating or non-depopulating area are shown in Table 39, together with the results of the ANOVA test of differences between groups. It can be observed that the intention for family plans related to migration does not get affected at all by the residential location, whereas individual plans are the main reasons for considering migration in both depopulating and non-depopulating areas.

Table 39. Future life plans and future migration intentions

Life choice	Area type	N	(%) MIG	F-value	(%) RET	F-value	(%) MP	F-value
Study at a university	D	296	52.7%	0.41	**19.3%**	**3.04***	22.3%	0.00
	ND	393	44.3%	0.29	**18.6%**	**3.32***	14.2%	0.44
Have a good car	D	299	**53.2%**	**3.27***	21.4%	1.00	21.7%	0.07
	ND	214	**50.5%**	**7.11*****	20.6%	1.10	17.8%	1.98
Being famous	D	159	**60.4%**	**7.87*****	19.5%	0.01	25.2%	1.03
	ND	107	**64.5%**	**24.75*****	**25.2%**	**3.10***	17.8%	0.86
Personal achievement in sports or arts	D	151	**58.9%**	**2.94***	21.9%	0.08	23.2%	0.08
	ND	137	**54.0%**	**8.16*****	**24.8%**	**3.60***	14.6%	0.25
Traveling to a desired faraway destination	D	381	**56.7%**	**14.89*****	20.7%	0.02	**23.9%**	**3.19***
	ND	315	**49.2%**	**17.73*****	20.0%	1.61	16.2%	1.57
Earning a lot of money	D	477	**52.6%**	**5.57****	20.8%	0.05	21.6%	0.04
	ND	354	**46.9%**	**11.24*****	19.8%	1.38	14.1%	0.87
Having a worthwhile job in a corporation	D	453	**54.1%**	**3.03***	**23.0%**	**9.19*****	23.4%	0.07
	ND	366	45.4%	1.68	19.7%	0.14	14.8%	0.10
Working in a family business	D	74	54.1%	0.29	**28.4%**	**6.89*****	**18.9%**	**7.14*****
	ND	35	48.6%	0.19	22.9%	0.09	**5.7%**	**8.42*****
Owning your own business project	D	92	56.5%	1.26	21.7%	0.75	23.9%	0.34
	ND	50	62.0%	2.24	**28.0%**	**2.78***	18.0%	0.69
Have a partner / be married	D	389	53.7%	2.22	23.1%	0.92	21.9%	0.06
	ND	277	46.9%	0.95	20.6%	0.04	14.4%	0.40
Have one child	D	312	54.5%	0.82	22.8%	0.02	23.7%	1.00
	ND	210	46.7%	0.18	21.9%	0.26	13.8%	0.45
Have 2 children or more	D	322	55.3%	1.64	21.7%	0.21	23.3%	0.06
	ND	227	48.0%	1.10	21.6%	0.06	14.5%	0.00
Have a pet(s)	D	372	53.8%	2.12	21.8%	0.93	21.5%	0.63
	ND	245	48.6%	1.57	20.0%	0.01	16.7%	1.95

6.4.3 Discrete choice models for future migration plans

The influence of the variables related to social exclusion, time perspective profile, social exclusion and future life plans are jointly considered in discrete choice models that make possible to capture their influence on the future migration intentions of our respondents.

According to the information in Table 3, we consider 4 main groups for modelling

the migration choices and we employ a Multinomial Logistic regression model (MNL). The predicted variable is a nominal type with more than two levels which correspond to the following migration choices: *Migrate, Stay, Undecided and Possibly*. For that reason, a MNL estimation is chosen. Table 40 shows the classification of the different migration choices.

Table 40. Migration options and grouping for the model

Description	**Dependent variable**
Migration from current residential place	
Future migration has been decided, but not because of my own will.	*Migrate*
I want to continue living in this place	*Stay*
I have not considered future residence	*Undecided*
I have considered future residence, but I have hesitated to decide	*Possibly*
I intent to move to a different area in Japan to live	*Migrate*
I already started the preparation for my future migration	*Migrate*
I already decided to move somewhere else in Japan	*Migrate*
I am considering, preparing or I have decided to move overseas	*Migrate*
Returning to current residential place	
In case of future migration, would you like to return to your current residential place? (If Yes, *Return*=1, 0 otherwise)	*Return (R)*
In case of future migration, would you like to return to your current residential place? (If No, *PM*=1, 0 otherwise)	*Permanent migration (PM)*

The migration options could have been initially considered in an ordinal level, according to the degree of intention for migration. However, there were specific options where the migration decision depends on external factors not related to the surveyed individual. On the other hand, the degree of intention was not specifically inquired in the

survey, presuming that the uncertainty would be much higher for first-year students than for last-year students, for instance. Due to these reasons, a discrete choice model was considered more appropriate instead of other regression models such as an ordinal type, which requires the dependent variable to be measured at the ordinal level, which that was not specific in the survey questionnaire (see Appendix B for details).

In the multinomial logit (MNL) model we specify the individual response probability for each one of the migration choices as:

$$\Pr(y_i = j \mid Xi) = \frac{\exp(x_i' \beta_j)}{\sum_k \exp(x_i' \beta_k)} \qquad (1)$$

where $i = 1, 2,\ldots,1017$, j = *Migrate, Stay, Undecided, Possibly*

In addition, we model the variables *Return* and *Permanent migration (PM)* (see Table 1) as binary variable responses, we employ a binary logistic regression model, where we model the individual response probability for each one of these migration choices as follows:

$$\Pr(R = 1 \mid Xi) = \frac{\exp(x_i \beta_R)}{1 + \exp(x_i \beta_R)} \qquad \Pr(PM = 1 \mid Xi) = \frac{\exp(x_i \beta_{PM})}{1 + \exp(x_i \beta_{PM})} \qquad (2)$$

where $i = 1, 2, \ldots, 1017$

The results of the model estimations are shown in Table 41.

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6.4.3.1 Independent variables

For the independent variables of the models, we group our predictors considering 4 main groups: individual attributes, time perspective profiles, social migration and future life plans.

- **Individual attributes**

As individual attributes, we employ the following predictors: study in depopulating area (dummy variable), whether the student belongs or not to science or humanities classes (dummy variables), gender (dummy variable), household size (number of members), number of elderly members of household (older than 65 years old), and travel time to school (in minutes).

- **Time Perspective profiles**

According to the Zimbardo Time Perspective Inventory, different scores for the corresponding time perspective components are calculated. Detailed information of the Zimbardo Time Perspective Inventory test can be consulted in the Appendix C. The corresponding scores for Past Negative (PN: 10 question items), Present Hedonistic (PH: 15 question items), Future (F: 13 items), Past Positive (PP: 9 items) and Present Fatalistic (PF: 9 items) are calculated as a standardized score for each dimension.

- **Social exclusion**

For each of the 21 items in the seven dimensions of social exclusion here aforementioned, a value is assigned to each social exclusion item. Then for each social exclusion dimension *d* (see Table 3) the values were summed and standardized in an index (Abe, 2010), so that each index assumes a value between 0 (disagreement with all items in the corresponding latent construct) and 1 (agreement with all the items in the corresponding latent construct). Therefore, values closer to 0 represent more social exclusion in a certain dimension *d* whereas values closer to 1 represent more social inclusion.

$$SE_i^{\,d} = \frac{\sum_{k=1}^{N^d} b_i^{\,d}}{5N^d} \qquad (3)$$

where,

$SE_i^{\,d}$: Standardized social exclusion index for the individual *i* in the dimension *d*

$b_i^{\,d}$: Score in the Likert scale (from 1 to 5) for individual *i* in the corresponding question *b* belonging to dimension *d*

N^d: Number of items in the dimension *d*

d = Social support, Participation, Health condition, Natural environment, Safety, Accessibility, Lifestyle

- **Future life plans**

Each one of the future life plans is treated as a dummy variable, as previously explained in the section 4.3. If for any future life choices the respondent answers "I would possibly do" or "I seriously consider", the dummy variable gets a value of 1, 0 otherwise.

6.4.4 Summary of results

The migration intentions in the overall sample can be considered equally distributed for practical effects, i.e. approximately half of the students are considering a migration-related option whereas the other half is not considering a change in residential location in the future. 209 students (20.6%) in the whole sample are considering to return to their current residential location in case of a hypothetical future migration and among them, the categories for the duration of their imagined migration can also be considered equally distributed for practical effects (see Figure 1). But, when comparing the future migration intentions by type of area, a significant larger proportion of respondents in depopulating areas are considering migration and permanent migration in comparison to the proportion of respondents who study in non-depopulating areas, as it can be confirmed by the Chi-square test results. For the migration and permanent migration models, the fit of the models can be considered acceptable, based on the values of *McFadden* R^2.

The influence of time perspective, particularly the PP and PH scores for future migration intentions is notorious. On the other hand, some aspects of social exclusion are also influential. The desire for a change of lifestyle (or for keeping it) appears to be the strongest driver for future migration intentions. Others such as perceived lack of social support also play a role for motivating permanent migration.

Table 41. Regression results for migration options

	Migration related options: **(Baseline: *Undecided*)**			Return to current residential location	
	Migrate	***Stay***	***Possibly***	***Return (R)***	***Permanent migr. (PM)***
Individual attributes					
Study in depopulated area	0.31	0.03	**0.58****	-0.08	**0.51****
Belongs to science class	0.20	0.41	0.12	-0.27	0.21
Belongs to humanities class	**-0.42****	-0.20	**-0.63*****	**-0.43****	0.03
Gender (1 = Male)	-0.18	-0.09	-0.32	0.28	**-0.38***
Household size	0.06	**0.20*****	**0.12***	-0.02	-0.03
Elderly in household	**0.20***	0.08	0.14	0.00	0.05
Travel time to school	-0.01	0.00	0.00	0.00	0.00
Time perspective					
Past Negative score	-0.15	-0.06	0.14	0.02	-0.17
Past Positive score	-0.04	**0.39***	0.12	-0.11	**-0.58*****
Present Hedonistic score	**0.61****	-0.27	0.12	**0.52****	-0.07
Present Fatalistic score	-0.04	-0.09	**-0.40***	0.06	0.37*
Future score	0.11	0.14	0.06	0.19	-0.01
Social exclusion					
Social support	-0.34	-0.65	0.62	0.32	**-1.82*****
Participation	0.23	-0.47	1.17	0.33	0.44
Health condition	-0.45	-0.64	**-2.43*****	-0.25	0.70
Natural environment	-0.84	**1.92*****	-0.39	0.36	-0.87
Safety	-0.21	0.30	-0.36	0.36	-0.45
Accessibility	**-1.03***	1.11*	-0.41	**-0.94***	0.06
Lifestyle	**3.48*****	**-2.28*****	**1.27****	**0.97***	**3.48*****
Future life plans					
Study at a university	0.02	**-0.47****	-0.36	**-0.35***	0.03
Have a good car	-0.10	0.21	0.11	-0.15	0.10
Have a pet(s)	0.14	0.19	0.21	0.02	-0.02
Earning a lot of money	-0.31	-0.11	0.16	-0.24	**-0.61****
Having a job in a corporation	0.24	-0.21	0.06	0.29	**0.44***
Working in a family business	-0.17	0.35	**0.55***	0.23	**-0.54***
Own business project	**0.53***	0.41	0.30	0.06	0.28
Have a partner / be married	0.02	0.18	0.02	0.19	-0.10
Have one child	0.17	0.22	-0.01	0.12	0.06
Have 2 children or more	-0.04	-0.24	-0.01	-0.07	0.19
Being famous	**0.60****	0.10	**0.66*****	-0.14	0.32
Personal achievement	0.08	-0.05	0.00	0.09	-0.09
Traveling to faraway destination	**0.35***	-0.02	0.26	-0.19	0.11
Number of observations	1017			1017	1017
Initial Log-likelihood	-1387.50			-516.57	-494.16
Final Log-Likelihood	-1247.98			-491.84	-444.17
Prob > Chi2	0.000			0.025	0.0000
McFadden R^2	0.1006			0.0479	0.1012

Note: coefficients statistically significant at * 90%, ** 95%, ***99% levels

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7. Travel behaviour, Well-Being and Health-related Quality of Life in Japanese urban areas

Chapter 7
Travel behaviour, Well-Being and Health-related Quality of Life in Japanese urban areas

Based on the survey of health-related quality of life in Japanese cities that was conducted in 2010 (Zhang, 2013), in this chapter of dissertation we analyse transport disadvantage and social exclusion based on the changes of health-related quality of life and other subjective well-being indicators.

7.1 Preliminary information

For the analysis of travel behaviour, we make use of GIS data issued by the government of Japan, travel behaviour information collected in the survey and additional information that is relevant for the model results.

7.1.1 GIS Data Matching

Based on the postcode of residential location, it is possible to obtain land-use-related information of those locations from the National Land Numerical Information service provided by the Ministry of Land, Infrastructure, Transport and Tourism of Japan (MLIT).

The National Land Numerical Information is digitized geographic information on topography, land use, public facilities, roads, and railroads, and other land-related information. Grid cell (meshed) data comprise much of the data that can be combined with population and other statistical data to conduct further analyses. The land-use-related information used in this study comprises of the following features and facilities:

- Land-related attributes of the zone: Based on the postcode area, we determined whether the predominant land use in a location is commercial or not as an indicator of mixed land use. Similarly, we can determine a value for the population in the corresponding cell of the mesh data. Each cell has an area of 1 km^2, so this value is equivalent to the population density of the corresponding residential location [48]. The last year of updated information for the predominant type of land use in each cell of the mesh was 2011, and for the population density it was 2010.
- Park location: Based on park locations, we can calculate corresponding measures of distance and number of parks within a 1 km radius of each resident's residential location. The last updated information for this layer is from 2011, and relates to the built parks based on the Urban Park Act of Japan.
- Cultural facilities: Museums, libraries, memorial halls, and other cultural facilities in the zone are included as cultural facilities. Similarly, we can calculate the

corresponding measures for the distance and number of cultural facilities. The most recent collection of data for this information was in 2012.

7.1.2 Travel behaviour

The travel behaviour of the individuals is characterized in terms of the activity (purpose of travel), the frequency, the travel mode, and the moving distance. For activity, 11 different purposes of travel are listed: commuting, doing other business, shopping, pursuing leisure activities, doing sports, engaging in non-academic learning, pursuing social activities, attending to health care, eating out, taking care of personal matters, and others. In the questionnaire, the frequency of travel is characterized by using an ordinal scale from 0 to 10, in which 0 is assigned when the activity is not considered by the respondent, 1 is equivalent to a few times a year, and 10 is equivalent to an daily/almost daily activity.

The travel modes considered in the study were walking, riding a bicycle, riding a motorcycle, using a car (as the driver), using a car (as a passenger), taking a train, taking a streetcar, taking a monorail, taking a bus, taking a taxi, and others. For the purposes of this study, we group the walkers and cyclists as active travellers. We characterize the active travel behaviour by calculating a joint index, i.e., Active Travel Score (ATS), to describe the use of active travel modes and the frequency, as follows.

$$ATS_n = \sum f_{ni} a_{ni} \quad (1)$$

Where f_{ni} is individual n's frequency for travel by purpose i (where i =1, 2,...,11) and a_{ni} is a dummy variable indicating whether an active travel mode is used by individual n for travel purpose (activity) i. Thus, the ATS indicates roughly how much or how often an individual uses active travel modes in comparison to other people. The score for an individual who walks or rides a bicycle to engage in any of the aforementioned activities is higher than those who do not, and the more frequent an individual walks or rides a bicycle, the higher the score is.

7.1.3 Additional information for modelling

In Table 42 the variables that have been employed in this model are listed in detail. The remaining categories that were considered correspond to:

- Residential environment: Characteristics of the residential environment included in the analysis were obtained from both the questionnaire survey and GIS data. The influence of parks, cultural facilities, commercial facilities, and population density in the health-related QOL and the active travel behaviour is examined.
- Individual attributes: Age, gender, driving license, car possession, occupation, income, and household characteristics are included here.

- Lifestyle habits: The eight lifestyle habits as proposed initially by Morimoto (1989) are included in the current.
- Health-related QOL: According to the conceptual definitions of the SF-36 model, questions aiming to obtain scores for the 36 different items are included in the survey questionnaire. These questions include: ability to perform baseline activity, and perceptions of individual health condition, mental condition, well-being, accomplishments, and possible limitations in daily activities due to health limitations, as explained previously (Gordon-Larsen, 2006; Echenique et al., 2012).

Table 42. Variables selected for this analysis

Category	Description	Min	Max	Mean	SD
Residential environment					
No. of parks	Number of parks within a 1 km radius from the residential location	0	68	18.39	9.84
Distance to park	Distance to the closest park from the residential location (m)	14.2	2,656.6	222.2	182.9
No. of cultural facilities	Number of cultural facilities within a 1 km radius from the residential location	0	31	5.64	5.27
Distance to cultural facility	Distance to the closest cultural facility from the residential location (m)	8.1	2,929.4	590.2	379.51
Population density	Number of inhabitants in the corresponding 1 km2 area of the residential location	127	28,738	10,984.4	6,026.18
Commercial land use	Dummy variable: 1 if the use of land is predominantly commercial, 0 otherwise.	0	1	0.19	0.39
Health-related QOL					
PCS	Physical Component Score	5.4	100	73.43	14.81
MCS	Mental Component Score	3.2	100	69.14	15.86
RCS	Role (Social) Component Score	0.0	100	79.78	16.41
Individual attributes					
Age	Age in years	15	69	42.12	13.39
Gender	1 if male, 0 if female	0	1	0.50	0.50
Driving license ownership	1 if there is possession, 0 otherwise	0	1	0.84	0.37
Car ownership	1 if there is possession, 0 otherwise	0	1	0.50	0.50
Household size	Number of household members	1	9	2.75	1.30

Table 42. Variables selected for this analysis

Category	Description	Min	Max	Mean	SD
Lifestyle habits					
Breakfast	Eat breakfast everyday (1:Rarely, 5: Everyday)	1	5	4.18	1.20
Sleep	Sleep 7 - 8 hours (1:Rarely, 5: Everyday)	1	5	3.24	1.27
Meal	Meal is balanced / nutritious (1:Rarely, 5: Everyday)	1	5	3.47	1.01
Smoke	Do not smoke (1:Rarely, 5: Everyday)	1	5	4.16	1.55
Sports	Practice sports periodically (1:Rarely, 5: Everyday)	1	5	2.71	1.38
Alcohol	Do not drink much alcohol (1:Rarely, 5: Everyday)	1	5	4.14	1.19
Work	Work within 9 hours a day (1:Rarely, 5: Everyday)	1	5	3.43	1.40
Stress	Do not feel much conscious stress (1:Rarely, 5: Everyday)	1	5	3.00	1.18
Health-related QOL scales					
General health	Calculated value for this health scale	0	100	58.33	19.05
Physical functioning	Calculated value for this health scale	0	100	91.24	14.19
Role – physical	Calculated value for this health scale	0	100	87.87	20.66
Role – emotional	Calculated value for this health scale	0	100	85.73	21.92
Social functioning	Calculated value for this health scale	0	100	82.09	22.66
Bodily pain	Calculated value for this health scale	0	100	77.53	21.40
Vitality	Calculated value for this health scale	0	100	54.86	20.24
Mental health	Calculated value for this health scale	0	100	64.57	19.73
Travel behaviour					
Walking	Active Travel Score (ATS) for walking	0	95	11.59	14.31
Cycling	Active Travel Score (ATS) for cycling	0	79	7.38	13.21
Public Transport	Equivalent score for the use of public transport	0	73	6.35	10.69
Active commuting	Commuting by active travel modes	0	10	2.22	4.12
PT commuting	Commuting by public transport	0	10	2.42	4.26
Active NC travel	Active modes by non-commuting purpose	0	85	16.76	15.91
PT travel	Public transport by non-commuting purpose	0	63	3.93	8.22
Travel purpose					
Frequency by purpose	Numerical scale equivalent to the number of days in a week (see analysis in Table 3)	0	5	-	-

7.2 Segmentation of travel behaviour and cluster analysis

In the questionnaire survey we asked the respondents about their travel frequency for different purposes. Only commuting behaviour revealed important information, but the observed heterogeneity with respect to the other purposes of travel makes the overall travel behaviour more difficult to grasp. In order to make a more simplified travel behaviour analysis, we use cluster analysis techniques to find travel behaviour patterns that are sufficiently representative to make clusters of individuals with similar travel behaviour characteristics. After grouping the individuals in their respective clusters, we employ regression methods and structural equation modelling to analyse the direct and indirect effects of the residential environment on the active travel behaviour and the health-related QOL in each of those groups.

Here, we made use of hierarchical cluster analysis to classify individuals so as to capture the influence of heterogeneity based on the variation of the frequency by travel purpose. We found an acceptable solution was to divide the sample into three clusters to group the respondents by their frequency. Then we employed the Euclidean distance method for minimization of the distance to each centroid cluster, and each individual was assigned to one of clusters 1, 2, or 3 (containing 312, 501, and 386 individuals, respectively). Table 43 shows the cross-tabulation results for the travel frequency average

values by group, the standard deviation in parentheses, the travel frequency values that define the cluster centres, and the number (and percentage) of participants that take part in each travel purpose, respectively. For the cluster analysis, the frequencies are converted into an equivalent numerical scale that reflects how many days per week the respondent travels to take part in each activity.

Table 43. Results of cluster analysis

Travel purpose	**Clusters [Average travel frequency (standard deviation)]**			**Cluster centres for travel frequency**			**Respondents in the entire sample**
	Cluster 1	*Cluster 2*	*Cluster 3*	*Cluster 1*	*Cluster 2*	*Cluster 3*	
Commuting	4.71 (1.14)	0.23 (0.50)	5.00 (0.00)	4.7	0.2	5.0	750 (62.4%)
Business	5.00 (0.00)	0.20 (0.79)	0.07 (0.35)	5.0	0.2	0.1	388 (32.2%)
Shopping	1.93 (1.71)	2.48 (1.83)	1.56 (1.61)	1.9	2.5	1.6	1006 (83.5%)
Leisure	0.77 (1.11)	0.56 (1.03)	0.60 (1.03)	0.8	0.6	0.6	690 (57.0%)
Sports	0.73 (1.33)	0.95 (1.62)	0.61 (1.24)	0.7	1.0	0.6	531 (44.1%)
Non-academic learning	0.26 (0.96)	0.12 (0.64)	0.18 (0.79)	0.3	0.1	0.2	120 (9.9%)
Social activities	0.06 (0.32)	0.14 (0.50)	0.04 (0.21)	0.1	0.1	0.0	197 (16.4%)
Health care	0.18 (0.62)	0.18 (0.45)	0.076 (0.21)	0.2	0.2	0.1	484 (40.1%)
Eating out	0.71 (1.15)	0.36 (0.67)	0.50 (1.02)	0.7	0.4	0.5	685 (56.8%)
Personal affairs	0.28 (0.62)	0.26 (0.37)	0.12 (0.35)	0.3	0.3	0.1	677 (56.1%)
Others	0.44 (1.14)	0.31 (0.86)	0.17 (0.65)	0.4	0.3	0.2	331 (27.4%)
Number of individuals (N)	312	501	386	-	-	-	1199

Note: Values of frequency are represented in equivalent days in a week.

As defined by the cluster centre values, the individuals in *Cluster 1* can be characterized by the almost daily average frequencies for commuting and daily travel frequencies for business purposes, and occasional frequencies for other activities such as leisure, sports, and eating out. The individuals in *Cluster 2* do not commute, but travel occasionally to go shopping, or to take part in other activities related to sports, health care, or eating out. The individuals in *Cluster 3* are daily commuters who occasionally travel to

go shopping, but in general, they make trips for different purposes less frequently than do individuals in *Cluster 1*.

7.2.1 Features of the different clusters

In Table 44 and Table 45 the main features of the different clusters are summarized. Hereafter the general description for each of them can be observed.

Cluster 1 is a group of active members. In this cluster, 71% of the group members are male, and people in this group have the smallest average household size. Despite having higher numbers of people with driving licenses and higher levels of car ownership than people in *Clusters 2* and *3*, these individuals have the most active lifestyles, reflected by their travel habits and in their ATS scores for the use of cycling, walking, and public transport, far exceeding those for members of *Clusters 2* and *3*; and their use of active modes and of public transport for non-commuting purposes is significantly much higher than for those in *Clusters 2* and *3*. However, individuals in this group do not use active travel modes for commuting significantly more than individuals in *Cluster 3*.

Cluster 2 can be defined as the less mobile group. Individuals in this group do not commute, but they make use of walking and cycling trips that are associated mainly with shopping, and occasionally with leisure, health care or other personal matters. This is group in which 71% of the respondents are women, and individuals in this group are the

oldest among the respondents. They live in areas with higher concentrations of parks in their surroundings. On the other hand, they tend to have higher values in the categories of vitality and mental health.

Cluster 3 can be called the commuters-only group. The mobility patterns of individuals belonging to this group are mostly associated with commuting and shopping errands on an occasional basis. Regarding their active travel behaviour, based on their ATS scores, we can observe that they use active modes less frequently in comparison with individuals in *Clusters 1* and *2*. We can observe that they travel mostly for their commuting needs, and their lifestyle is less active than the lifestyle of people in *Cluster 1*, since they travel less frequently for purposes other than commuting in general.

Table 44. Main features of the clusters

Cluster / Trip purpose	Cluster 1	Cluster 2	Cluster 3
Commuting	Daily	Rarely	Daily
Business	Daily	Rarely	Rarely
Shopping	Sometimes	Frequently	Sometimes
Other purposes	Sometimes	Sometimes	Rarely

Table 45. ANOVA analysis results

Variables	*Cluster 1*	*Cluster 2*	*Cluster 3*	F value	p-value
Residential environment					
No. of parks	17.45	19.37	17.89	4.42	0.012
Distance to park	215.2	219.39	235.0	1.21	0.299
No. of cultural facilities	6.36	5.14	5.71	5.26	0.005
Distance to cultural facility	580.32	615.05	566.23	1.95	0.143
Population density	11551	10538	11104	2.82	0.060
Commercial land use	0.23	0.17	0.17	2.37	0.094
Health-related QOL attributes					
PCS	73.1	72.8	74.4	1.31	0.027
MCS	68.4	69.7	69.0	0.68	0.507
RCS	80.2	78.3	81.4	4.09	0.017
Health-related scales					
General health	57.1	58.2	59.4	1.23	0.293
Physical functioning	92.5	88.2	94.1	21.65	0.000
Role - physical	88.9	84.7	91.1	11.22	0.000
Role - emotional	86.8	84.1	86.9	2.36	0.095
Social functioning	82.5	81.4	86.9	0.35	0.707
Bodily pain	77.4	76.1	79.5	2.86	0.057
Vitality	52.5	58.1	52.5	11.5	0.000
Mental health	63.1	66.8	62.8	5.8	0.003
Individual attributes					
Age	41.8	47.3	35.7	93.6	0.000
Gender	0.71	0.29	0.61	89.9	0.000
Driving license ownership	0.90	0.82	0.81	6.21	0.002
Car ownership	0.59	0.48	0.45	6.98	0.001
Household size	2.62	2.87	2.70	3.756	0.024
Lifestyle habits					
Breakfast	3.97	4.40	4.06	15.6	0.000
Sleep	2.95	3.61	3.00	38.7	0.000
Meal	3.31	3.79	3.19	46.6	0.000
Smoke	3.76	4.33	4.26	14.6	0.000
Sports	2.70	2.76	2.67	0.48	0.617
Alcohol	3.91	4.31	4.11	11.6	0.000
Work	3.13	3.63	3.40	12.64	0.000
Stress	2.79	3.23	2.86	17.5	0.000
Travel behaviour					
Walking	16.04	11.53	8.0	28.6	0.000
Cycling	8.04	6.88	7.49	0.76	0.467
Public Transport	9.87	3.20	7.55	44.2	0.000
Active commuting	2.79	0.49	3.99	96.2	0.000
PT commuting	4.07	0.40	3.69	115.1	0.000
Active NC travel	21.3	17.9	11.5	37.3	0.000
PT travel	5.80	2.79	3.87	13.2	0.000

7.2.2 Direct effects of residential environment on active travel behaviour

To analyse the distribution of ATSs, we make use of binary logistic and Tobit regression models. These models are used to examine whether and how different elements of the

residential environment affect the active travel behaviour, i.e., the use of cycling and walking for commuting and other travel purposes. In total, four regression models are estimated with respect to the following four dependent variables defined by the ATS (see Table 46).

- Active travel by walking
- Active travel by cycling
- Commuting by active travel modes (walking and cycling)
- Non-commuting activity by active travel modes (walking and cycling)

It is important to mention that for '(3) commuting by active travel modes,' we employed a binary logistic regression instead of a Tobit regression. The reason is, by nature of its own definition, the (active) commuting will adopt either the minimum or the maximum frequency values only (i.e., '0' or '10'), but no intermediate values in the frequency scale, thereby reducing the dependent variable to two possible outcomes that are transformed into a binary-equivalent code to employ the binary logistic regression model.

Here, distance to the closest park, distance to the closest cultural facility, number of parks within a 1 km radius of residence, number of cultural facilities within a 1 km radius of residence, commercial land use, and population density are used as explanatory variables.

Table 46. Direct effects of residential environment on active travel behaviour

Clusters	**Cluster 1**		**Cluster 2**		**Cluster 3**	
Statistical values	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Active Travel by Walking						
Constant term	11.35		5.40		1.487	
Distance to park	0.004	0.636	-0.0004	0.935	-0.0003	0.963
Distance to cultural facility	**-0.0115**	**0.008**	**-0.00048**	**0.090**	-0.0036	0.324
No. of parks	-0.013	0.936	-0.0075	0.943	-0.154	0.229
No. of cultural facilities	-0.355	0.602	0.0451	0.935	-0.504	0.423
Commercial land use	1.13	0.721	**9.28**	**0.001**	**4.569**	**0.100**
Population density	**0.00058**	**0.016**	0.00017	0.307	**0.00035**	**0.055**
Log likelihood	-1070.19		-1497.45		-971.95	
Pseudo R-squared	0.0101		0.0085		0.0052	
Active Travel by Cycling						
Constant term	-5.32		-14.58		-14.92	
Distance to park	-0.0027	0.874	-0.0046	0.625	0.192	0.106
Distance to cultural facility	-0.011	0.181	-0.0076	0.111	**-0.012**	**0.092**
No. of parks	**-0.615**	**0.076**	.0.191	0.256	0.183	0.402
No. of cultural facilities	**-2.38**	**0.095**	**-1.574**	**0.091**	0.652	0.514
Commercial land use	2.43	0.691	-6.085	0.152	1.719	0.722
Population density	0.0007	0.115	**0.0014**	**0.000**	0.00012	0.693
Log likelihood	-592.91		-951.6		-774.83	
Pseudo R-squared	0.0078		0.0176		0.0064	
Commuting by active travel modes (walking and cycling)						
Constant term	-0.327				0.1984	
Distance to park	-0.00036	0.675			0.0004	0.541
Distance to cultural facility	-0.0005	0.255			**-0.0009**	**0.025**
No. of parks	-0.019	0.245			0.0042	0.743
No. of cultural facilities	-0.289	0.724			-0.0068	0.911
Commercial land use	**0.732**	**0.013**			**0.579**	**0.041**
Population density	-0.000005	0.830			**-0.00003**	**0.084**
Log likelihood	-179.77				-253.34	
R-squared	0.0264				0.056	
Non-commuting activity by active travel modes (walking and cycling)						
Constant term	18.46		11.86		3.37	
Distance to park	0.010	0.101	-0.0026	0.596	0.007	0.236
Distance to cultural facility	-0.004	0.171	**-0.0055**	**0.030**	-0.0053	0.102
No. of parks	0.031	0.756	-0.0633	0.511	0.0030	0.978
No. of cultural facilities	**0.339**	**0.054**	-0.3538	0.484	-0.0439	0.933
Commercial land use	**6.203**	**0.006**	**5.239**	**0.032**	**4.219**	**0.081**
Population density	**0.00043**	**0.007**	**0.00076**	**0.000**	**0.00042**	**0.009**
Log likelihood	-1176.60		-1777.54		-1171.785	
R-squared	0.015		0.0139		0.0080	

Note: figures in **bond** type mean they are statistically significant at the 1%, 5%, or 10% level. Note 2: For commuting by active travel modes, binary logistic regression was used instead of a Tobit regression. Note 3: Individuals in *Cluster 2* are non-commuters.

With respect to the results of the regression models, some major observations are summarized below:

- Parks are not influential to the use of active travel for any purposes, except for cycling activities in Cluster 1. Generally speaking, as shown in Table 2, parks are located within walking distance of the home. But this does not necessarily mean that people like to visit parks frequently. In reality, those parks nearby residence are usually very small and they are not suitable places in which people can do physical exercise. Instead, what is often observed is that some married women sometimes visit those parks with their children, and children of elementary and/or secondary schools play in those parks. One or more large-scale parks are found in many cities, but these are normally far from residences. These facts may support this finding.
- Cultural facilities are found to affect active travel behaviour. The closer the distance to the nearest cultural facility, the higher the walking frequency for Clusters 1 and 2, the more use of active commuting for Cluster 3, the more non-commuting active travel for Cluster 2, and the more cycling for Cluster 3. The higher the number of cultural facilities near the residence, the more non-commuting activities by active travel modes can be observed for Cluster 1. If there are larger numbers of cultural facilities nearby the residence, people belonging to Cluster 1 are more likely to use active travel modes.
- If commercial land use is predominant in a residential location, the residents in all clusters are more likely to do active travel, both for commuting and non-commuting

purposes, and individuals in Clusters 2 and 3 will generally prefer to walk more. For cycling activities, no influence of a commercial or mixed land use was observed.

- Population density is positively associated with the use of active travel for non-commuting purposes in all the clusters, relevant to use of active travel for commuting in Cluster 3, relevant for cycling in Cluster 2, and for more walking activities among commuters (individuals in Clusters 1 and 3). Increased population density within residential areas will increase the use of walking for the commuters and for the non-commuting activities by active travel modes for people in general.

In summary, the residential environment has marked effects on the use of active travel, but effects differ across different types of trip makers. . The effects are not only mixed depending on types of trip makers but they also very limited because, in many cases, significant effects are only observed with respect to one or two elements of the residential environment.

7.2.3 Effects of residential environment on health associated with active travel

Considering the observations related to the regression models in the previous section, we need a framework to jointly accommodate the relationships between residential environment and active travel, between active travel and the health-related QOL, and between residential environment and the health-related QOL. To this end, we build a

structural equation model (SEM) with latent variables, as shown in Figure 66 and Table 47, which includes the following latent variables.

Transport-based disadvantage or transport-based social exclusion related variables were not included originally in this measurement, but from travel behaviour we aim to find based on the influence on Health-related QOL which types of travel behaviour pose greater influenced in diminishing the well-bring condition.

Table 47. Variables in the SEM model

Latent variable	**Observed variables**	**Description**
Residential environment:	Age, gender, car and driving license ownership, household size	The same set of variables as in the above regression analyses is selected to represent the residential environment.
Health-related QOL	PCS, MCS, and RCS scores	
Lifestyle habits	Frequency for eight habits: regular exercise, alcohol consumption, smoking, sleeping patterns, nutritional balance, breakfast, working pattern, and subjective stress	As initially proposed by Morimoto (1989)
Active travel:	We calculated four different scores for commuting by active travel, non-commuting activity by active travel, commuting by public transport, and non-commuting travel by public transport.	This is based on the definition of the Active Travel Score (ATS) and the observed travel frequencies by purpose and by mode. The first two scores are the same as in the above regression analyses. The public transport scores are measured by frequencies of using buses, trains, trams, or subways.
Personal attributes	Age, gender, ownership of driving license, ownership of vehicle, and household size.	

It is assumed here that the residential environment may have both direct and indirect effects on the health-related QOL, where the indirect effects are observed via the practice of lifestyle habits and active travel. Additionally, it is assumed that the previously listed

personal attributes may influence all the other latent variables (except built environment). Modelling estimation results are shown in Figure 67 and Table 48.. In Figure 67, the dashed lines represent the nonsignificant paths of influence in the SEM model and the solid lines represent the significant causal relationships (paths) that have been found in the different model estimations.

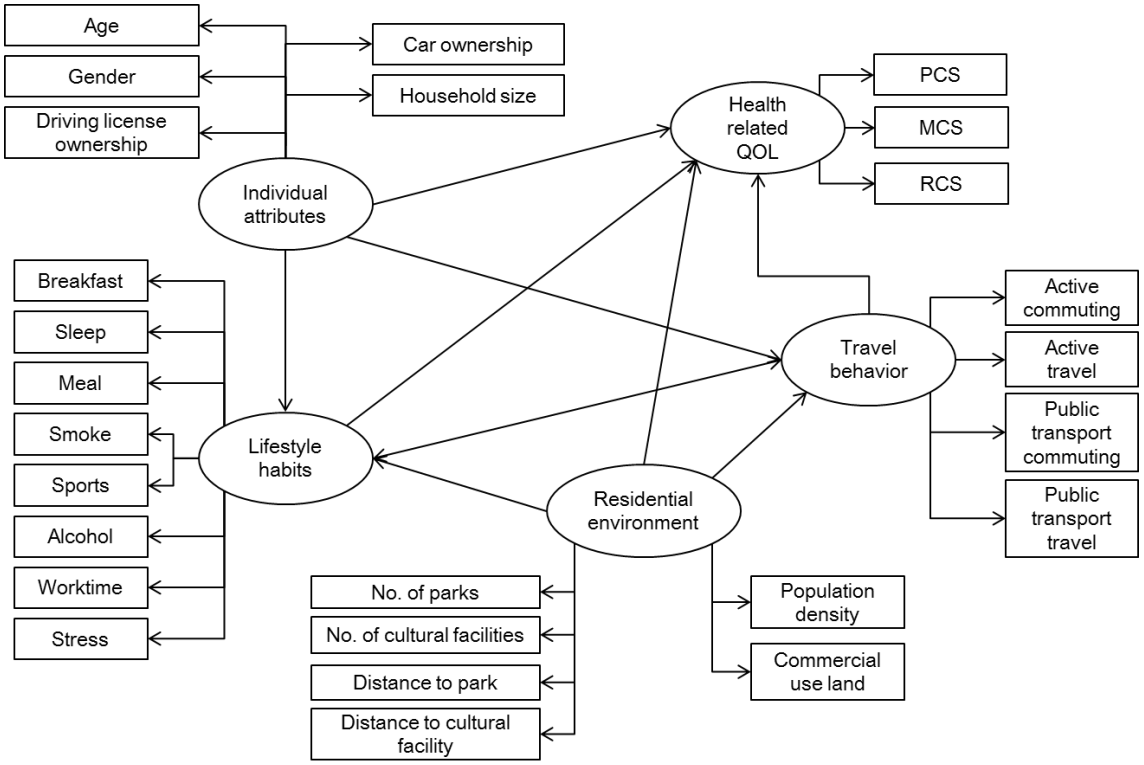

Figure 66. The basic SEM model assumed in this study

Table 48. Results of the SEM model by clusters

	Cluster 1		*Cluster 2*		*Cluster 3*	
	Standardized parameter	p-value	Standardized parameter	p-value	Standardized parameter	p-value
Individual attributes *to explain the following endogenous latent variables*						
Lifestyle habits	0.008	0.930			**-0.162**	**0.041**
Travel behaviour	**-0.352**	**0.001**			**-0.389**	**0.002**
Health-related QOL	0.117	0.148			**0.19**	**0.008**
Residential environment *to explain the following endogenous latent variables*						
Lifestyle habits	0.035	0.667	**-0.233**	**0.000**	**-0.148**	**0.063**
Travel behaviour	**0.288**	**0.000**			0.068	0.440
Health-related QOL	-0.042	0.533	-0.068	0.224	0.017	0.769

Table 48. Results of the SEM model by clusters

	Cluster 1		*Cluster 2*		*Cluster 3*	
	Standardized parameter	p-value	Standardized parameter	p-value	Standardized parameter	p-value
Lifestyle habits *to explain the following endogenous latent variables*						
Health-related QOL	**0.493**	**0.000**	**0.28**	**0.000**	**0.636**	**0.000**
Travel behaviour	**0.240**	**0.001**			0.158	0.117
Travel behaviour *to explain the following endogenous latent variables*						
Lifestyle habits	0.335	0.014	0.947	0.560		
Health-related QOL	-0.057	0.458			-0.064	0.445
Individual attributes *to explain the following exogenous observed variables*						
Age	0.286				0.6	
Gender	**0.440**	**0.000**			**0.251**	**0.000**
Driving license ownership	**0.529**	**0.000**			**0.672**	**0.000**
Car ownership	**0.694**	**0.000**			**0.665**	**0.000**
Household size	**0.167**	**0.038**			-0.1	0.102
Lifestyle habits *to explain the following exogenous observed variables*						
Breakfast	**0.364**	**0.000**	**0.546**	**0.000**	**0.28**	**0.000**
Sleep	**0.523**	**0.000**	**0.362**	**0.000**	**0.321**	**0.000**
Meal	**0.636**	**0.000**	**0.704**	**0.000**	**0.379**	**0.000**
Smoke	**0.188**	**0.007**	**0.346**	**0.000**	**0.202**	**0.001**
Sports	**0.343**	**0.000**	**0.483**	**0.000**	**0.397**	**0.000**
Alcohol	0.110	0.108	**0.22**	**0.000**	**0.137**	**0.027**
Work	**0.436**	**0.000**	**0.26**	**0.000**	**0.389**	**0.000**
Stress	0.546		0.504		0.36	
Health-related QOL *to explain the following exogenous observed variables*						
PCS	0.999		0.994		0.998	
MCS	**0.952**	**0.000**	**0.958**	**0.000**	**0.965**	**0.000**
RCS	**0.927**	**0.000**	**0.951**	**0.000**	**0.938**	**0.000**
Residential environment *to explain the following exogenous observed variables*						
No. of parks	**0.267**	**0.000**	**0.14**	**0.013**	**0.743**	**0.000**
Distance to park	**-0.229**	**0.001**	**-0.171**	**0.003**	**-0.625**	**0.000**
No. of cultural facilities	**0.612**	**0.000**	**0.671**	**0.000**	**0.114**	**0.068**
Distance to cultural facility	**-0.768**	**0.000**	**-0.603**	**0.000**	**-0.17**	**0.008**
Population density	0.468		0.50		0.475	
Commercial land use	**0.338**	**0.000**	**0.393**	**0.000**	0.026	0.669
Travel behaviour *to explain the following exogenous observed variables*						
Active commuting	**0.432**	**0.000**			0.479	
PT commuting					**0.63**	**0.000**
Active NC travel	0.927		0.373	0.209		
PT travel			0.07			
Chi-squared	694.8		758.2		830.1	
Goodness of fit index (GFI)	0.849		0.875		0.839	

Note: figures in bond type mean they are statistically significant at the 1%, 5% or 10% level.

As shown in Figure 67, the residential environment has direct and significant effects on travel behaviour (including active travel behaviour) for Cluster 1. Even though the

above regression analyses confirmed that the residential environment had mixed effects on active travel, when the health-related QOL is treated as the final dependent variable when examining these effects, the effects of the residential environment on travel behaviour disappear for Cluster 2.

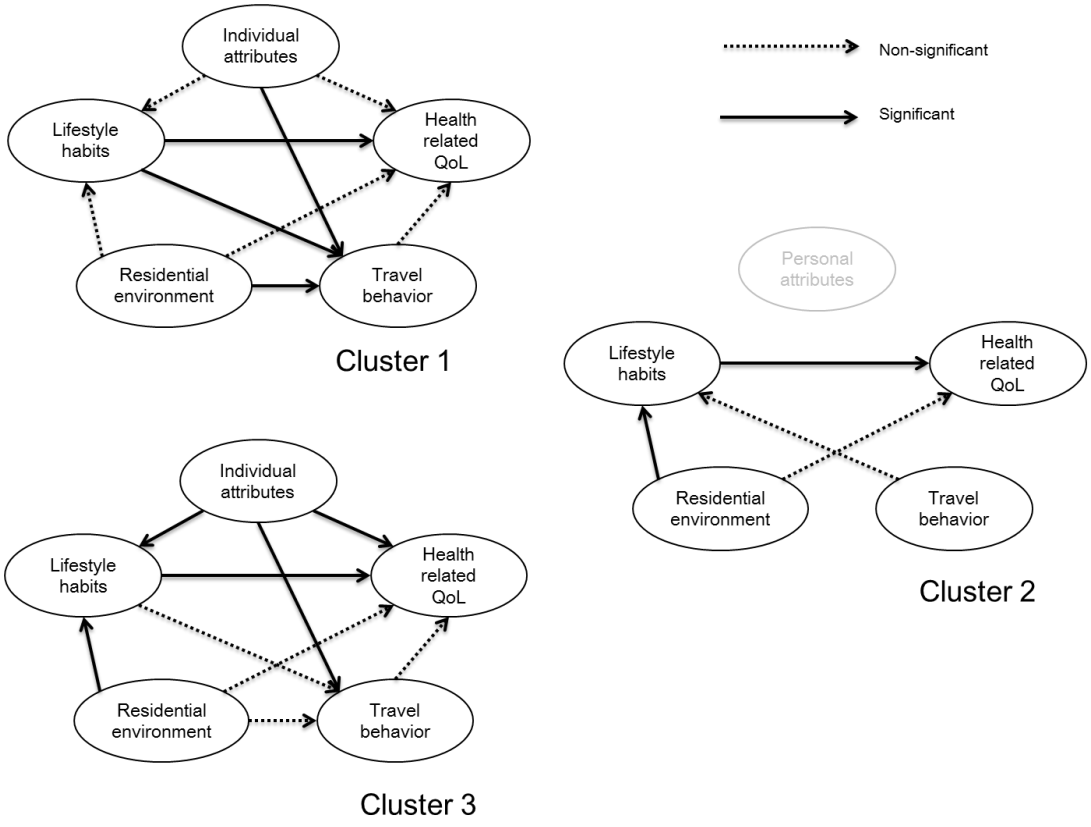

Figure 67. Variations in SEM model structures by clusters

Figure 67 also reveals that different cause–effect relationships are derived with respect to the three clusters. It is relevant to note that these three structures were uniquely derived based on a repeated trial-and-error process. In other words, no other alternative structures were found. However, in any cluster, it was found that travel behaviour

(including active travel behaviour) does not have any influence on the health-related QOL in any direct or indirect ways. This finding is not consistent with the results of existing studies. In this study, frequency of travel by mode is introduced. In contrast, existing studies mostly just select the use of different modes. Even though walking and cycling contribute to the improvement of health in general, if the frequency is not high enough, the relevant effects on health may not be measurable. At the least, this case study supports the existence of such a possibility.

For all three clusters, lifestyle habits have direct effects on the health-related QOL in a statistical sense. This is not surprising because it is not found for the first time since such effects on health have been confirmed widely in the field of public health. We have reconfirmed the same finding using a different set of data. In particular, the effects of lifestyle habits are most remarkable because the relevant total effects are the highest among all explanatory latent variables and all are statistically significant. Interestingly, for Cluster 1, it is confirmed that lifestyle habits have a significant effect on travel behaviour.

The residential environment has a direct effect on lifestyle habits for Clusters 2 and 3 (see Table 7), but as an overall effect, it does not affect the health-related QOL in this case study in Japan in either direct or indirect ways. As for factors characterizing the residential environment, population density is not relevant. This may suggest that, in Japan, further increasing the population density in residential areas is not beneficial to the final health

outcome (i.e., QOL), even though it is widely recognized that emissions from car traffic will be reduced with the increase of population density as a result of the development of compact cities. Concerning other factors, both parks and cultural facilities are an important factor determining the quality of the residential environment for all three clusters, from the perspectives of both the distance from home and the number of parks and cultural facilities around the residential location. Commercial land use is relevant for influencing the health-related QOL in Clusters 1 and 2.

Table 49. Total effects for the latent constructs

	Individual attributes	Residential environment	Travel behaviour	Lifestyle habits
Cluster 1				
Travel behaviour	-0.350	0.297		0.240
Lifestyle habits	0.008	0.035		
Health-related QOL	0.141	-0.042	-0.057	0.480
Cluster 2				
Lifestyle habits		-0.233	0.947	
Health-related QOL		-0.134	0.265	0.280
Cluster 3				
Travel behaviour	-0.415	0.045		0.158
Lifestyle habits	-0.162	-0.148		
Health-related QOL	0.114	-0.08	-0.064	0.626

Note: figures in **bond** type mean they are statistically significant at the 1% or 5% level.

While all the eight types of habits studied here are relevant to forming healthy lifestyle habits for Clusters 2 and 3, drinking alcohol is not important to people belonging to Cluster 1. As for the other six types of habits (breakfast, sleep, meals, not smoking, sports and working time), all are equally consistent and relevant for all the clusters. As

regards drinking alcohol, we might associate the non-relevance of that habit with the type of lifestyle that we can observe from travel behaviour, highly mobile and highly social, with frequent trips for shopping and leisure, for instance.

Considering that most of the respondents in Cluster 2 can be associated with female gender, more advanced age, and bigger household size, the higher homogeneity in this latent construct may explain why this is not a valid or influential latent construct for the proposed structure in this cluster.

As regards active travel, the relevance of commuting by active modes can be noted for Cluster 1, while the relevance of the use of public transport for commuting purposes can be noted for Cluster 3. For Cluster 2, no relevant factors associated with the non-commuting travel behaviour (by active modes and by public transport) could be found.

7.3 Estimation of mediation effects of non-motorized trips in health and well-being

In this section we apply a causal mediation analysis structure in order to find any effects of the influence of built environment on non-motorized travel and their joint influence on well-being and health related quality of life.

Higher rates of walking and cycling to work have been associated with a higher percentage of adults who achieved recommended levels of physical activity and a lower

percentage of adults with obesity and diseases such as diabetes (Pucher et al 2010) or depression (Lindsay et al., 2011), etc. In addition, considering the bodily health perspective, cycling represents a potentially powerful way to meet the recommended levels of physical activity for many populations (Oja et al., 2011).

In Figure 68 the framework for analysis in this section can be observed. The basic hypothesis is that well-being conditions might be to some extent influenced by the built environment and non-motorized travel, which is simultaneously influenced by built environment, configuring a causal mediation relationship.

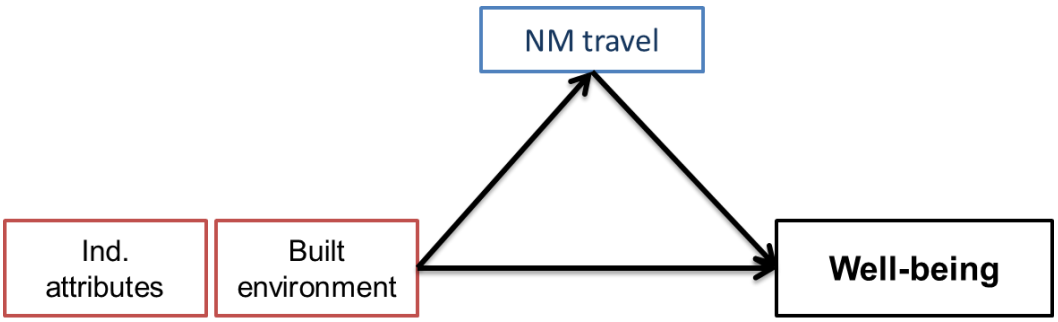

Figure 68. Proposed causal path for joint influence on well-being

For characterizing travel behaviour in this section the variables are treated somewhat differently: based on the frequency for all the listed activity related purposes we can distinguish two main groups: activities that are carried out daily (commuting and business purposes) and activities that are carried out on an occasional basis (other activities) as it can be detailed in Figure 69 and Table 50.

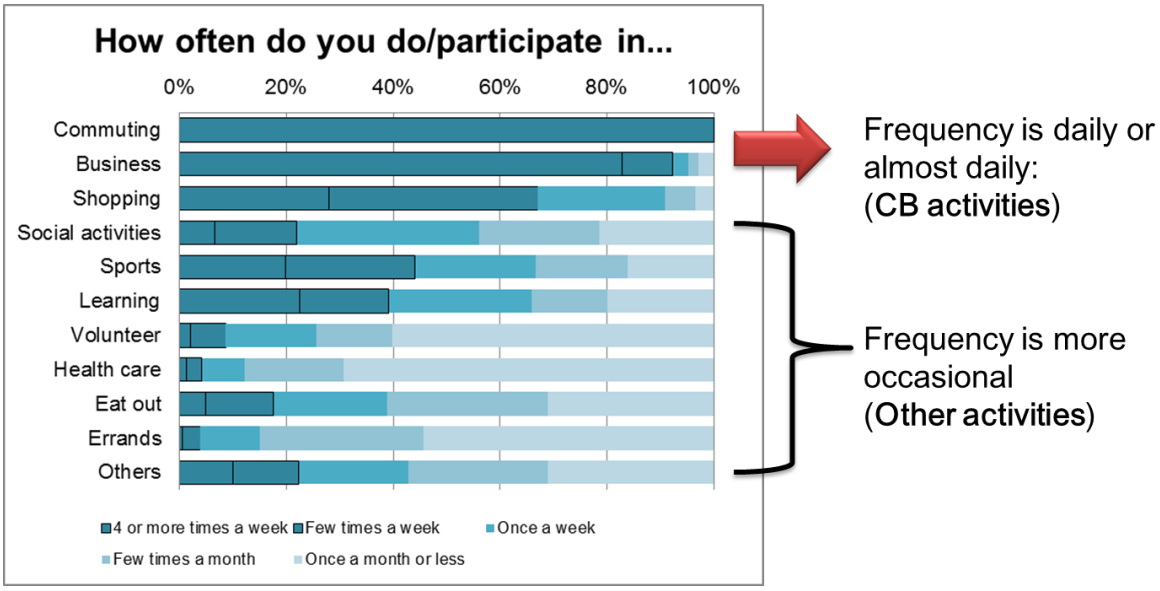

Figure 69. Frequency of trips for different activity purposes

7.3.1 Influence of environment on active travel

By definition, the frequency for commuting and business trips is daily, so a binary-type predicted variable is used in order to represent the possibility of commuting by a non-motorized mode or an active mode. For other activities, the frequency of trip is the intended predicted variable. The description of the frequency of trips for other purposes can be observed in Table 50 and Figure 70.

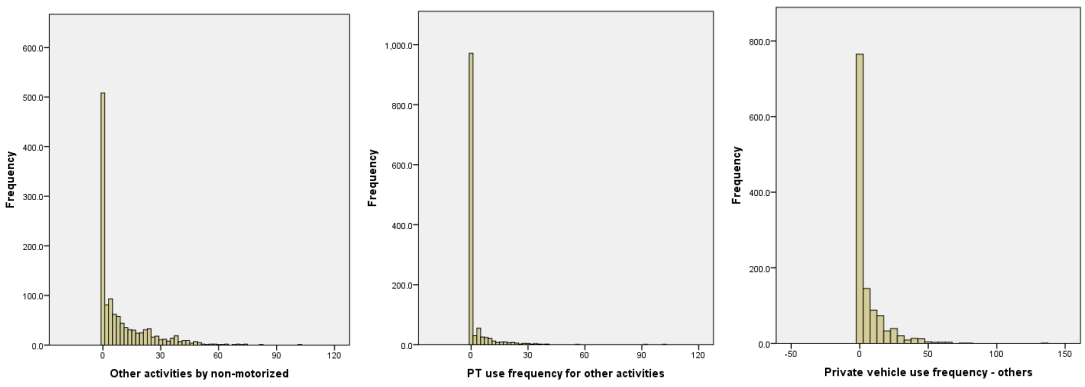

Figure 70. Joint frequency of travel for occasional activities

Table 50. Characterization of travel behaviour

	Min	Max	Mean	SD
Undertakes CB activities (Y/N)	0	1	0.66	0.47
Uses a non-motorized mode	0	1	0.30	0.46
Uses Public Transport	0	1	0.25	0.43
Uses Private Modes	0	1	0.19	0.40
Other activities frequency (Times / month)				
By non-motorized modes	0	101	9.39	13.87
By public transport	0	102	2.27	7.14
By private modes	0	133	6.04	11.77

The Table 51 displays some additional aggregate-level information of the characteristics of trips that respondents make for each one of the listed activities, including distance and percentage of respondents in the sample who choose non-motorized or public transport travel modes.

Table 51. Non-motorized and public transport users by activity

	Dist. (km)	Walk	Bicycle	PT	%NM1	%NM2	%PT1	%PT2
Commuting	8.8	142	136	295	38.3%	22.9%	40.7%	24.3%
Business	17.7	136	36	90	44.0%	14.2%	23.0%	7.4%
Shopping	5.7	357	247	46	59.6%	49.8%	4.5%	3.8%
Leisure	15.2	136	144	154	40.5%	23.1%	22.3%	12.7%
Sports	9.4	249	105	39	66.2%	29.2%	7.3%	3.2%
Learning	10.5	30	23	31	44.2%	4.4%	25.8%	2.6%
Volunteer	8.0	93	42	17	67.8%	11.1%	8.5%	1.4%
Health care	12.7	158	106	63	54.3%	21.8%	13.0%	5.2%
Eat out	7.4	161	86	92	35.8%	20.4%	13.4%	7.6%
Errands	8.6	245	172	46	61.3%	34.4%	6.8%	3.8%
Others	5.2	82	68	59	45.2%	12.4%	17.8%	4.9%

W: Walk for the corresponding activity
B: Uses bicycle for the corresponding activity
PT: Uses public transport for the corresponding activity
%NM1: Relation between number of non-motorized users and the number of participants for each activity
%NM2: Relation between the number of non-motorized users and the total number of respondents in the sample (N = 1213)
%PT1: Relation between number of public transport users and the number of participants for each activity
%PT2: Relation between the number of public transport users and the total number of respondents in the sample (N = 1213)

7.3.2 Joint influence of active travel and built environment on well-being

The next step is to examine which factors of the built environment influence travel behaviour. According to the characterization of travel behaviour that is being considered in this section, two types of models are here employed:

- Commuting / business: By definition, frequency is every day. A binary logit regression was used to find the influence of built environment and individual and household attributes on the decision to commute by non-motorized or public travel mode. The results of the models are displayed in Table 52.

- Other purposes: The total estimated and summed frequency for trips related to leisure, sports, learning, volunteering, health care, eat out, errands or others. A zero-inflated negative binomial regression was employed to determine the influence of built environment and individual and household attributes on the frequency for doing trips with the aforementioned purposes by any non-motorized mode or by public transport. The results of the ZINB models used to predict travel frequencies for other purposes are displayed in Table 53.

Table 52. Logit model results for the influence of built environment on commuting trips by specified modes

Commuting / business	**Non-motorized**		**Public transport**		**Private modes**	
Distance to City hall	-0.03		0.03		-0.02	
Distance to post office	-0.10		-0.02		0.07	
Distance to Kinderg	-0.17		0.12		0.07	
Distance to primary school	-0.08		0.01		0.08	
Distance to junior high school	0.14		-0.07		-0.12	
Distance to senior high school	-0.04		-0.02		**0.10**	**
Distance to hospital	-0.13		0.06		-0.01	
Distance to community centre	0.08		0.01		-0.03	
Distance to train station	0.04		**-0.26**	***	0.04	
Distance to bus stop	0.09		-0.14		-0.15	
Distance to supermarket	0.00		-0.02		-0.10	
Distance to park	0.00		-0.05		0.20	
Time living in your current location	0.00		-0.02		0.00	
Living in house?	-0.52		0.07		-0.72	
Living in apartment?	-0.48		-0.17		-0.65	
Have elevator?	0.23		-0.03		**-0.43**	*
Population density	0.00		**7.8E-05**	***	**-8.9E-05**	***
Residential land use	-0.41		-0.01		0.36	
Commercial land use	0.02		-0.45		0.36	
Industrial land use	-0.36		0.09		**0.74**	*
Gender	**-0.35**	**	0.29		0.01	
Age group	-0.03		-0.14		0.16	
Young adult?	-0.13		0.06		-0.11	
Elderly?	**1.19**	*	-0.29		-0.45	
Household size	**0.21**	**	-0.09		-0.01	
Children in household	-0.35		-0.41		0.14	
Students in household	-0.19		-0.12		0.17	
Elderly in household	**-0.90**	***	**1.08**	***	0.08	
Have a driving license	-0.20		-0.04		**0.87**	*
Have a car	-0.31		**-0.62**	***	**1.57**	***
Income (x1M JPY)	**-0.08**	***	**0.11**	***	-0.03	
	1.81		-0.63		-1.87	
Number of observations	698		698		698	
LR chi2(31)	66.85		125.84		171.69	
Prob > Chi2	0.0002		0		0	
McFadden R2	**0.0696**		**0.1362**		**0.1995**	
Initial log-likelihood	-480.1		-461.9		-430.2	
Final log-likelihood	-446.7		-399.0		-344.4	

Table 53. Results of ZINB regression for the frequency of trips for other activities

Other purposes	**Non-motorized**		**Public transport**		**Private mode**	
CB activities by NM mode	**0.27**	**	-0.27		**-0.32**	**
CB activities by public transport	-0.21		**0.48**	**	**-0.32**	**
CB activities by private mode	**-0.59**	***	-0.35		**0.21**	*
Distance to City hall	-0.01		0.03		-0.01	
Distance to post office	**-0.15**	*	-0.06		-0.04	
Distance to Kinderg	0.10		0.00		-0.05	
Distance to primary school	**-0.20**	***	-0.04		0.05	
Distance to junior high school	0.05		-0.09		-0.05	
Distance to senior high school	-0.03		**0.09**	**	**0.07**	***
Distance to hospital	0.03		0.03		-0.05	
Distance to community centre	0.03		-0.12		0.00	
Distance to train station	**-0.06**	*	0.00		-0.01	
Distance to bus stop	0.04		-0.12		-0.08	
Distance to supermarket	0.02		-0.01		-0.05	
Distance to park	0.01		**-0.27**	*	0.08	
Time living in your current location	0.00		-0.01		**0.01**	*
Living in house?	-0.32		0.16		0.28	
Living in apartment?	-0.33		-0.06		0.35	
Have elevator?	0.09		-0.04		**-0.33**	**
Population density	0.00		0.00		**0.00**	*
Residential land use	-0.15		0.24		-0.06	
Commercial land use	0.11		0.58		0.08	
Industrial land use	0.06		0.56		-0.08	
Gender	**0.24**	**	0.01		0.00	
Age group	-0.03		0.05		0.00	
Young adult?	**-0.40**	**	0.12		**0.42**	***
Elderly?	0.04		0.02		0.23	
Household size	**-0.11**	*	-0.16		**-0.11**	*
Children in household	-0.10		-0.05		-0.04	
Students in household	**0.29**	*	**0.59**	**	0.24	
Elderly in household	**0.28**	*	0.42		-0.05	
Have a driving license	**-0.30**	**	-0.09		0.23	
Have a car	-0.16		**-1.03**	***	**0.35**	**
Income (x1M JPY)	0.02		**0.04**	*	**0.05**	***
Model parameters						
ln alpha	0.48	***	-0.07		-0.17	
alpha	1.61		0.93		0.85	
Vuong test of ZINB vs Standard Negative Binomial						
z	11.28		3.18		4.04	
Pr > z	0.000		0.00		0.0000	
Number of observations	1042		1042		1042	
Non-zero observations	619		210		445	
Zero observations	423		832		597	
LR chi2 (34)	115.5		86.6		98.1	
Prob > chi2	0.000		0.000		0.000	

For the characterization of well-being a set of variables related to emotional condition, self-assessed health, self-perceived health and social capital are employed. Linear regression models are employed to examine which elements of individual attributes, built environment and travel behaviour can influence the dimensions of well-being. Since Social Capital is a binary-type variable (yes / no questions) a binary logit regression model is used. In Table 54 the descriptive statistics of the well-being related variables is listed. The results of the model estimations for all the well-being variables can be observed in Table 55.

Table 54. Variables used to describe well-being

Well-being variable		**Min**	**Max**	**Mean**	**SD**
Emotional condition	Total life satisfaction	9	45	29.0	5.9
	Happiness	1	11	7.2	2.2
Self-assessed health (from SF-36)	Physical component score	5.4	100	73.4	14.8
	Mental component score	3.2	100	69.1	15.8
	Role (social) component score	0.0	100	79.8	16.4
Self perceived health	Health condition	1	5	2.9	0.8
	Health condition compared to previous year	1	5	2.9	0.7
Social Capital	Do you feel others are reliable?	0	1	0.7	0.5
	Do you feel others are helpful?	0	1	0.6	0.5
	Do you engage in other activities (hobby, volunteer)?	0	1	0.1	0.3

Table 55. Joint influence of travel behaviour, built environment and individual attributes on well-being

	SAT	Happiness	PCS	MCS	RCS	Health	Health_0	Reliable	Helpful	Participation
CB activities by NM mode	-0.36	0.02	0.96	0.52	1.78	-0.01	-0.02	0.09	0.12	-0.40
CB activities by public transport	**-0.83** *	-0.02	0.30	-0.06	2.01	-0.07	-0.08	0.02	0.00	-0.21
CB activities by private mode	-0.66	-0.07	0.94	0.74	2.18	-0.08	-0.04	-0.12	-0.05	-0.14
Other activities by NM mode	**0.03** **	**0.01** ***	0.05	**0.08** **	0.00	**0.01** ***	**0.01** ***	0.00	**0.02** ***	**0.03** ***
Other activities by public transport	0.01	0.00	-0.01	-0.01	-0.06	0.00	0.00	0.00	0.01	**0.03** **
Other activities by private mode	0.02	**0.02** **	0.00	0.00	-0.02	**0.01** **	0.00	0.01	0.01	**0.03** ***
Distance to City hall	0.04	0.02	0.05	0.12	0.06	0.01	0.00	-0.02	0.01	-0.04
Distance to post office	-0.32	-0.02	-0.63	-0.65	-0.72	-0.06	-0.03	-0.04	0.08	0.04
Distance to Kinderg	0.15	0.03	-0.21	-0.14	-0.33	0.04	0.01	0.09	**0.15** *	-0.08
Distance to primary school	**-0.36** *	**-0.13** *	-0.51	-0.69	**-1.26** **	-0.01	0.03	**-0.14** *	-0.03	**0.22** **
Distance to junior high school	0.19	0.09	0.48	0.65	**0.87** *	0.02	0.02	-0.06	-0.05	-0.11
Distance to senior high school	0.00	-0.02	0.18	0.13	0.16	0.00	-0.01	**0.08** **	0.04	0.02
Distance to hospital	-0.03	0.02	0.20	0.02	0.21	0.00	0.00	-0.01	-0.05	**-0.17** *
Distance to community centre	-0.17	-0.05	**-1.38** ***	**-1.28** ***	**-1.59** ***	**-0.06** ***	-0.01	-0.01	**-0.10** *	-0.11
Distance to train station	0.03	0.00	-0.31	-0.37	-0.26	0.00	0.00	-0.02	-0.03	0.03
Distance to bus stop	0.15	-0.10	0.33	0.39	0.81	0.02	-0.01	0.14	-0.12	-0.07
Distance to supermarket	0.08	-0.08	0.27	0.22	0.48	0.04	0.03	-0.07	-0.03	-0.02
Distance to park	**-0.66** **	**-0.30** ***	-0.64	-0.80	-0.66	-0.01	0.00	-0.02	-0.02	0.13
Time living in your current location	0.00	-0.01	0.00	-0.01	0.02	0.00	0.00	0.00	0.01	0.00
Living in house?	-1.17	-0.26	-4.09	-3.79	-4.09	**-0.29** *	**-0.32** **	-0.53	-0.39	**-1.17** **
Living in apartment?	**-2.70** **	-0.32	-3.16	-3.22	-2.65	**-0.34** **	-0.25	-0.69	-0.41	**-0.90** *

	SAT	Happiness	PCS	MCS	RCS	Health	Health_0	Reliable	Helpful	Participation
Have elevator?	**1.91** ***	-0.01	-0.18	-0.01	0.33	0.08	0.00	0.12	0.27	-0.16
Population density	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residential land use	0.31	-0.09	0.46	0.18	-0.05	-0.03	-0.10	-0.10	**-0.64** **	-0.38
Commercial land use	-0.02	-0.21	**-3.56** *	**-3.73** *	**-4.83** **	-0.06	-0.11	-0.10	**-0.57** *	-0.44
Industrial land use	-0.11	-0.10	-1.77	-1.45	-2.36	-0.03	-0.06	-0.04	-0.38	0.08
Gender	-0.23	**-0.61** ***	-0.15	-1.30	-0.21	**-0.11** **	0.01	**-0.35** **	**-0.40** ***	**-0.38** *
Age group	0.12	**0.18** **	0.29	1.02	0.12	-0.03	0.00	**0.35** ***	**0.23** **	**0.36** ***
Young adult?	**1.85** ***	**0.57** ***	0.66	0.78	-0.31	**0.14** *	**0.16** **	**0.47** **	0.33	0.12
Elderly?	**2.54** ***	0.42	2.28	3.58	2.43	0.03	0.07	0.09	0.00	**0.68** *
Household size	-0.27	-0.01	-0.14	-0.01	-0.19	0.00	-0.01	-0.03	0.09	0.18
Children in household	**1.47** **	**0.64** ***	1.07	1.01	1.43	0.10	-0.01	**0.68** ***	0.22	**0.53** *
Students in household	0.16	-0.13	**2.71** *	1.69	**2.95** *	0.09	0.06	**0.76** ***	0.38	0.42
Elderly in household	-0.21	-0.28	-0.51	-0.79	-0.19	0.03	-0.09	-0.21	-0.15	-0.03
Have a driving license	-0.55	0.14	1.61	1.25	2.25	0.13	-0.01	0.19	0.12	0.01
Have a car	**0.84** *	0.10	0.34	0.35	0.42	0.06	-0.02	**0.32** *	0.17	0.29
Income (x1M JPY)	**0.29** ***	**0.10** ***	**0.36** ***	**0.40** ***	**0.34** **	**0.02** ***	**0.02** **	0.00	-0.02	-0.01
Constant	28.76	6.47	74.65	68.47	80.85	3.07	3.08	-0.48	-0.25	-2.80
F (37, 1004) / LR chi2 (37)	4.13	4.12	2.07	2.21	2.34	2.28	1.46	73.97	69.16	119.25
Prob > F / Prob > Chi2	0	0	0.0002	0.0001	0	0	0.0373	0.0003	0.001	0
R-squared / McFadden R2	0.132	0.1318	0.0708	0.0752	0.0795	0.0776	0.0512	0.0573	0.0508	0.1366

7.3.3 Additional remarks

Regarding the active travel, it is observed that women have more prevalence for undertaking commuting or business activities by non-motorized modes in comparison with men, as well as low-income segments of population do; yet male respondents are more likely to use non-motorized modes for other activities Furthermore, having elderly members in household makes the chances of non-motorized CB activities decrease. The more members there are in respondents' household the more likely it is that respondents will undertake commuting non-motorized trips. On the other hand, in smaller households with few members, respondents are more likely to make non-motorized trips for other purposes different than commuting business.

The influence of non-motorized CB trips by the built environment is relatively limited. As for public transport, commuters who use public transport tend to use public transport for other activities as well. Higher values of population density was found to be influential for the use of public transport to commute and discourage the use of private modes for commuting trips, which support similar findings in the way. Denser populated environments make more difficult and more expensive to use cars to the limited space availability in dense urban areas.

It is evident from the results that different elements of the built environment, individual attributes and travel behaviour will have different influence depending on which type of well-being variables are examined.

The proximity of parks and primary schools, being between 18 and 35 years old, having children in household, higher income and a higher non-motorized frequency for other purposes is positively influential on the emotional condition of the respondents. The proximity to a community centre is highly influential for the health-related quality of life, i.e. beneficial for physical, mental and social health.

Regarding travel behaviour, the influence of active travel for other purposes is positively influential for almost all the aspects of well-being, and much more important than commuting trips in comparison. Non-motorized trips for other activities are much more important for health and well-being than commuting related trips.

Considering the abovementioned main findings, we can note that mainly office workers and residents of residential-only neighbourhoods could be considered at higher risk of social exclusion, from the perspective of a worse mental and social health. These factors – either separated or in combination - , make people undertake less activities in their surrounding environment; which is reflected into less walking and cycling for leisure purposes, less social contact with neighbours and friends in the community and the need to

travel longer distances to do things such as shopping, engage in any leisure activities or do other different activities than the main occupation. From our results we could observe how these issues can impact negatively well-being.

On the other hand, women without a full-time job, elderly people and people living in mixed land-use areas in general, together with park users and community centre users in particular were found to be among the less vulnerable groups from the same point of view, considering health-related quality of life. They can more easily access various services (e.g. shopping) and activities (e.g. go to the park, eat out, meet with friends and neighbours, etc.) than other members of the community, considering that they do have more available time for leisure activities than full-time workers and can do several activities within a short distances that are easy to reach by walking or cycling.

7.4 Park usage and its contributions to health-related QOL

The promotion of healthy lifestyles and healthy environments are fundamental for the establishment of healthy cities where people mutually support each other in performing all the functions of life and in developing to their maximum potential.

In many cities around the globe it is generally possible to find different types of parks which may offer different health benefits; from small neighbourhood parks, which may

contribute to social interaction and physical activity, to larger parks that can perform important ecological functions and provide citizens with more intense and beneficial contacts with nature (APA, 2007). It has been agreed that outdoor recreation activities, including increased walking (Cohen et al., 2007), jogging and cycling, may be the best source of physical activity for the population in general and particularly for population segments such as older people, as it can be incorporated in daily life (Oglivie et al., 2006; Dalton et al., 2016).

It has been similarly agreed that there are potential health benefits of greenspace exposure which include opportunities to participate in activities within the space and psychological benefits of viewing and interacting with nature (Lachowycz and Jones, 2013). However, there is less clarity regarding the causal mechanisms that would clarify the answer to questions related to why and how these health benefits can be observed (Lachowycz and Jones, 2013), as well as more detailed knowledge of the processes and the relationships between health, well-being and the use of greenspaces involved (Dinnie et al., 2013).

On the other hand, despite the existence of a large body of evidence suggesting the positive effects of urban green spaces, many studies that tried to assess links between urban green spaces and health benefits have found weak, inconsistent, and occasionally

contradictory results (Lee and Maheswaran, 2011). Hidden or included effects of density and accessibility, as well as differential effects for separate population groups, depending upon the urban features analysed may be a reason for that absence of significant associations (Melis et al., 2015). Therefore, more detailed studies are required to bring more clarity to these apparently contradictory issues, as evidenced in the previous chapter.

Considering the above mentioned issues, this chapter aims to clarify the following research questions: 1) does the use of parks change among people in different demographic groups considering type and frequency of activities that users undertake?, 2) Are there any differences for the use of infrastructure in the park among demographic groups?, 3) Is satisfaction with different features of the parks likely to change among groups of users and if so, how do these park features (i.e. infrastructure) contribute to the changes?, 4) do park usage and satisfaction with park influence changes in the respondents' well-being indicators?, and 5) are there any influences of built environment features of Japanese cities related to park location on the park usage?.

For this purpose we consider well-being as the main observed category, which includes subjective measurements (i.e. self-assessment) of health in physical, mental and social aspects; as well as happiness and life satisfaction as well-being indicators. In addition, the practice of health habits by the respondents is also considered as part of the

well-being assessment for the purposes of this publication. It should be remarked the consideration that the concept of well-being, as opposed to health, means that it is experienced subjectively as a dynamic process rather than a fixed state (Dinnie et al., 2013).

7.4.1 Research framework and basic features

According to the research questions that were discussed in the introduction section, the framework for this research is based in some basic assumptions: from using a park and enjoying its benefits, a person will be likely to enjoy a better condition, thus experience positive changes in well-being and health indicators in comparison with non-park users. The quality of the experience in the park is also influenced by the activities, as well as by the type quality of the infrastructure that users find in the places they visit (i.e. how well the parks are suited for the activities that visitors wish to do over there). In addition, individual attributes and built environment attributes (i.e. geographical) might have an influence over an individual's decision of using a park. A more detailed scheme of the proposed connections among these elements can be observed in Figure 71.

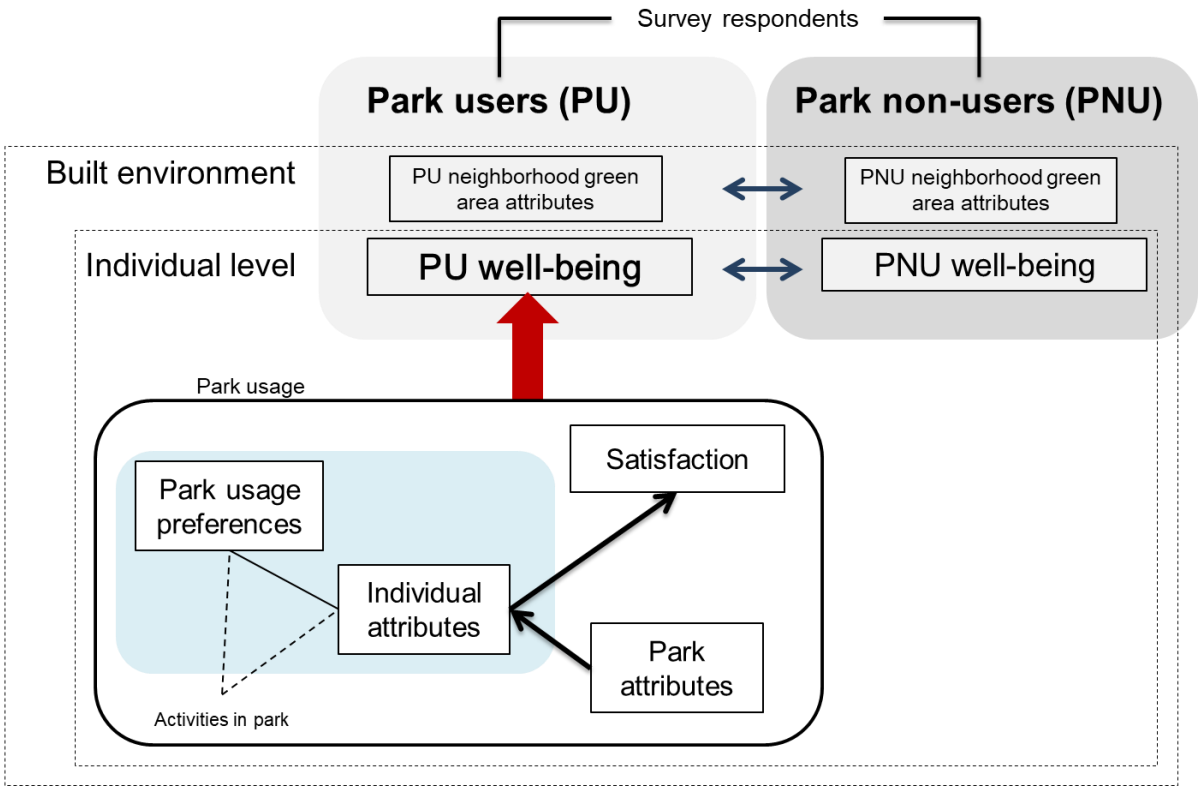

Figure 71. Framework for this section: influence of park usage in well-being

Eight main demographic groups have been distinguished by considering gender (male - M, female - F) and age group: non-adults (15 to 19 years old – M1, F1), young adults (20 to 39 years old – M2, F2), senior adults (40 to 64 years old – M3, F3) and elderly adults (over 65 years old - M4, F4). The number and distribution of respondents according to demographic group and park visiting status (i.e. visit, not visit) is shown in Figure 72. In Table 56 the main features of the individual attributes can be observed, i.e. the percentage of respondents in each demographic group that are office workers (the most common reported occupation), householders, living alone, as well as the average time of residence in the current location. In the last column, the percentage of respondents in each

demographic group that visit a park(s) can be observed as well. In this context, "visit a park" refers to users who do at least one of the listed activities in a park (see Table 57). It is worth remarking that the respondents can choose in the questionnaire more than one activity, and include all those in the list that are considered a good fit to describe their occasional or usual park routines.

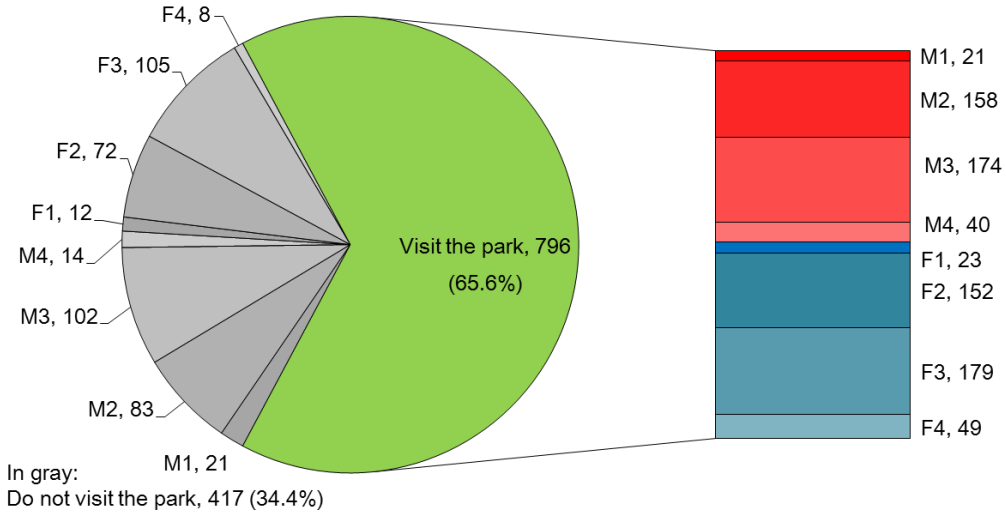

Figure 72. Distribution of the sample between park users and non-users

Table 56. Characteristics of each demographic group

Demographic group		N	Office worker?	Householder?	Lives alone?	Years living in the place		Park visitors within demographic group	
						Mean	SD		
M1	Male 15 – 19	42	4.8%	21.4%	26.2%	9.5	7.0	21	50.0%
M2	Male 20 – 39	241	60.6%	78.8%	32.0%	8.6	9.8	158	65.6%
M3	Male 40 – 64	276	61.6%	92.8%	18.8%	15.3	13.1	174	63.0%
M4	Male 65 -	54	13.0%	96.3%	1.9%	25.7	15.3	40	74.1%
	Male total	**613**						**393**	**64.1%**
F1	Female 15 – 19	35	0.0%	11.4%	14.3%	9.3	6.1	23	65.7%
F2	Female 20 – 39	224	29.0%	24.1%	18.3%	7.7	8.6	152	67.9%
F3	Female 40 – 64	284	21.1%	20.8%	14.4%	13.7	11.3	179	63.0%
F4	Female 65 -	57	0.0%	19.3%	10.5%	22.1	13.3	49	86.0%
	Female total	**600**						**403**	**67.2%**
	Total	**1213**	**37.1%**	**52.3%**	**19.3%**	**12.6**	**12.0**	**796**	**65.6%**

A list of possible activities to do in a park was included in the questionnaire for respondents to select which ones they do when they go to a park. Details of the activities and how many respondents undertake each one of the activities are shown in Table 57.

Table 57. Activities in the park by frequency and demographic group

Code	Activity	Number of participants			%A	%B
		Male	Female	Total		
A1	Sports w/ direct ball collision (soccer, basketball volleyball, etc.)	11	25	36	3.0%	4.5%
A2	Sports w/ no direct ball collision (tennis, run, etc.)	24	47	71	5.9%	8.9%
A3	Calm sports (badminton, table tennis, jog, swim)	65	53	118	9.7%	14.8%
A4	Do social activities in the park	23	28	51	4.2%	6.4%
A5	Spend time with family in the park	18	23	41	3.4%	5.2%
A6	Take a walk in the park	245	275	520	42.9%	65.3%
A7	Walk your dog in the park	58	45	103	8.5%	12.9%
A8	Take a rest in the park	118	122	240	19.8%	30.2%
A9	Look after a child in the park	107	91	198	16.3%	24.9%
A10	Do exercise	59	119	178	14.7%	22.4%
A11	Enjoy nature	185	143	328	27.0%	41.2%
A12	Enjoy talking	98	38	136	11.2%	17.1%
A13	Other activities	18	8	26	2.1%	3.3%

%A: Percentage of the total sample (1213), %B: Percentage of park visitors (796)

In Table 58 we can observe the percentage of park visitors by demographic group who find the following list of facilities in the parks they visit: *circulation* facilities (P1), *landscape* facilities (P2), *recreation* facilities (P3), *amusement* facilities (P4), facilities for *sports* (P5), *service* areas (P6), *management* facilities (P7) and *security* facilities (P8) respectively. In addition, other details related to park usage such as the preferences for access travel mode, preference of one park or several, and have accompany when using the park are shown in

Table 59, which are also sorted by demographic group. The results of the ANOVA test for difference among demographic groups can be also observed in those tables.

Table 58. Park infrastructure usage by demographic group

Group \ Facilities →	P1	P2	P3	P4	P5	P6	P7	P8
M1	86%	48%	62%	29%	5%	10%	5%	0%
M2	87%	49%	65%	55%	19%	11%	23%	18%
M3	89%	66%	68%	54%	31%	18%	34%	21%
M4	90%	83%	70%	55%	20%	10%	20%	15%
F1	74%	35%	74%	39%	17%	4%	13%	17%
F2	84%	66%	78%	64%	25%	17%	27%	15%
F3	80%	75%	77%	59%	23%	15%	27%	18%
F4	90%	76%	82%	47%	20%	6%	22%	10%
Total	85%	65%	72%	56%	23%	14%	26%	17%
ANOVA test (df = 7)								
F value	1.40	**6.67**	**1.98**	**2.34**	**1.81**	1.44	**2.23**	1.26
p-value	0.203	**0.000**	**0.055**	**0.023**	**0.082**	0.185	**0.030**	0.267

Types of facilities: *circulation* (P1), *landscape* (P2), *recreation* (P3), *amusement* (P4), *sports* (P5), *services* (P6), *management* (P7) and *security* (P8). Percentage values indicate the proportion of users within each demographic group who find the corresponding facilities in the parks that they visit.

Table 59. Preferences for park usage by demographic group

Group	Visit only one park?	Does some activities in the park alone	Does activities in the park accompanied	Does all the activities in the park alone	Goes to the park by walking / cycling	Goes to the park by using a vehicle
M1	29%	81%	33%	82%	90%	14%
M2	48%	57%	68%	56%	87%	20%
M3	39%	72%	57%	59%	88%	19%
M4	20%	75%	58%	57%	95%	15%
F1	35%	57%	74%	46%	96%	4%
F2	45%	43%	80%	46%	86%	20%
F3	35%	60%	67%	55%	88%	19%
F4	27%	69%	69%	44%	96%	14%
Total	39%	61%	67%	55%	89%	18%
ANOVA test (df = 7)						
F value	2.84	5.99	4.75	4.75	1.02	0.70
p-value	0.006	0.000	0.000	0.000	0.413	0.668

It should be noted that the variables that are assessed in the columns of Table 3, 4 and 5 do not correspond to necessarily mutually-exclusive categories. For instance, if a respondent does more than one activity in the park (see Table 5), some of these activities might be performed alone and others in accompany (for example, a person who takes

walks in the park alone and also plays tennis – something that requires company). In that case, the person will be counted in both groups "Does some activities in the park alone" and "Does activities in the park accompanied" simultaneously. In addition, there were no respondents who manifested that they do all their activities in the park accompanied by someone. The same situation applies for the travel mode to access the park(s): if two or more parks are visited for different activities, a person might use both non-motorized (walking and cycling) or a vehicle to go to different parks, depending on the location and the activity. In that case, that respondent will appear registered as someone who "*goes to the park by walking / cycling*" and "*goes to the park by using a vehicle*" simultaneously.

7.4.2 Park-related satisfaction

The respondents' satisfaction regarding several aspects of park usage (size, health-related equipment, other type of non-health-related equipment, nature function, location, access, other users' manners, management tasks, overall satisfaction) was surveyed and the distribution of results can be observed in Figure 73. The variation of respondents' average satisfaction values differentiated by age group and gender can be observed in Figure 74.

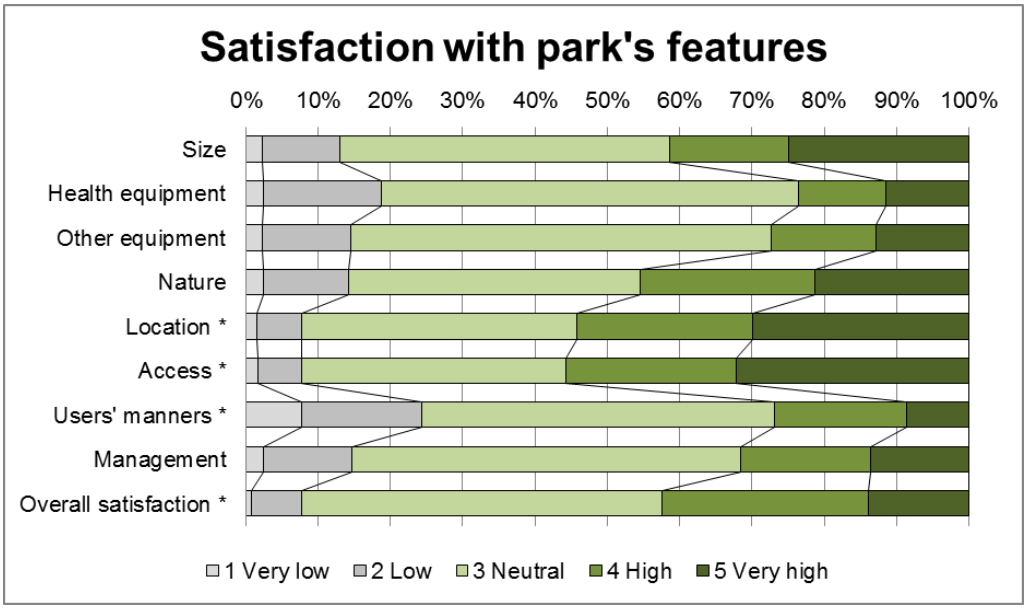

Figure 73. Satisfaction with park's features

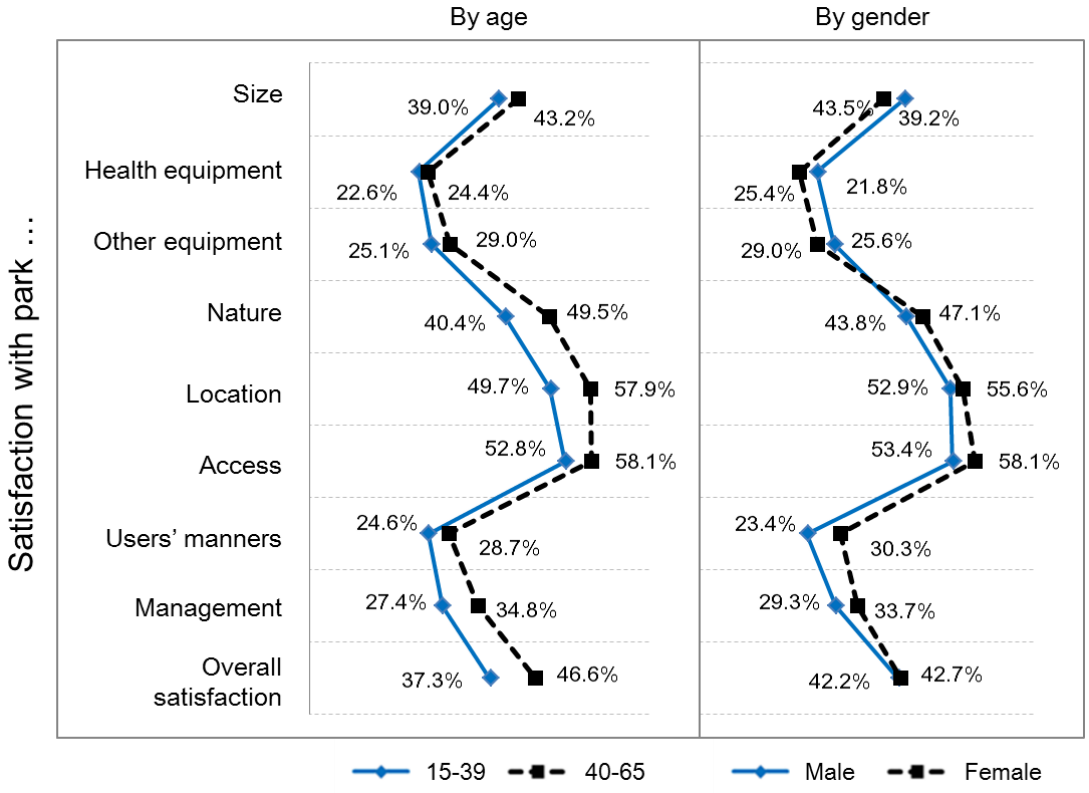

Figure 74. Satisfaction with park's features differentiated by age and gender of park visitors.

The percentages correspond to the proportion of park visitors within each group who answered "high" or "very high" to their satisfaction regarding each aspect.

Based on the Pearson Chi-Square test values, statistically significant differences between age groups were found for nature ($\chi 2 = 10.53$, df = 4, $p = 0.032$), location ($\chi 2 = 12.76$, df = 4, $p = 0.012$), management ($\chi 2 = 10.9$, df = 4, $p = 0.027$) and for users' manners between gender groups ($\chi 2 = 10.8$, df = 4, $p = 0.029$). Other aspects of satisfaction do not report statistically significant differences between groups.

7.4.3 Infrastructure of park infrastructure on park satisfaction

In this section, we make use of path analysis techniques in order to assess the magnitude and significance of the influence of different types of park infrastructure (P1 – P8) on the different aspects of park satisfaction that were previously detailed (see Figure 75). To clarify whether these effects are influenced by age, we make three estimations: one for all the respondents in the sample who are park users, one for teenagers and young adults (M1, M2, F1, F2) and one for senior and elderly adults (M3, M4, F3, F4). The estimation results of these three path analysis estimations can be observed in Table 60, where the existence of causal connections is highlighted in bold.

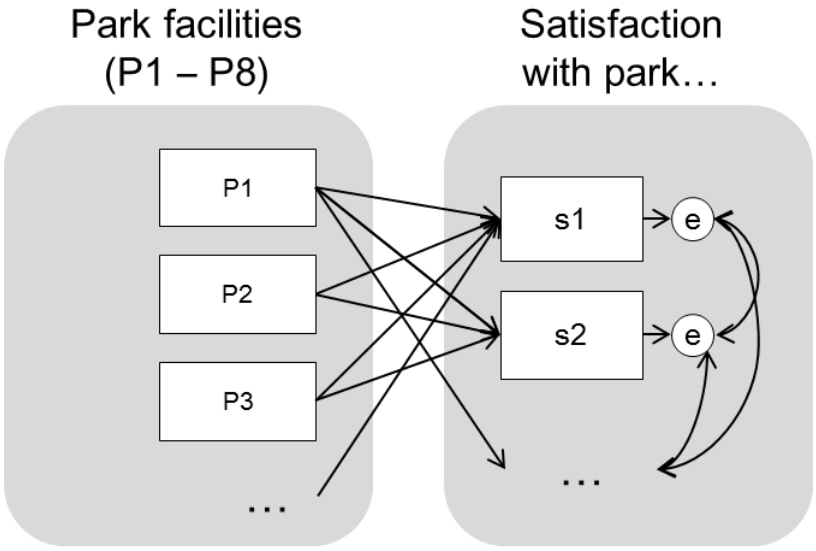

Figure 75. Path analysis structure to understand the influence of park infrastructure on aspects of park satisfaction

Table 60. Influence of park infrastructure on aspects (P1 – P8) on aspects of park satisfaction

	Satisfaction with park's …	All park users		Young (<39 years old)		Senior (>40 years old)	
		Estimate	p-value	Estimate	p-value	Estimate	p-value
P1	**Influence from circulation facilities**						
	Size	**0.10**	**0.004*****	**0.09**	**0.093***	**0.11**	**0.015****
	Health equipment	0.02	0.676	-0.04	0.405	0.06	0.197
	Other equipment	0.02	0.523	-0.04	0.42	0.07	0.116
	Nature	0.05	0.167	**0.08**	**0.098***	0.02	0.669
	Location	0.04	0.308	0.05	0.341	0.03	0.516
	Access	-0.03	0.44	-0.04	0.468	-0.01	0.794
	Users' manners	0.00	0.918	0.02	0.686	-0.02	0.635
	Management	0.01	0.768	0.00	0.939	0.02	0.651
	Overall satisfaction	0.05	0.142	0.03	0.561	0.07	0.11
P2	**Influence from landscape facilities**						
	Size	**0.14**	**0.000*****	**0.15**	**0.004*****	**0.13**	**0.006*****
	Health equipment	**0.07**	**0.048****	**0.13**	**0.012****	0.02	0.72
	Other equipment	**0.08**	**0.027****	**0.10**	**0.067***	0.06	0.171
	Nature	**0.15**	**0.000*****	**0.12**	**0.016****	**0.15**	**0.001*****
	Location	**0.13**	**0.000*****	**0.10**	**0.051***	**0.13**	**0.006*****
	Access	**0.08**	**0.016****	0.03	0.532	**0.11**	**0.014****
	Users' manners	**0.09**	**0.01****	0.07	0.159	**0.09**	**0.045****
	Management	**0.12**	**0.000*****	0.08	0.135	**0.14**	**0.002*****
	Overall satisfaction	**0.13**	**0.000*****	0.05	0.308	**0.16**	**0.000*****
P3	**Influence from recreation facilities**						
	Size	0.05	0.193	0.02	0.769	0.07	0.145
	Health equipment	0.01	0.79	0.00	0.973	0.02	0.632
	Other equipment	0.05	0.127	0.06	0.233	0.04	0.337
	Nature	0.05	0.116	0.06	0.226	0.05	0.317
	Location	**0.10**	**0.006*****	0.08	0.15	**0.12**	**0.009*****
	Access	**0.09**	**0.013****	**0.12**	**0.017****	0.06	0.213

Table 60. Influence of park infrastructure on aspects (P1 – P8) on aspects of park satisfaction

	Satisfaction with park's …	All park users		Young (<39 years old)		Senior (>40 years old)	
		Estimate	p-value	Estimate	p-value	Estimate	p-value
	Users' manners	-0.01	0.88	0.02	0.686	-0.03	0.555
	Management	0.05	0.134	0.08	0.105	0.02	0.695
	Overall satisfaction	**0.08**	**0.018****	**0.12**	**0.024****	0.05	0.261
P4	**Influence from amusement facilities**						
	Size	**-0.10**	**0.003*****	-0.08	0.127	**-0.12**	**0.01****
	Health equipment	**-0.07**	**0.059***	-0.07	0.196	-0.07	0.163
	Other equipment	**-0.11**	**0.001*****	-0.08	0.135	**-0.14**	**0.003*****
	Nature	**-0.11**	**0.001*****	**-0.09**	**0.068***	**-0.12**	**0.012****
	Location	0.03	0.35	**0.13**	**0.011****	-0.04	0.37
	Access	**0.08**	**0.021****	**0.18**	**0.000*****	0.00	0.956
	Users' manners	-0.01	0.722	-0.01	0.825	-0.01	0.813
	Management	**-0.06**	**0.098***	-0.07	0.16	-0.04	0.425
	Overall satisfaction	**-0.09**	**0.011****	-0.07	0.168	**-0.09**	**0.044****
P5	**Influence from sport facilities**						
	Size	**0.11**	**0.002*****	**0.11**	**0.033****	**0.10**	**0.035****
	Health equipment	**0.11**	**0.002*****	**0.12**	**0.02****	**0.10**	**0.031****
	Other equipment	**0.12**	**0.000*****	**0.14**	**0.008*****	**0.11**	**0.02****
	Nature	**0.09**	**0.008*****	**0.08**	**0.098***	**0.08**	**0.07***
	Location	0.05	0.178	0.03	0.559	0.05	0.271
	Access	0.03	0.436	0.01	0.848	0.03	0.519
	Users' manners	0.01	0.839	0.02	0.759	0.00	0.952
	Management	-0.02	0.500	-0.02	0.688	-0.04	0.442
	Overall satisfaction	0.05	0.132	0.01	0.84	0.07	0.154
P6	**Influence from service areas**						
	Size	**0.08**	**0.024****	**0.14**	**0.008*****	0.03	0.563
	Health equipment	**0.08**	**0.016****	0.07	0.200	**0.09**	**0.056***
	Other equipment	**0.09**	**0.014****	**0.10**	**0.057***	0.07	0.159
	Nature	**0.15**	**0.000*****	**0.21**	**0.000*****	**0.11**	**0.022****
	Location	0.02	0.587	0.07	0.173	-0.01	0.81
	Access	**-0.07**	**0.047****	0.01	0.821	**-0.12**	**0.007*****
	Users' manners	**0.12**	**0.000*****	**0.13**	**0.013****	**0.12**	**0.012****
	Management	**0.12**	**0.000*****	**0.15**	**0.004*****	**0.08**	**0.07***
	Overall satisfaction	**0.10**	**0.006*****	**0.17**	**0.000*****	0.05	0.334
P7	**Influence from management facilities**						
	Size	**0.07**	**0.038****	0.08	0.109	0.07	0.121
	Health equipment	0.00	0.919	-0.02	0.746	0.00	0.996
	Other equipment	0.05	0.184	-0.01	0.93	**0.08**	**0.073***
	Nature	0.03	0.382	0.02	0.738	0.05	0.302
	Location	0.05	0.176	0.03	0.541	0.06	0.200
	Access	**0.11**	**0.001*****	0.04	0.397	**0.16**	**0.000*****
	Users' manners	-0.06	0.116	-0.05	0.356	-0.06	0.228
	Management	**0.06**	**0.092***	0.04	0.444	**0.08**	**0.087***
	Overall satisfaction	**0.09**	**0.014****	**0.11**	**0.04****	**0.08**	**0.097***
P8	**Influence from emergency facilities**						
	Size	**0.08**	**0.027****	0.02	0.649	**0.13**	**0.007*****
	Health equipment	**0.10**	**0.003*****	0.07	0.203	0.06	0.183
	Other equipment	0.03	0.376	-0.01	0.842	0.05	0.324

Table 60. Influence of park infrastructure on aspects (P1 – P8) on aspects of park satisfaction

Satisfaction with park's …	All park users		Young (<39 years old)		Senior (>40 years old)	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
Nature	0.04	0.286	0.03	0.504	0.05	0.321
Location	**0.06**	**0.065***	**0.09**	**0.099***	0.00	0.999
Access	0.03	0.428	0.07	0.173	0.02	0.753
Users' manners	0.02	0.504	0.04	0.45	**0.14**	**0.002*****
Management	**0.10**	**0.003*****	0.06	0.237	**0.12**	**0.012****
Overall satisfaction	**0.06**	**0.089***	0.06	0.286	0.07	0.158
Model indicators						
Number of observations	796		442		354	
Chi-square (df =28)	974.85		451.34		545.82	
Probability level	<0.001		<0.001		<0.001	
Goodness of fit (GFI)	0.828		0.822		0.831	

Significant at *: 90% level, **: 95% level or ***: 99% level.

From the results of Table 6, notorious differences between the causal links structure for population groups can be observed, where especially the influence from landscape facilities and amusement facilities on park satisfaction is associated with different statistically significant causal paths between young and senior adults.

7.4.4 Infrastructure of park infrastructure on park satisfaction

In this section we assess the joint influence of park attributes, park usage, and satisfaction with park and individual attributes on well-being of the population. To achieve this, we apply structural equation modelling (SEM) with latent variables to estimate the model shown in Figure 76. Specifically in this model, five latent constructs are considered for the structural model. A full version of SEM consists of structural equations and measurement equations. Structural equations define the relationships between latent variables, and measurement equations are used to answer whether and how much each

latent variable can be used to explain observed variables (Jöreskog and Sörbom, 1989; Golob, 2003).

In Figure 76 the structural model can be observed. The results for the structural and measurement model can be observed in Table 61. In addition, the results of the standardized direct, indirect and total effects among the latent constructs of the model can be observed in Table 62.

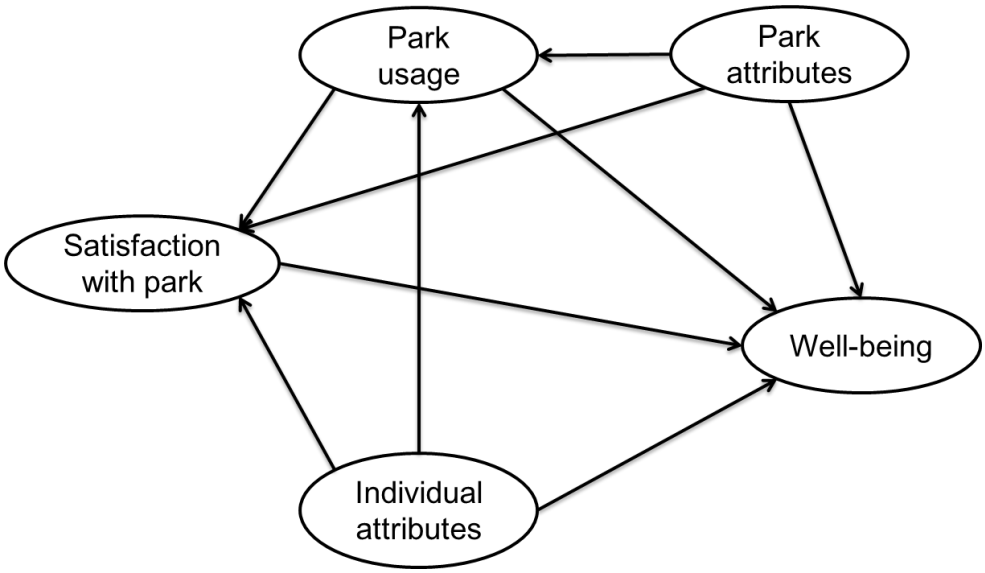

Figure 76. Proposed Structural Equation Model for the influence of park usage on well-being

Table 61. Results of structural equation model

	Model 1: All park users		Model 2: Younger adults (under 39)		Model 3: Older adults (over 40)	
	Parameter		Parameter		Parameter	
Structural model						
Park attributes →Park usage	**-0.171**	***	**-0.226**	*	**-0.242**	**
Ind. attributes → Park usage	**0.149**	**	**0.282**	***	0.085	
Park attributes → Satisfaction with park	**0.392**	***	**0.388**	**	**0.390**	***
Ind. attributes → Satisfaction with park	-0.023		-0.025		0.127	
Park usage → Satisfaction with park	**0.092**	**	0.103		0.066	
Satisfaction with park → Well-being	**0.141**	***	**0.221**	***	0.071	

Table 61. Results of structural equation model

	Model 1: All park users		Model 2: Younger adults (under 39)		Model 3: Older adults (over 40)	
	Parameter		Parameter		Parameter	
Park attributes → Well-being	0.081		0.031		**0.130**	*
Individual attributes → Well-being	0.007		-0.037		0.056	
Park usage → Well-being	**-0.083**	**	**-0.157**	**	0.049	
Measurement model						
Well-being						
PCS – Physical health	0.997		0.996		0.997	
MCS – Mental health	0.949	***	0.956	***	0.947	***
RCS – Social health	0.943	***	0.935	***	0.95	***
Happiness	0.319	***	0.396	***	0.252	***
Life satisfaction	0.456	***	0.452	***	0.461	***
Park attributes (infrastructure)						
Circulation	0.176		0.135		0.208	
Landscape	0.489	***	0.528	**	0.442	***
Recreation	0.468	***	0.458	**	0.465	***
Amusement	0.259	***	0.268	**	0.239	***
Sports	0.481	***	0.515	**	0.449	***
Services	0.603	***	0.6	**	0.617	***
Management	0.726	***	0.73	**	0.726	***
Other facilities	0.55	***	0.543	**	0.559	***
Satisfaction with park						
Management	0.7		0.708		0.693	
Users' manners	0.5	***	0.517	***	0.489	***
Access	0.542	***	0.486	***	0.588	***
Location	0.658	***	0.587	***	0.711	***
Nature	0.805	***	0.794	***	0.81	***
Other equipment	0.799	***	0.838	***	0.767	***
Health equipment	0.76	***	0.819	***	0.71	***
Size	0.807	***	0.784	***	0.822	***
Individual attributes						
Gender	0.553		0.629			
Age	-0.079				0.985	
Office Worker (Y/N)	0.662	***	0.549	***	-0.269	
Living Alone (Y/N)	0.208	***	0.289	***	-0.142	
Park usage						
Go alone	0.694		0.696		0.227	
Visit only 1 park	-0.054		-0.042		0.039	
Go by walk or bicycle	0.346	***	0.205	***	0.796	***
Go by vehicle	-0.367	***	-0.24	***	-0.905	***
Go to park with others	-0.761	***	-0.847	***	-0.297	***
Model features						
Number of observations	796		354		442	
Chi-2	3383.3		1656.7		1866.9	
p-value	<0.001		<0.001		<0.001	
GFI	0.779		0.761		0.775	
AGFI	0.740		0.718		0.734	
RMSEA	0.097		0.100		0.096	

Significant at *: 90% level, **: 95% level or 99%***:
Significant at *: 90% level, **: 95% level or ***: 99% level. GFI = 0.779; AGFI = 0.740.
(+) Parameter fixed during the model estimation

Table 62. Standardized effects among latent constructs

	Effects	Individual attributes	Park attributes	Park usage	Satisfaction - park	Well-being
Park usage	Direct	0.149	-0.171	0	0	0
	Indirect	0	0	0	0	0
	Total	0.149	-0.171	0	0	0
Satisfaction - park	Direct	-0.023	0.392	0.092	0	0
	Indirect	0.014	-0.016	0	0	0
	Total	-0.01	0.376	0.092	0	0
Well-being	Direct	0.008	0.08	-0.083	0.14	0
	Indirect	-0.014	0.067	0.013	0	0
	Total	-0.005	0.147	-0.07	0.14	0

From the SEM model results is it possible to observe significant links among park attributes, park usage and satisfaction with park, as well as significant effects of park usage and satisfaction with park for the increase of respondents' well-being. As for the measurement model, it can be considered satisfactory for describing the latent constructs, although there were no significant effects from the variables Age and go alone to the park.

7.4.5 Differences in well-being well-being between park and users and non-users

In this section, we observe in detail differences in well-being between park users and non-park users for the following groups of variables: well-being assessment (physical, mental and social health score components, life satisfaction and happiness), opinions on well-being (percentage of respondents in each group who responded in an affirmative way to the corresponding statement), and built environment attributes (distance to the closest park, area of the closest park, park density and population density).

In Figure 77, we can observe the percentage of respondents who practice the listed health habits, determined by the number of respondents who answered “Nearly True” or “Totally True” to each one of them, and compared between the segment of respondents who make use of parks and respondents who do not. Statistically significant differences between park users and non-users were found for people who eat breakfast regularly ($\chi 2$ = 22.2, df = 4, p<0.001), sleep 7-8 hours on average ($\chi 2$= 13.1, df = 4, p = 0.011), eat nutritious and balanced meals ($\chi 2$ = 50.2, df = 4, p < 0.001), practice sports periodically ($\chi 2$ = 37.3, df = 4, p< 0.001) and do not feel conscious stress ($\chi 2$ = 23.4, df = 4, p < 0.001). For the habits not smoking, drinking alcohol moderately and work within 9 hours a day there were no significant differences among park users and non-users.

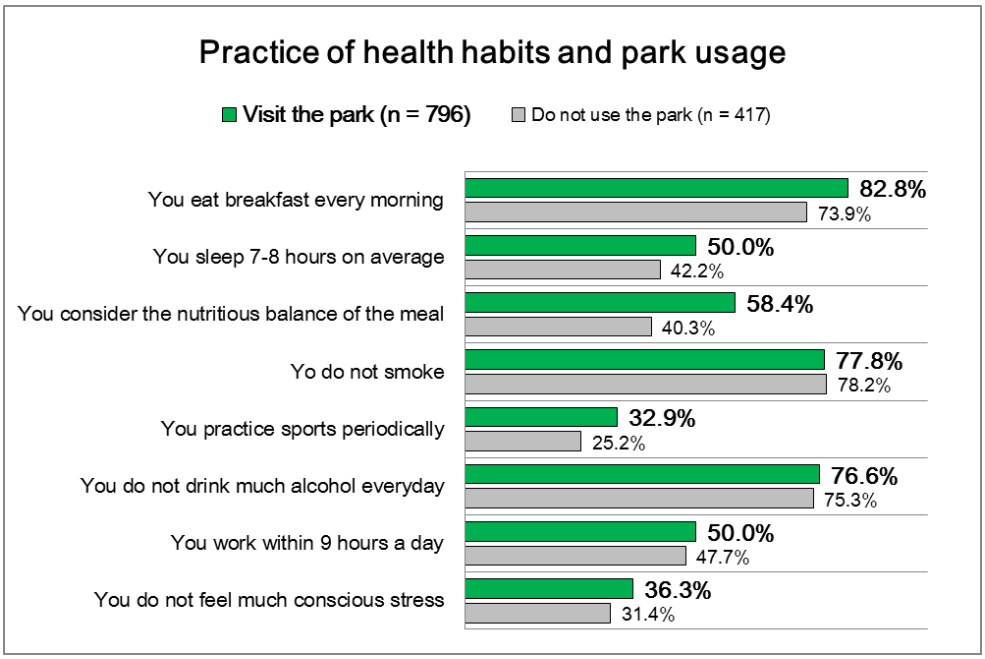

Figure 77. Change of health habits practice between park users and non-users

Finally, the differences between park users and non-users are compared concerning well-being measurements, additional opinions on well-being and main characteristics of the built environment, as it was previously detailed. The results of the comparison between the two groups can be observed in Table 63. The statistical significance for the difference was assessed by using the t-test results, with equal variances between groups assumed.

Table 63. Differences in well-being between park users and non-users

	Park usage group		**t - test for equality of means (df = 1211)**		
	Users	**Non-users**	**t-value**	**p-value**	
Respondents	796	417			
Well-being and health-related QoL assessment					
Physical component health score	**74.1**	**72.1**	**-2.21**	**0.027**	**
Mental component health score	**70.1**	**67.2**	**-2.96**	**0.003**	***
Social (role) component health score	80.0	79.4	-0.61	0.544	
Life satisfaction	**29.5**	**27.9**	**-4.73**	**0.000**	***
Happiness score	**7.40**	**6.69**	**-5.25**	**0.000**	***
Additional opinions on well-being					
Do you think using a park is good for health?	**94.0%**	**73.6%**	**-10.43**	**0.000**	***
Do you feel others are reliable?	**72.4%**	**60.2%**	**-4.35**	**0.000**	***
Do you feel others are helpful?	**67.3%**	**54.0%**	**-4.61**	**0.000**	***
Do you participate in other activities?	14.4%	11.3%	-1.54	0.123	
Built environment and park-related geographical attributes					
Distance to closest park (m)	226.0	218.2	-0.70	0.487	
Area of the closest park (m2)	11149.3	12431.7	0.27	0.790	
Park density (1 km radius)	18.1	19.0	1.16	0.101	
Population density (people / km2)	10783.0	11368.9	1.64	0.107	

7.4.6 Discussion

From the respondents in the sample, we found that 65.6% are routinely park users. This proportion does not change significantly among adults of different ages and gender. Although gender inequity issues are reflected in other individual attributes such as occupation, in which a big disparity between male and female office worker for all the age

groups is notorious, with an average of 72.3% of male respondents who are office workers and 18.9% of females who are office workers, the use of parks is something that citizens of both genders in Japan do in approximately equal proportions.

In general terms, we can allege that the most popular activity to do in the parks by the respondents is to take a walk, with 70% of the male respondents and 60% of the female respondents doing it when they visit a park, and the most common activity in a park among people of all ages. Enjoying nature is a function of the park that is highly appreciated both by male and female senior and elderly adults. But in terms of monthly frequency, we can observe that activities such as walking a dog and spend time with family make people go to the park most frequently (with 11 and 10 times a month in average respectively). Males in the group 40 – 64 years old have a slightly higher tendency to do activities in the park alone in comparison to women, whereas young adults tend to visit more than one park location more frequently then senior adults.

It should be specially noted that more than 86% of the park users go mostly to the green areas that can reach within walking or cycling distance, while the percentage of users who go by car is not higher than 20%. Therefore, it must be considered of crucial importance for urban planners to have green areas that are uniformly and sufficiently

distributed over the city area to make their benefits easily accessible for all the residents, enhancing the well-being and promoting a better health-related QOL among citizens.

More than half of parks that respondents visit have amusement, recreation, landscape and circulation facilities. It is much less frequent to find parks with facilities for sports, service areas, management facilities and security facilities. It should be noted that in Japanese cities sports parks usually exist as a separate category of park, which has facilities mostly dedicated for specific sports practice only (baseball field, athletics and running tracks, outdoor fields, basketball courts and other player facilities), therefore the design of those spaces is specifically oriented for the necessities of people into practice of sports. It is not unusual to find sports parks and leisure parks separated from each other in cities. As for service areas, management facilities and security facilities; they are likely to be found only in parks with considerably large areas (i.e. parks for city wide use). As of 2005, 78,154 parks for community use (with a total area 29,598 ha) have been registered, while only 1,973 parks for city wide use (with a total area of 34,350 ha) respectively have been registered in all over Japan (MLIT, 2006) [20].

Considering the responses of the overall sample, it is possible to observe that access, location and nature functions of the parks that the users visit are the aspects that users report to be more satisfied with, whereas the park equipment and the interaction with other

users are the aspects that make respondents less satisfied with when they use a park. In general senior adults tend to experience higher satisfaction with parks than young adults do.

As for the facilities in a park, the positive influence of landscape facilities, service areas for almost all the aspects of park satisfaction and for all age groups can be considered the most notorious. Similarly, the presence of sports facilities has positive effects for increasing the satisfaction with nature, size, health-related and non-related functions of the park for people of all ages. It is also notorious that the presence of amusement facilities in the parks tends to reduce the park satisfaction feelings of elderly adults, and other contradictory effects for the park satisfaction of young adults were found from the presence of amusement facilities in the park. In fact, these types of contradictory effects have been in fact referenced in the literature. For instance, a jogger may want a large space with quiet paths whereas a family with young children might prefer smaller areas with play, toilets and parking facilities (Lachowycz and Jones, 2014). The possible existence of conflicts of similar nature could be considered for the case of amusement facilities, which are used mainly by families with small children going to play, while elderly adults however would tend to prefer peaceful and calm environments. Additionally, parks with amusement facilities apparently come in conflict with the nature functions of the park, something

reflected in the negative effects on satisfaction with nature derived from the presence of amusement facilities.

The more frequent practice of health habits is in general more frequent for park users than for non-users. From our results, remarkable exceptions are the consumption of alcohol, smoking and working within a proper time in a day. To this respect, it is worth mentioning a few observations. Japan was famous for very high ratios of smoking men in the 60s, but in decline from 83% then to 30% estimated for 2014 (Nippon.com, 2016). Some municipalities have established their ordinance prohibiting smoking in all public spaces, including parks and sidewalks, while at the same time establishing designated smoking areas in public locations (parks included) along with no-smoking ordinances (Nippon.com, 2016). As for alcohol drinking, it is considered a common social practice to drink alcohol at a picnic on a park, especially during festivities or particular occasions such as the cherry blossom in spring.

From the SEM model results, we are able to confirm significant links of joint influence from park infrastructure design to park usage, and park satisfaction on well-being and health-related QOL. Therefore, attention must be paid on the design of parks and green areas that are attractive bring a satisfactory experience to their users. In this way, having

good experiences when visiting parks and green areas is something that contributes for health and well-being.

The effects of park usage on well-being are reflected in higher levels of well-being and health-related QOL indicators for park users in comparison with non-users. However, there is a remarkable exception: no significant differences for the social component score of health and social participation (participation in other activities) between park users and non-users were found. This finding comes in contradiction with other findings in literature.

It has been argued that it is common to consider social interaction with others as an important part of a greenspace engagement, which implies that the presence of others is important to using and enjoying the park [8], that social interactions in greenspace drive associations between access and health according to evidence from the Netherlands [13,32]; and that the social, not the unmediated 'natural' effects of using green space that may have broader health and social benefits, often defined as 'social capital' (Carpenter, 2013). The importance of social interaction to people's greenspace use in Japan seems to be more limited in comparison with western countries. Therefore, more attention should be paid to the ways that Japanese individuals (and individuals in any particular socio-geographical context) interact with others when they are spending time in the park, as well as other behavioural issues related to the use of green areas and public spaces

should be paid more attention in future research involving the beneficial effects of park design and usage.

Finally, no relations between the attributes related to the green areas linked to other neighbourhood characteristics and the current situation of park usage were found. This finding is somehow consistent with other authors that stated how size and distance to the park itself are not as important for park use as the green space quality eventually is (Malek et al., 2012; Zhang et al., 2017).

7.4.7 Limitations of this study

Although the respondents in the sample can be considered well balanced considering gender and age issues, it should be noted that there were very few responses from young people (under 19 years old) and elderly adults (over 65 years old). Therefore, the findings of this publication may be applicable for the adult population segment that is under 65 years old only. It is estimated that people aged over 65 already account for more than 22% of the population in Japan, which makes the country a “super-aged” society [34]. It can be considered an absolute necessity to collect more information describing the effects on well-being that parks and other infrastructure can have particularly on this segment of population, considering the inevitable impacts that an aging population has on social systems, including public health [34]. In a similar way, we recognize the considerable

necessity to collect more information regarding young people's park and greenspaces usage.

On the other hand, the activities that people do in a park are much more diverse and serve many more purposes than the ones that have been listed in this research. Therefore it is necessary more qualitative and quantitative research that allows to further clarify other issues related to park usage behaviour and the mechanisms through which these behavioural issues contribute to an increased well-being. In behavioural terms, the use of park can also be linked with other daily activities before and after park usage, something that was not deeply considered into this analysis. For instance, in this study we took into consideration the practice of sports that take place in the park. Activities related to sport practices that do not occur in the park (for example, running on the road) were not taken into consideration for these analyses; however, their effects on health and potential links to other activities that occur in the park should be considered in future research.

As for the links between parks and other neighbourhood characteristics, no specific information (geographically speaking) of the parks is known in our questionnaire, which limits our capacity to explore the characteristics and issues of neighbourhoods and parks that influence people's decisions regarding specific park locations and activities to do there. Other factors such as occupation, weather, emotional condition, family situation and even

influence of social circle may play important roles either as motivation agents or as deterrents for using park or deciding which type of activities to perform there. The approach used in this research is not sufficient to capture more in detail these types of influence. The cross-sectional design of this study also constitutes a limitation to draw more causal inferences.

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8. Conclusions and recommendations

Chapter 8
Conclusions and recommendations

In this section, the main findings are described and summarized according to the results obtained in each chapter. Policy implications and recommendations are discussed according to the different geographical areas and the different demographic groups under consideration. Limitations of the study and recommendations for future work are discussed in another sub-section. Finally, the contributions of this research are summarized.

8.1 Main findings

8.1.1 Identification of transport-based social exclusion, Bangladesh

The policy implications for improvement of the exclusion conditions should be oriented to satisfy specific needs of residents in different locations and the special needs of workers, women, the young, the aged and the disabled. These population groups we found to be more vulnerable in the cities of Bangladesh, i.e. at higher risks of exclusion from society. We found that some of the poorest conditions for accessing transportation systems and the lowest happiness and life satisfaction levels coincide. For example, the interviewees in Chittagong area show themselves more reluctant to believe that an improvement in their

travel conditions would help to provide them more opportunities for education, health, or improving their income, but they agree in a majority with the idea that the improvements would help their leisure opportunities and their overall life satisfaction.

Other aspects of transport-related social exclusion that were found in this study and require more detailed investigation in future steps of research, are strongly associated to the development of new infrastructure (for motorized-transport) worsens the environmental conditions of places where poor environmental conditions already exist. In alternative cases, the new infrastructure brings bad environmental conditions to places where despite poverty existing, there were no air pollution related issues. In many other cases, the development of new infrastructures requires most of the times the resettlement of the affected persons.

On the other hand, the resulting gains in circulation speed or the increase of vehicle traffic congestion have made the socialization functions of the street fade or disappear, which has seriously affected the social bonds of communities. For example, the increasing use of motorized vehicles changes the social practices in the street space, such as serving as playing area for children, festivals, collection of loans and savings, food selling and buying, etc. This has serious implications in the willingness for a social change and different lifestyles reflected in family structure, number of children, education, social and

economic behaviour, and occupation, as well as desired and dreams about raising one's standard of living or achieving personal goals.

- **Transport-disadvantage categories from factor analysis**

After applying the Principal Components Analysis (PCA) to the list of fear-based and physical accessibility related items in the survey, we found a satisfactory solution with 6 main factor loadings, as follows: use of public spaces and accessibility (23.2%), traffic-related unsafety (11.9%), crime-related unsafety (10.3%), use of public transportation (8.3%), safety of remote places (7.1%), and on-road obstructions (6.2%).

The access and use of public spaces shows several related inefficiencies and hazards for pedestrians. It is estimated that in Dhaka city 60% trips are made on foot everyday but the pedestrians are facing many problems while using the walkways. In Dhaka City, pedestrians are walking for different purposes, mainly going to the workplace and shopping. Sometimes, walking becomes the only possible choice, considering the narrow street sections or the available space, which makes difficult to use any different travel mode, even bicycles.

Living in the proximity of factories and other employment areas makes walking the most convenient and the only possible choice to go to work in many cases. On the other side, pedestrians face a lot of obstacles in the streets that pose hindrances to their

circulation. Vendors that occupy the path space (often illegally), illegal vehicle parking on footpaths, establishment of the dustbins on footpath, discontinuation of the walkway alignment and poor pavement design are some of the aspects that form serious barriers to the pedestrians in the urban areas that we selected as location for the survey.

According to our factor analysis, the problems that children, elder, disabled and other vulnerable users faced when walking can be counted as the most important factor, based on how much of the total variance it explains.

The traffic-related unsafety was the second factor in our analysis. For walking to work, back home and shopping, usually a large number of vendors on the walkway surface and offer almost no space for the walkers to use the surface, forcing them to use the roadway in combination with the mixed traffic, with higher risk of accidents and injuries. Additionally, pedestrian accidents can occur in higher numbers in places where pedestrian facilities are seriously deficient or lacking. Pedestrians crossing the roads and drivers engaging in risky behaviours create hazardous situations, so measures including law enforcement, traffic calming, and engineering design are extremely necessary to protect the non-motorized users, the large majority of users in the streets of the studied urban areas.

The crime related unsafety is also a serious threat to the urban dwellers in general. For instance, the five major crimes on the walkways have been identified as: hijackings,

presence of drug sellers on the walkways, verbal harassment to the lady walkers, pick pocketing and snatching the bags from the walkers (Rahaman, 2005 http://www.ut.t.u-tokyo.ac.jp/hp/thesis/2005/01khan.pdf).

After considering issues related to walking and the safe use of public spaces, the limitations to the use of public transportation to get to other places in the city become evident from the 4th factor. For instance, in Dhaka city, buses are the only available organized mass public transport system. It can be observed that the buses in Dhaka mostly remain over-crowded, therefore they are often not accessible for the elderly or disabled people as well as for the women. Moreover, the frequency of bus service (headway) is not good (Rahman and Nahrin, 2012). Since the city is planning to have bus rapid transit (BRT) systems and metro systems to cater the increasing demand for public transport, these aspects of physical-based could be dramatically improved if the needs of users are comprehensively considered for the future operation of those systems.

Finally, factors related to the perception or –usually non-visited or unknown- places in the city and related to the inconvenience of parked cars to the movement of people and goods can be summarized in the last factors that were derived from the analysis. Further analyses and studies are required to find which improvements in the infrastructure and transportation systems would be the most effective to improve people's travel conditions,

and how they could positively impact the access to more opportunities for education, health, improving their income, leisure activities and their overall quality of life.

8.1.2 Links between transport disadvantage, social exclusion and well-being in Bangladesh

From this study, we were able to confirm the subjective nature of transport-based social exclusion, based on the fact that not all the theoretical dimensions of transport-disadvantage are deteriorating the well-being of the respondents. In addition, some dimensions have stronger impacts on well-being than others. From the 5 dimensions of transport disadvantage that we evaluated, mainly the physical, geographical and (partially) the time-based categories occur among the respondents of our survey as social exclusion. At the same time, the economic and time-based categories of transport disadvantage cause very little or no social exclusion among respondents.

From this study we can also observe a context where modal choices are very restricted due to a limited availability of space and economic resources for large segments of the population. Therefore, there is a high dependence on non-motorized travel modes (i.e. walking mainly) and that helps to explain to a considerable extent why just some aspects of transport-related disadvantage make people more socially excluded.

The geographical location has been found to be a relevant driver of social exclusion, which is reflected on the influence of population density at a district level for well-being. Some authors have largely discussed how population density may not have beneficial effects for health and quality of life (Fassio et al., 2013; Recsei, 2013; Sundquist et al., 2004). As it has been observed in the results of this study, the effects of excessively high population densities have significant counter effects in the residents' well-being leading to more social exclusion of residents. The negative effects of agglomeration are aggravated by the little available public spaces (Hobbes, 2014) and their disproportionate use by private cars despite the insignificant car ownership (UNDP, 2016). The influence of geographical location in transport-based social exclusion is also reflected in the significant results for the variables 'rickshaw' and 'times outside the neighbourhood'. Thus, we can reasonably argue that the capacity of traveling outside the neighbourhood facilitates people inclusion in society, associated with access to services and opportunities.

For reducing the physical and fear-based social exclusion it is necessary to prioritize the improvement of physical accessibility for walkers, by improving the quality of public open spaces and the implementation of traffic-related safety measures that protect more effectively the vulnerable users (i.e. pedestrians) on the streets. It is very possible that the increasing motorization will contribute drastically to people's social exclusion if opportunistic traffic-calming and other traffic management measures are not taken.

Some of the limitations of this study include the lack of information in our dataset to characterize the influence of exclusion from facilities and spaces dimensions, the reduced participation of women and more frequent users of other travel modes. Future studies should carefully target stratified population samples that include them and other identified vulnerable groups as well (e.g. recent migrants), in order to understand how transport disadvantage related to travel behaviour generates social exclusion within these groups.

Through this study, we could understand how the majority of our respondents (and a big proportion of the residents in Bangladeshi urban areas) use walking as their main travel mode attributable to economic and limited public space available in the built environment. Due to the characteristics of the sample, there is also very limited information (i.e. few observations) for residents who use rickshaws, bicycles and buses to travel. Given the widely unbalanced numbers of routinely cyclists, bus and rickshaw users in proportion to the number of walkers, future studies should consider stratified samples that target more specifically those users. More information about the characteristics and utility of trips by rickshaw, bus and bicycle (and other vehicles) in the densely populated areas should be collected in future studies to understand more comprehensively how transport-based social exclusion occurs in these cities.

Furthermore, we must take under consideration that the monetary poverty impacts the general quality of life and increases the risks of social exclusion for large segments of population to a point much beyond the reach of what the implementation of transport infrastructure and transport policies can contribute to solve. Nevertheless, social exclusion and its association with transport are relevant to understand how to address transport disadvantage (Stanley and Vella-Brodrick, 2009).The vertiginous changes in the urban structure and socioeconomic conditions that are taking place in the country will induce changes in the mechanisms of social exclusion at the same vertiginous speed, linked deeply with social comparison that comes from culturally determined standards of acceptability, desirability and success. However, changes in urban policy oriented to improve the transport-based social exclusion could do much to alleviate the non-monetary poverty of urban dwellers.

8.1.3 Future life and migration plans of Japanese high school students

Among the future life plans, the most commonly desired are to get a job in a corporation and to have a good income, followed by traveling, studying at a university and getting married. It is remarkable that the least desired life plans are related to getting involved in both an individually owned and a family's owned business.

The decision to migrate is influenced by (not) belonging to humanities class, more elderly people in household, having a Present Hedonistic dominant time profile, bad accessibility related issues, a desire for a change in lifestyle (which is the most influential driver for migration among all the social exclusion dimensions) and the plans to have own business, become famous and travel.

It has been found that family-related life preferences (get married, having children or a pet) are neither decisive nor influential for any migration preferences, which are mostly motivated by individual projects and achievements. It should be noted that approximately half of the sampled high-school students would consider different family-related choices in the future. On the other hand, the decision to stay in influenced by a bigger household size, a Past-Positive predominant time profile, the possibility to enjoy a good natural environment and the lack of motivation to change lifestyle, in opposition to the migrants. Among the life plans, studying at a university influences strongly the decision to stay. As it was mentioned previously, the urban area of Higashi-Hiroshima is a place where several higher education institutions (i.e. universities) are located, so to some extent it makes sense that students who want to attend a university are strongly motivated to stay in Hiroshima area.

In addition to the results of the MNL model, studying in a depopulated area, (not) having a Present-Fatalistic predominant time profile, experiencing a poor health condition. The willingness to work in a family business and becoming famous are influential for the ones who are considering migrating but have not made the decision yet.

The students with a Present-Hedonistic predominant time profile score can be considered as prone to migrate as to return, thus making a temporary migration. In addition, studying at a university is also an incentive to return in case of a hypothetical travel, so we might reasonably assume that 'return' in this contexts means moving from the rural to the urban areas within Hiroshima prefecture – for study purposes. As a matter of fact, it takes no longer than 2 hours of road travel to connect all the locations in the survey.

It was also found that the decisions on permeant migration are influenced by studying in a depopulated area, gender (women are less likely to return to their current location than men), scoring low in Past-Positive time perspective profiles, lacking social support in the community, the willingness to change lifestyle and the preference of a stable job over things such as a big salary or getting involved in family business.

The psychological implications of the different variations of time perspectives are to be examined with more detail by professionals in mental health sciences, but this study evidences a clear link between specific time profiles and future migration decisions. In

future studies, the effects and interactions between the time perspective scores and future life choices should be further examined.

Among the social exclusion dimensions, social support, health condition and low accessibility are influential for high-school students to consider future migration, together with a desire to change the current lifestyle, which is already recognized as one of the most common drivers for rural-to-urban migration for young people in Japan.

8.1.4 Influence of built environment on active travel behaviour and health-related QoL in Japanese cities

Considering the type of activities choice and the purpose of trip, differences were also found. Residents in local cities have higher health-related scores when they go for shopping, sports practice or spend time with the family mainly. On the other hand, residents in metropolitan cities have higher health-related scores when they travel out for leisure, non-academic learning or spend time in social activities.

Living in compact, dense urban areas promotes directly a more extended practice of health activities, especially where there is availability of green areas and parks. Needless to say, the conscious practice of these health activities will contribute to improve the health-related QOL.

In Japanese cities, the importance of having a community centre[6] near the residential location can be considered as very relevant, whereas it is associated with a significant increase in all the health components, in both local and metropolitan cities. The availability of green areas and parks is significantly important to promote integrally healthy lifestyles in metropolitan areas. We could argue that the effect of this variable is not significant in local areas because there is much more availability of green spaces that have not been urbanized and transformed into paved surfaces. For the case of metropolitan cities, the variable "living in high floors" was found to be significant.

The health-related QOL approach can overcome the shortcomings of the BMI and provides more useful insights into policy making in the areas of urban design and planning in Japan. We found that commuters in Japanese cities have better scores in physical subscales (GH, PF) of the health-related QOL on one hand, while they have worse scores of mental subscales (VT, MH) than non-commuters.

Whereas SF-36 appears to adequately explain the influences and direction of causality of the built environment and lifestyle habits and their effects on health-related QOL, it appears to insufficiently explain the joint influence of the built environment and active travel behaviour on the health-related QOL, even though the influences of the built

[6] In Japan, it is a place where the members of a community can gather for social or cultural activities.

environment on travel behaviour and the influences of active travel behaviour on health have been separately demonstrated.

Some studies confirmed that neighbourhood characteristics can be associated with individuals' travel decisions, especially on non-motorized travel frequency (Handy et al., 2005; Mokhtarian et al., 2008; Saelens and Handy, 2008). Similar findings can also be observed with respect to the influence of the built environment on the different types of active travel behaviour that we employed in this study. A properly planned built environment contributes to a reduced dependency on cars and other private modes of transport due to the restrictions placed on their use, creating a necessity for greater use of public transportation and active travel modes—either as the way to reach a transit connection or to reach a final destination (Ewing and Cervero, 2010; Chorley, date unknown).

On the other side, commuters and active commuters will enjoy better physical functioning than the non-commuters. So, a specific travel behaviour may lead to an improvement in one of the dimensions, while another dimension may worsen. For the social health components, no visible effects could be observed associated to the residential environment or travel behaviour. This is in accordance with the ideas of other authors. For example, Ogilvie et al. (1999) stated that targeted behaviour change programs can be

effective in changing the transport choices of motivated subgroups, but the social distribution of their effects and their effects on the health of local populations are unclear (Oglivie et al., 2007) .

In this study we found associations between the residential environment and the health-related QOL, but it is important to note that the former does not directly influence the latter. Rather, the residential environment imposes its influence via health promotion activities and lifestyle habits—including but not limited to travel behaviour or active travel behaviour (Zhang , 2013).

It is observed how different configurations of the built environment will have different effects on travel behaviour according to the activity-related trip generation: a higher density of cultural facilities will encourage non-commuting travels in general for the members of Cluster 1 (commuters and other purpose trips with some frequency), but interestingly and at the same time, a neighbourhood with fewer cultural facilities in the surrounding area will mean that cycling activities will increase for members of Clusters 1 and 2 (who take more frequently trips for other purposes). Population density is a key factor in promoting the numbers of active travel and non-commuting trips for all members in the sample, and in particular, results in more walking by commuters (Clusters 1 and 3) and more cycling by non-commuters (members of Cluster 2). Living in areas of greater

density makes commuters of Cluster 3 (people who commute and rarely make trips for other activities) more likely to consider commuting by active modes.

A mixed land use will influence positively the active travel commuting for respondents in Clusters 1 and 3, i.e., the commuters, as well as the active travel for non-commuting activities for all the respondents in the sample, particularly the walking behaviour of individuals in Clusters 2 and 3, who are less likely to walk. This finding is totally consistent with the findings of other studies, that indicators associated with urban containment such as shorter distances to central services and facilities (and the subsequent reduction in travel times), and mixed land use, are all associated with less transit use, more walking, and active transport options (Frank et al., 2006; Croucher et al., date unknown; Lathey et al., 2009; Aytur et al., 2008;).

From the SEM models, we observed how the health-related QOL is influenced by the residential environment via the lifestyle habits for the groups involving commuters, while the active travel behaviour is mostly influenced by the individual attributes in the model, without being globally influenced by factors related to the residential environment, which have limited effects in particular groups. In case of non-commuters, it is found that neither travel behaviour nor the residential environment affects the health-related QOL (precisely speaking, the self-reported health).

Concerning the aforementioned insignificant influences of travel behaviour on the health, one reason might be because the current health-related QOL does not have specific measures directly related to daily trip making (commuting and/or non-commuting). This result may imply that the SF-36 measurement is actually not suitable to reflect the impacts of daily travel on the health. Furthermore, there is very strong scientific evidence, based on a wide range of well-conducted studies in the USA, that physically active people have a lower risk profile for developing a number of disabling medical conditions and lower rates of various chronic diseases than do people who are inactive (US Department of Health and Human Services, 2008). This may suggest that the self-reported health indicators may not be sufficient to capture the impacts of repeated daily travel on health. Considering that multitasking during use of public transportation systems and the liking of specific travel modes (e.g., car, bus, train, bicycle or walk) might be associated with positive utility of travel, these should be reflected in the conceptualization of travel behaviour in future for deriving conclusions based on more solid evidence.

- **Influence of green areas and park usage on health-related QoL in Japanese cities**

Through the study in Chapter 7, we confirmed the contribution of parks to health-related QOL and well-being in Japanese cities, considering particular issues present in Japanese society and the characteristics of infrastructure of Japanese urban areas. A

better quality of parks and green areas leads to an enhanced experience quality of the users, which will be reflected in the increases of well-being. Designing parks with attractive features will not only influence positively their usage; but the pleasantness of the users' experiences that take place there, which would reflected in a higher satisfaction with park spaces and services. This increased satisfaction turns itself into a valid causal mechanism contributing to explain improvement in the well-being condition of residents in urban areas, as well as the feelings and the emotions we perceive in the natural environment form a relevant part of our experience in it. In addition, it is necessary to conduct more qualitative research that allows a more detailed understanding of the social processes that take place in the parks, together with the underlying mechanisms through which the use of greenspace contributes to improve well-being condition.

In this study we confirmed the idea that the use and meaning of greenspace for one group can affect, both negatively and positively, the meaning for other users. As an example of it, we can observe how the influence of amusement facilities has some negative significant effects on satisfaction for senior and elderly adults, while having positive effects on satisfaction for young adults. Through this example, we could confirm that people looking to enhance well-being in one way might eventually find their experience contested by others engaged in different activities.

Finally, the influence of the built environment or the social environment for park usage seems to be very limited for the case of Japanese cities. Although the effects of park usage for health have been clarified, still much remains unknown about the underlying mechanisms that connect activities in the parks with enhanced well-being conditions and improve health. Furthermore, a good health related QOL or good levels of well-being condition might be by themselves reasons that influence park usage. Similarly the connections between benefits of park usage at consciousness levels (doing activities in the park with specific health purposes) and unconscious levels (getting unnoticed health and well-being benefits or even eventually negative effects from activities that take place in the park) should be further examined.

8.2 Policy implications

Based on the abovementioned findings, several policy implications must be discussed, regarding the improvement of well-being in its multiple dimensions for citizens, as well as which measures and policies could be most effective in order to maximize the benefits of urban and transport systems planning as well as the well-being and general quality of life. Moreover, based on the main findings, policy actions should be oriented to improve the access to transport services of specific groups which were found more vulnerable in terms of the risk of experiencing transport-based social exclusion. In Figure 78 the most and least

vulnerable groups in terms of their risk of becoming socially excluded are depicted. Policy measures and implications according to each location of study are further discussed in this section.

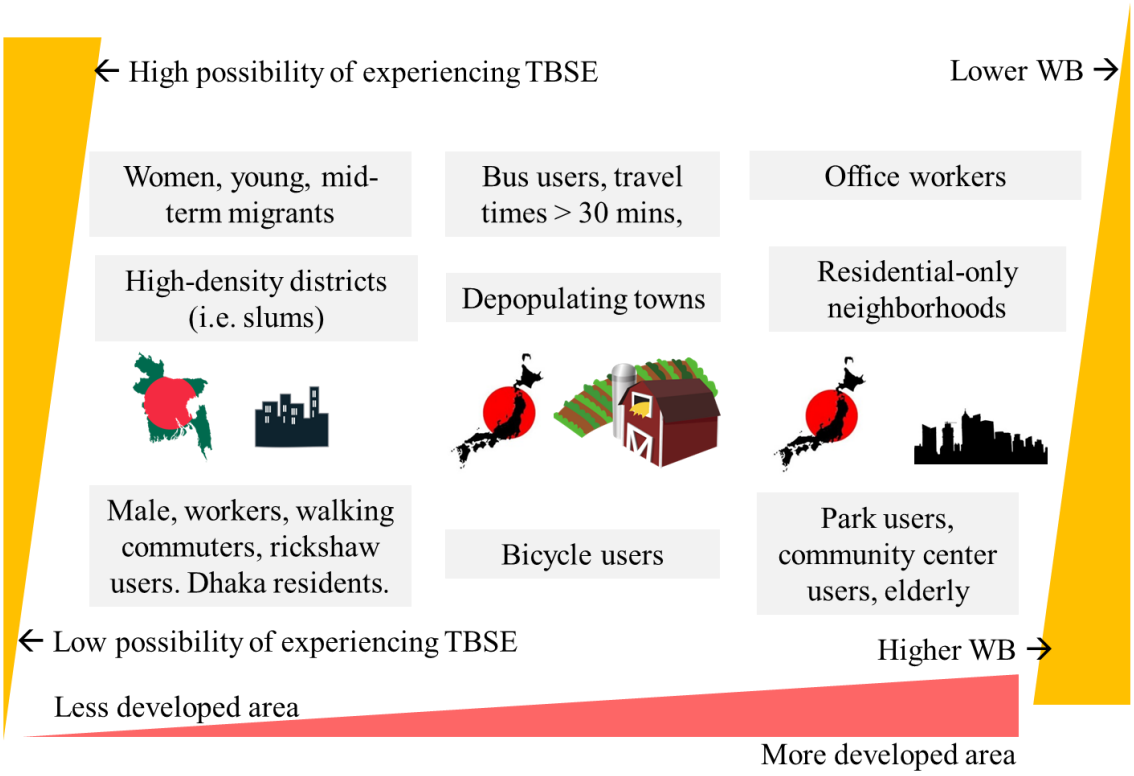

Figure 78. Groups at lowest and highest risk of experiencing transport-based social exclusion by locations of study.

8.2.1 Urban areas in Bangladesh

In Bangladeshi cities, especially in Dhaka city, the alleviation of poverty in both monetary and non-monetary terms must be regarded as the top priority for policy makers. Generation of employment, alleviation of poverty, improvement of housing, public sanitation, basic services crime and violence are part of the priorities when it comes to urban planning. The

possible contributions of urban planning and transport systems for the overall quality of life will have limited or no effect on the improvement of the general quality of life unless the previously mentioned more urgent issues are adequately addressed. However, important measures must be considered:

- Improve road safety for pedestrian traffic: The perceptions of safety regarding the use of vehicles poses hazards and detriments to the general well-being. Traffic calming measures are essential, as well as the regulation of informal trade activities in public, which play a key role for the local economy and the society but at the same time make the pedestrian circulation more difficult.

- Density: high density housing already exists but better planning for new and formal housing buildings should definitely be encouraged, otherwise the positive effects of high density populations in urban areas will be non-existent.

- Establish satellite townships together with financial and industry districts: this allows people to access work and school activities within a walking distance, something that has been organically developed as a part an spontaneous urban development, especially in Dhaka city. It reduces the dependence on motorized transport and makes possible to allocate income for household necessities, bringing enormous benefits for

the alleviation of poverty. These patterns should be continued and properly regulated, and replicated under a more proper regulation in other growing areas of Bangladesh.

- Public transport: Dhaka faces currently a very elevated traffic congestion with a very low motorization rate. Priority to the implementation affordable and reliable public transport service must be given. In addition, Rickshaws contribute greatly to improve the general well-being, both for drivers as a source of income and for users as a way to facilitate trips to areas of the city that are hardly accessible to them. There is great potential in Dhaka for the promotion of non-motorized travel modes, and change from a car-oriented development to a community-oriented development that allows for more participation and sustainability in the urban planning processes.

8.2.2 Rural areas in Japan – Hiroshima prefecture

The high-school students who depend on bus services and spend longer times for traveling to school are more vulnerable in terms of quality of life and social exclusion. The risk of a deteriorated well-being increases if the travel time to school is longer than 30 mins, therefore this should be considered as a reasonable threshold for policy design.

The importance of keeping short travel times is evidenced by higher possibility of unhealthy behaviours such as smoking, sleeping little and irregular eating habits. On the

other side, longer travel times restrict social interactions and the possibilities of taking active part in the community. In addition, the affordability of the transport services that allow students to go to school is becoming a growing issue of concern among families and household in rural areas that face difficulties for covering the costs of transportation fees for schooling trips.

Measures to improve the efficiency of bus services, considering smaller vehicles, more flexible routes, competitions between the regional and local governments for service quality, and providing subsidized prices to students living in remote areas who depend on bus services to access high schools would be highly recommendable from the point of view of social exclusion and well-being.

Moreover, ensuring close access to facilities such as supermarket, train station, sports parks and community centres plays an important role in enhancing well-being via life satisfaction., particularly with finances, standard of life and sense of achievement.

From the application of ZTPI a set of future life choices can be better predicted within the career and family types of plans, including the intention to get married, have children, and get a job in a corporation. Therefore we recommend the further application of this test in high schools and other educational institutions as an instrument that would provide more

information of interest to the local and regional authorities, in order to better plan for the effects of population shrinking; mitigation of negative effects and revitalization measures.

From the time perspectives, the *present hedonistic* (PH) score is relevant and influential for most of the future life choices. This means, young generations tend to think more of the immediate future. As long as location in rural areas can cater for these short and mid-term needs, more young people would reconsider moving to a large city. Considering relocation into rural areas of working activities which include processes and focus on immediate details, creative tasks, activities with immediate feedback, and opportunities for social .interaction would make a pull factor for young people who have PH dominant profiles.

8.2.3 Urban areas in Japan

The direct effects of built environment itself are not influential for the health-related quality of life by themselves, but become influential for the quality of the social interactions that they are able to generate. Facilities such as community centres and densely populated areas with good quality greeneries are positively influential for the health-related quality of life of specific segments of population that exclude full-time office workers. They are less likely to engage in social interactions with their communities and undertake leisure activities, due mostly to a more reduced time availability. In other

words, they are less likely to enjoy additional health benefits induced by the built environment as other groups do. When leisure activities are available within walking or cycling distance, therefore inducing more non-motorized trips for purposes different than commuting, the well-being condition of individuals tends to improve.

Based on these findings, it is reasonable to presume that policies for implementation of more flexible working times, that allow full-time employees to work shorter hours so they can spend more time with their families or doing other activities would contribute to extend the benefits of compact and mixed-use urban environments to this segment of population.

In addition, the parks provide great opportunities for leisure activities. Although the importance, the quality and accessibility of facilities is influential to their use rather than other attributes such as area or distance. Particularly, the quality of facilities for landscape, amusement, sports and service areas contributes to an increased park satisfaction, which also contributes to enhance well-being.

8.3 Main contributions of this research

The notion of individual well-being was not considered in previous studies regarding transport-based social exclusion. In combination with the life-oriented approach, the

measurements of transport disadvantage can be expanded and understood under new multidisciplinary perspectives.

Moreover, the existing theories for defining transport disadvantage and transport-based social exclusion have been proven very useful to understand its most basic aspects, but the definitions must always be adjusted in function of the geographical location and the social context under study, as it was evidenced by contrasting the needs of an urban developing society, a rural society in a developed country and a urban society in a developed country.

A change in the language when talking about social-exclusion related issues must be included in the technical vocabulary and by practitioners. In general, people should not be labelled as socially-excluded or transport-disadvantaged, but we should rather talk of vulnerable groups and factors that put individuals and groups at higher risk of exclusion. due to the exposure to conditions of disadvantage that eventually pose hindrances for a better well-being..

A condition of exclusion depends also on individual factors and environment factors. Under the life-oriented approach we assume the individual expectations and needs play a vital role for decision-making, and different adaptation behaviours when it comes to facing conditions of disadvantage in this context, trading off among several life domains.

The incorporation of measuring instruments (i.e. SF-36 survey and Zimbardo Time Perspective Inventory) that have been developed in, have provided insights to further understand the effects that they have on decision making processes of segments of population of interest, as well as the effects of travel behaviour and built environment on human health. No studies had considered these integrated aspects previously.

Finally, the perspectives of well-being, health-related quality of life and life-oriented approach contributes with useful recommendations and perspectives for a more socially inclusive city-planning, that considers the maximization of individual and social well-being as one of the main pillars for the development of future infrastructure and the innovation of transport systems.

8.4 Limitations of the study and future work

The quality of life, health condition and other terms that have been used to describe well-being reflect its complex and multidimensional nature. In this study we measure quality of life based on specific aspects that we considered as relevant according to the time and location of surveying. Figure 79 shows an example of the main broad domains of quality of life as considered by the WHO. It can be easily observed that in this dissertation we did not consider the totality of aspects that are listed over there. Therefore, this study

can be considered as an initial approach, but further studies are required considering all the possible aspects that well-being entails. Nevertheless, well-being provides a practical and useful framework to understand the negative impacts of transport-based social exclusion on individuals that were not evident before.

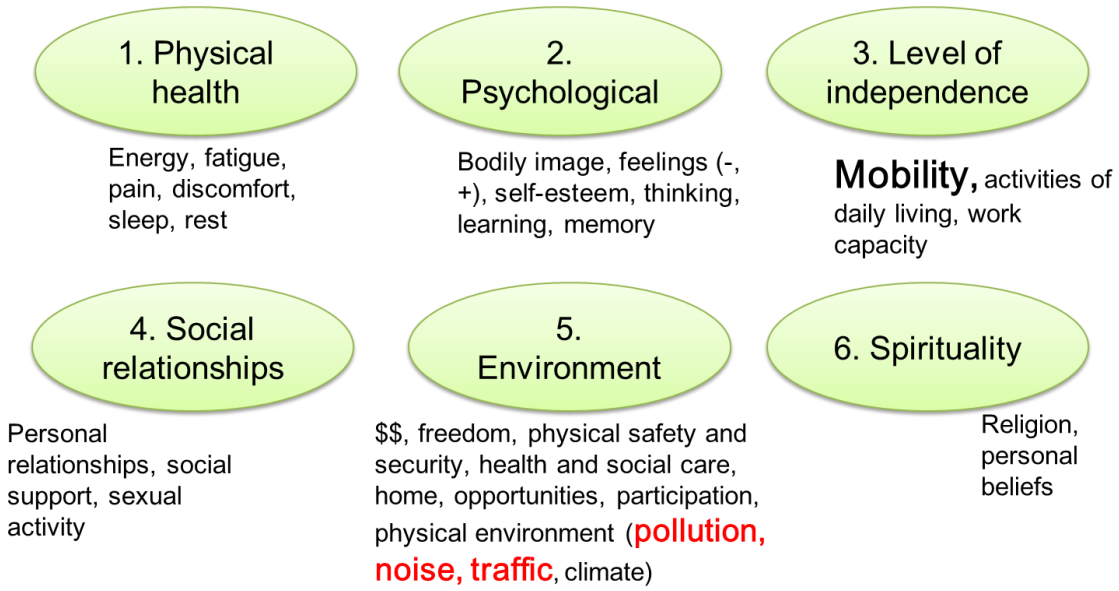

Figure 79. Broad domains of quality of life (by WHO)

Under the multidimensional nature of QOL concept, the impacts of transport and urban planning on well-being can be studied from multiple perspectives, including health, environmental quality, community development, etc.).

Moreover, through this study we already know what aspects of transport disadvantage cause impacts in well-being depending on the different locations of study, which we have defined here as the true process of Transport-based Social Exclusion. However, more

information on the causal mechanisms behind the reduced well-being is necessary to understand more comprehensively these phenomena. (see Figure 80) Thus, we know which makes Transport-based social Exclusion occur, but there is much less certitude on how or why it actually occurs.

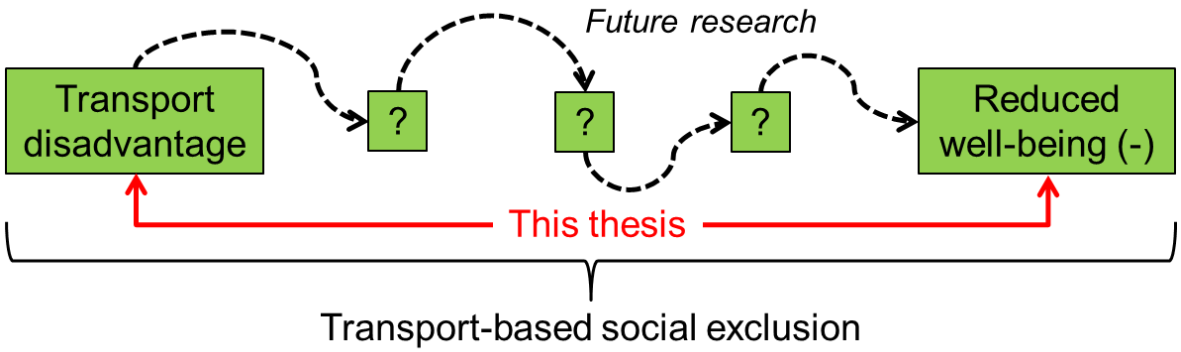

Figure 80. Causal mechanisms for reduced well-being due to transport disadvantage

- **Limitations related to the study in Bangladeshi cities**

No studies of well-being in rural areas of Bangladesh were conducted in this dissertation, where more detailed knowledge about their current needs is necessary to understand the rural-urban interactions that originate migration. In fact, we could not extend our study to the rural areas of Bangladesh, due to our constraints in time, human and financial resources; we prioritized the study of urban areas when it was the time to conduct the survey in the country. Understanding more about social exclusion in rural areas of the country is necessary for a more comprehensive understanding of the problems and challenges that rapidly growing urban areas are facing nowadays.

According to the World Bank (2014), in Bangladesh there are 47 million people who still live in poverty and 70 percent of them live in rural areas. Moreover, rural poverty continues to be significantly higher and more extreme than urban. Rural poverty and food security thus remain critical development challenges with the need for growth to be inclusive and pro-poor.

The study of transport-based social exclusion issues could contribute for poverty reduction, agriculture development, access to opportunities for employment and income increase, adaptation and mitigation of natural disasters, better and more equal distribution of resources, improvement of supply of basic needs (food, health care, education, etc.), foster productivity and improve inclusion in society. These issues undoubtedly need to be considered in future studies.

Other limitations are related to information that we could not collect or was not available to expand the scope of this dissertation. For instance, no information is available about the space-related category of social exclusion, something relevant in developing countries with profound social divisions and income gaps. Qualitative and quantitative research is necessary to understand how these lack of interactions lead to exclusion in some sectors of the population and which groups are at higher risk of exclusion.

More detailed geographical and statistical information about the urban structure in Bangladeshi cities is necessary to withdraw more detailed conclusions about the features built environment that contribute to enhance or to deteriorate health-related Quality of Life. Future studies should also target specific population sectors of specific segments such as cyclists, bus riders, rickshaw users, women, recent migrants, etc., which have been identified as groups at higher risk of exclusion. Their interactions with other members of society and with the built environment should be more difficult in several aspects than for other members of society and this hypothesis should be tested in future studies with evidence specifically oriented towards those groups.

- **Limitations related to the study in rural Japan**

Considering our main findings, here we list the main limitations in this work that should be addressed in future studies in rural Japan.

First, we do not have available information for the desired destinations in case of future migration. Thus, we cannot control for intra-prefectural or inter-prefectural migration effects, a much needed information to better plan and control for the population shrinking and the implications of relocation. In addition, we may presume that a large proportion of students wish to continue studying in a university in Hiroshima prefecture – where many universities are located – but due to confidentiality issues.

Second, future studies should be conducted in other prefectures with high numbers of depopulating municipalities, and evaluate the effect of incentives either to stay or to migrate into depopulating zones.

Third, it has been argued that the individual Time Perspective (TP) profiles might be something of a dynamic character, which means that the distribution and prevalence of scores are likely to change over time. Furthermore, we might presume that social exclusion and migration are life-changing experiences that would make TP profiles change, then having reverse and reciprocal cause-effect relationships between TP and future migration decisions.

Longitudinal studies are required to study more in depth these possible and unexplored causal effects, and would add valuable information on how TP profiles and migration intentions change over time. Finally, considering that social support and accessibility for schooling trips will make high-school students less likely to migrate permanently, more research should be focused on which strategies for community-based development and community participation should be provided in areas where future migration wants to be monitored, controlled or influenced.

As for the Japanese rural areas case, it was pointed that technology and other factors when being included, they can open the possibilities to improve quality of life in rural

areas, and in addition there are positive aspects of life in rural areas *per se* that should be considered in future studies. In fact, life in rural areas has many positive sides and groups of people start to notice it, a small – and growing - minority. Just as (transport-based) social exclusion is a push factor for migration from a rural to an urban area, it can be a push factor incentivizing migration from urban to rural areas as well.

Hays (2009) mentions 3 types of migrants: people who were brought up in the country, worked in the cities and then returned to their homes, called the "U-turners"; those who started in the country and then moved to a different rural area after getting fed up with urban life, called "J-turners."; and people who were brought up in the cities and moved to the country after college, called "I-turners". Therefore, there is potential in rural areas of Japan to attract population based on the experiences that some people might find desirable.

Among the most frequently mentioned motivations we can find: value of nature, low-stress country life, cheap rent and cost of life, it is possible to build a house, psychological well-being, grow one's own food and practice farming. Other people just become tired of city life, associated to desires to run away from the economic machine and the social system behind it.

And in many cases, people in rural areas who wish to stay or have not considered migration do work together to make their own communities a better place to live, contributing greatly to the revitalization efforts.

- **Limitations related to the study in urban Japan**

Although the respondents in the sample can be considered well balanced by gender, it should be noted that there were very few responses from young people (under 19 years old) and elderly adults (over 65 years old). Therefore, the findings of this publication may be applicable for the adult population segment that is under 65 years old only. This must be considered of special relevance in the context of aging population, where the preferences of underage young people and elderly people will have important implications for the mid- and long-term future of the society.

On the other hand, the activities that people do in a park are much more diverse and serve many more purposes than the ones that have been listed in this research. Therefore it is necessary more qualitative and quantitative research that allows to bring more clarity on other issues related to park usage behaviour and the mechanisms through which these behavioural issues contribute to an increase on well-being.

As for the links between parks and other neighbourhood characteristics, no specific information (geographically speaking) of the parks is known in our questionnaire, which

limits our capacity to explore the characteristics and issues of neighbourhoods and parks that influence people's decisions regarding specific park locations and activities to do there. Other factors such as occupation, weather, emotional condition, family situation and even influence of social circle may play important roles either as motivation agents or as deterrents for using park or deciding which type of activities to perform there.

Similarly, more information regarding the quality of infrastructure, the degree of interaction (not merely their presence or absence in an urban environment) of users and elements of the built environment, as well as more details about the type and duration of the activities that are possible thanks to those facilities should be captured and included in future analyses.

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Appendix A: Survey questionnaire for Bangladesh

Survey date: 2015 Month____Day_____ Interviewer ID: _____

Household ID: _____

Survey of Travel Behavior, Life, and Impacts of Natural Disasters

Q1. Your residence

Q1.1 Location: Zila_____Upazila_____Union_____Street_____

Q1.2 How long have you lived in the current residence? _____years_____months

Q1.3 Type of house

1. Reinforced concrete 2. Bricks 3. Bamboo 4. Earthen
5. Others (Specify _____)

Q1.4 Housing area _____ m2

Q1.5 Ownership of house 1. Own 2. Rent free 3. Rented 4. Subsidized rent 5. Others

Q1.6 Formal/information residence 1. Formal 2. Informal

Q2. Answer the following questions related to your migration.

Q2.1 Did you move from other place?

1. No, I was born in the current city/town/village (go to Q3)
2. Yes, I moved from other place (go to Q2.2)

Q2.2 If you moved from other place, where did you move from?

Zila_____Upazila_____Union_____

Q2.3 If you moved from other place, why did you move? (Multiple choice)

1. poverty 2. unemployment 3. insufficient education facilities
4. difficult to have enough food stably 5. bad relationship with neighbourhood
6. insufficient medical facilities 7. Influence of my relatives/friends/family
8. dislike agricultural activities 9. natural disasters 10. too boring to stay
11. water problem 12. electricity problem 13. Others

Q3. Where is your hometown?

1. Same as the location in Q1.1

2. My hometown is: Zila_____Upazila_____Union_____

Q4. Attributes of yours and your household

Q4.1 Your age: _____ years old

Q4.2 Your gender: 1. Male 2. Female

Q4.3 Do you practice any religion?

1. Muslim 2. Catholic 3. Buddhist 4. Hinduism 5. Others ( )

Q4.4 Your education level

1. Didn't pass any class 2. I-V class 3. VI-VIII 4. IX-X 5. S.S.C/Equivalent
6. H.S.C/Equivalent 7. Degree/Equivalent 8. Post grad./Equivalent
9. M.B.B.S/Engineering 10. Technology 11. Others ( )

Q4.5 Your household composition (how many persons for each category)

1. Males ( ) 2. Females ( ) 3. Members older than 60 years old ( ) 4. Members younger than 12 years old ( )

Q4.6 Your household monthly income (BDT)

1) < 5,000 2) 5,000–10,000 3) 10,000–15,000 4) 15,000–20,000
5) 20,000–25,000 6) 25,000–35,000 7) 35,000–50,000 8) 50,000–70,000
9) 70,000–100,000 10) 100,000–150,000 11) 150,000–200,000 12) > 200,000

Q4.7 Your monthly expenditure on transport

_____ BDT

Q4.8 Your family's monthly expenditure on food

_____ BDT

Q4.9 Your job: If you choose "13", please fill in how long you have been unemployed.

1. Farmer	2. Fisher	3. Labor	4.Merchant/ business man	5. Government staff	6. Government officer
7.Private job	8.Teacher	9.Student	10. Politicians	11. Rickshaw driver	
12. Boatman	13. Unemployed (_____ months)		14. Others (if any_____ _____)_		

Q4.10 Check if you are able to: (Multiple choice)

1. Normally walk 2. Ride a bicycle 3. Drive a motorcycle 4. Drive a car

Q4.11 Please tell us how many of these vehicles does your household owns.

1. Bicycles( ) 2. Motorcycles ( ) 3. Cars ( )
4. Light truck ( ) 5. Rickshaw ( )
6. Others: (1) Type of vehicle ( ) (2) how many vehicles ( )

Q5. Time spent on activities in a typical day (minutes) (WD: weekday; WE: Weekend)

	In-home activities			Out-of-home activities							
Total= 1440 min	Sleep	House-work	Others	Work	Study	Shopping	Leisure Recreation sports	Religious activities	Other social activities	Trip-making	others
WD											
WE											

Q6. In general, how happy would you say that you are?

1. Very unhappy 2. Unhappy 3. Normal 4. Happy 5. Very happy

Q7. Vehicle ownership and usage

	Passenger Car	Light Truck	Motorcycle
Displacement (Engine size)	( ) cc	( ) cc	( ) cc
Fuel type (select only one type)	1.Gasoline 2.Diesel 3.Hybrid 4. CNG 5.Other( )	1.Gasoline 2.Other( )	1.Gasoline 2.Other( )
Price of vehicle	( ) BDT	( ) BDT	( ) BDT
Distance traveled per year	( ) km	( ) km	( ) km
Your personal average usage frequency as driver or passenger	1 2 3 4 1. Almost every day 2. About 1 or 2 times/ week 3. About 3 or 4 times/week 4. Less than 1 or 2 times/week	1 2 3 4	1 2 3 4
Are there bicycles in your household? (Yes / No) Usage frequency? (1 2 3 4 : see above)			

Q8. How many times per day you go outside your neighbourhood? _____Times/day

Q9. How often do you make trips by travel modes and with different purposes?

Numbers in the following table mean:

1) not at all 2) seldom 3) about once a month 4) twice a month

5) 1 or 2 times per week 6) 3 or 4 times per week 7) almost everyday

Trip purpose	Car	Motorcycle	Bicycle	Rickshaw	Walk	Bus
Work	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
School	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Shopping	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Recreation/Leisure/sports	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Religious activities	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Other social activities	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7
Other purposes	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7	1 2 3 4 5 6 7

Q10. Tell us the travel time by travel modes and with different purposes?

Trip purpose	Car	Motorcycle	Bicycle	Rickshaw	Walk	Bus
Work	___ min	___ min	___ min	___ min	___ min	___ min
School	___ min	___ min	___ min	___ min	___ min	___ min
Shopping	___ min	___ min	___ min	___ min	___ min	___ min
Recreation/Leisure/sports	___ min	___ min	___ min	___ min	___ min	___ min
Religious activities	___ min	___ min	___ min	___ min	___ min	___ min
Other social activities	___ min	___ min	___ min	___ min	___ min	___ min
Other purposes	___ min	___ min	___ min	___ min	___ min	___ min

Q11. How far from your home to the NEAREST daily facilities listed below. Please put only one check mark (✓) for facility.

No.	Facilities	Distance from home
1	Your school/ work office	_____m
2	Kindergarten	_____m
3	Elementary school	_____m
4	Secondary school	_____m
5	High school	_____m
6	Supermarket	_____m
7	Convenience/small grocery store	_____m
8	Bus stop	_____m
9	Post office	_____m
10	Bank	_____m
11	Pharmacy/ drug store	_____m
12	Clinic / hospital	_____m
13	Park	_____m
14	City centre	_____m
15	City hall	_____m

Q12. Access to services

Please circle the answer that best applies to you and your neighbourhood.

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
I can do most of my shopping at local stores.	1	2	3	4	5
There are sidewalks on most of the streets in my neighbourhood	1	2	3	4	5
The sidewalks in my neighbourhood are well maintained (paved, even, and not a lot of cracks or potholes)	1	2	3	4	5
There are bicycle or pedestrian trails in or near my neighbourhood that are easy to get to	1	2	3	4	5

Sidewalks are separated from the road/traffic in my neighbourhood by parked cars	1	2	3	4	5
People who use wheelchairs can easily circulate on the sidewalks in my neighbourhood	1	2	3	4	5
Children and elderly people can use the streets without risk of injuries	1	2	3	4	5
I can understand the use of the bus routes in the city	1	2	3	4	5
Visitors in this area can easily use the bus routes in the city	1	2	3	4	5

Q13. Traffic accidents caused by you or by others to you within this recent one year.

	Frequency of traffic accidents
During walk	_____times
During riding a bicycle	_____times
During riding a motorcycle	_____times
During the use of a bus	_____times
During driving a car	_____times
During the use of a rickshaw	_____times
During the use of an auto-rickshaw	_____times

Q14. Perceived security of transportation systems

Q14.1 How safe would you feel by using the following modes in your residence city/town/village?

	Very unsafe	Unsafe to some extent	Neutral	Reasonably safe	Very safe
Walk	1	2	3	4	5
Ride a bicycle	1	2	3	4	5
Ride a motorcycle	1	2	3	4	5
Use a bus	1	2	3	4	5
Drive car	1	2	3	4	5
Use a rickshaw	1	2	3	4	5
Use an auto-rickshaw	1	2	3	4	5

Q14.2 How safe are areas surrounding the following places?

	Very unsafe	Unsafe to some extent	Neutral	Reasonably safe	Very safe
Your residential neighbourhood	1	2	3	4	5
The place where you work / study	1	2	3	4	5
City centre	1	2	3	4	5
Bus centre / bus stop	1	2	3	4	5
Railway station	1	2	3	4	5
Road intersection	1	2	3	4	5
Sidewalk	1	2	3	4	5

Q15. Safety from crime and vehicle traffic

Please circle the answer that best applies to you and your neighbourhood.

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
My neighbourhood streets are well lit up during night time.	1	2	3	4	5
The crime rate within and nearby my neighbourhood is high.	1	2	3	4	5
The crime rate within and nearby my neighbourhood makes me feel unsafe to walk during the day.	1	2	3	4	5
The crime rate within and nearby my neighbourhood makes me feel unsafe to walk at night.	1	2	3	4	5
The traffic conditions within and nearby my neighbourhood makes me feel unsafe to cross the streets during the day	1	2	3	4	5
The traffic conditions within and nearby my neighbourhood makes me feel unsafe to cross the streets at night	1	2	3	4	5
I would get worried if my kids walked alone in the streets of my neighbourhood	1	2	3	4	5

Q16. How secure are the following places in the case of natural disasters?

	Very unsafe	Unsafe to some extent	Neutral	Reasonably safe	Very safe
Your residential neighbourhood	1	2	3	4	5
The place where you work / study	1	2	3	4	5
Elementary school	1	2	3	4	5
Secondary school	1	2	3	4	5
High school	1	2	3	4	5

Q17. Please tell us about the last natural disaster you experienced in your residential location. (Circle only one. If choose 1 ~ 5, then answer the questions at its right side)

Choice 1: I have not experienced any natural disaster.			
Choices 2 -6	When?	For how long?	How about damages?
Choice 2: Flood (including sea level rise)	Year ( ) Month ( )	( )days	1. No damage 2. Some structural damage to houses 3. Complete damage to many houses
Choice 3: Flash flood	Year ( ) Month ( )	( )days	1. No damage 2. Some structural damage to houses 3. Complete damage to many houses
Choice 4: Riverbank erosion	Year ( ) Month ( )	( )days	1. No damage 2. Some structural damage to houses 3. Complete damage to many houses
Choice 5: Cyclone/storm surge	Year ( ) Month ( )	( )days	1. No damage 2. Some structural damage to houses 3. Complete damage to many houses

Choice 6: Tornado	Year ( ) Month ( )	( )days	1. No damage 2. Some structural damage to houses 3. Complete damage to many houses

Q18. Please tell us how your traveling-related activities were affected after the above-mentioned natural disaster occurred.

Numbers in the following mean

1: Seriously affected 2: Affected to some extent 3: Slightly affected 4: Not affected at all

Use of modes of transportation				
1. Walk	1	2	3	4
2. Ride bicycle	1	2	3	4
3. Ride motorcycle	1	2	3	4
4. Use bus	1	2	3	4
5. Drive car	1	2	3	4
6. Use a rickshaw	1	2	3	4
7. Use an auto-rickshaw	1	2	3	4
Access to facilities				
1. Work office	1	2	3	4
2. School	1	2	3	4
3. Kindergarten	1	2	3	4
4. Supermarket	1	2	3	4
5. Convenience/small grocery store	1	2	3	4
6. Pharmacy/ drug store	1	2	3	4
7. Clinic / hospital				
8. City centre	1	2	3	4
9. City hall	1	2	3	4
10. Relatives' homes	1	2	3	4
11. Friends' / neighbours' homes	1	2	3	4
12. Religious facility	1	2	3	4

Q19. Do you think you are very optimistic about the life of you and your family in future?

1. Fully agree 2. Agree slightly 3. Neutral 4. Disagree slightly 5. Fully disagree

Q20. In general, how are you satisfied with the following areas of your life?

	Strongly dissatisfied	Somewhat dissatisfied	Neither satisfied or dissatisfied	Somewhat satisfied	Strongly satisfied
Your residence	1	2	3	4	5
Your family financial conditions	1	2	3	4	5
Your health conditions	1	2	3	4	5
Your family members' health conditions	1	2	3	4	5
Your neighbourhood	1	2	3	4	5
Your education	1	2	3	4	5
Your family's education	1	2	3	4	5
Your employment	1	2	3	4	5
Your family's employment	1	2	3	4	5
Your family life	1	2	3	4	5
Your leisure and recreational activities	1	2	3	4	5
Your social state (reputation)	1	2	3	4	5
Your family's social state (reputation)	1	2	3	4	5
Your residence city, town, village	1	2	3	4	5
Your country's security and stability	1	2	3	4	5
Your overall life satisfaction	1	2	3	4	5

Q21. If transport access to various facilities/services in your city/town were better than now, how much do you think your life would be improved?

	Not at all Or not relevant	Slightly	To some extent	Very much
Your income level	1	2	3	4
Your family's income level	1	2	3	4
Your education	1	2	3	4
Your family's education	1	2	3	4
Your health conditions	1	2	3	4
Your family's health conditions	1	2	3	4
The quality of your residence	1	2	3	4
Effective use of your time to improve your life	1	2	3	4
Your participation in leisure and recreational activities	1	2	3	4
Your communication with members in your social network	1	2	3	4
Your overall life satisfaction	1	2	3	4

Appendix B: Survey questionnaire for High Schools in Japan

学年:（1 年生、2 年生、3 年生）　　コース:（文系、理系、その他、未定）

高校生の生活及び将来の人生選択に関するアンケート調査

このアンケート調査では、高校生の皆様の現在の生活と将来の人生選択についてお尋ねいたします。皆様のプライバシーに配慮し、個人を特定できる情報をお聞きいたしません。また、回答内容はすべて統計処理したうえで、学術研究のためのみに使用いたします。調査の趣旨にご理解していただき、ご協力していただきますよう、よろしくお願い申し上げます。

パート１　あなたのことについてお尋ねいたします。

1.1.　引っ越しの経験がありますか。該当数字に○印をつけてください。

(1) ある　　(2) ない

➢　「ある」を選んだ方、以下のことをご回答ください。

引っ越しの年月	以前の居住地 番地まで記入する必要はありません。 都道府県、市町村区分までの覚えている範囲でお答えください。	あなたの両親が引っ越しを決めた理由（以下の理由から選び、該当数字を○印で囲んでください）　（複数回答可）
_____年 _____月	郵便番号　(　　)ー(　　)	1　2　3　4　5　6　7　8　9 10　11　12　13　14　15　16 17　18　19　20　21　22　23 24　25　26
_____年 _____月	郵便番号　(　　)ー(　　)	1　2　3　4　5　6　7　8　9 10　11　12　13　14　15　16 17　18　19　20　21　22　23 24　25　26

＜引っ越しの理由＞

1. 自分の入学・進学
2. 父親の就職
3. 父親の転職（両親の都合による）
4. 父親の転職（会社の都合による）
5. 父親の転勤
6. 父親の家業継承
7. 父親の起業
8. 父親の定年退職
9. 母親の就職
10. 母親の転職
11. 母親の転勤
12. 母親の家業継承
13. 母親の起業
14. 母親の定年退職
15. 祖父母（父方）と同居
16. 祖父母（父方）と近居
17. 祖父母（母方）と同居
18. 祖父母（母方）と近居
19. 住宅事情
20. 生活環境上の理由
21. 自分の通勤・通学の便
22. 父親の通勤・通学の便
23. 母親の通勤・通学の便
24. 弟・妹を育てる環境上の理由
25. 家庭の健康上の理由
26. その他

1.2. 年齢： _____ 歳

1.3. 性別：(1) 男性　(2) 女性

1.4. 卒業年もしくは卒業予定年

(1) 中学校	(2) 高等学校
_____ 年_____ 月	_____ 年_____ 月

1.5. 家族構成：それぞれの項目に当てはまる人数をご記入ください

(1) 男性_____人　　(2) 女性_____人　　(3) ６５歳以上の人数_____人

(4) 兄弟姉妹の人数

	兄	弟	姉	妹
すべての兄弟姉妹	人	人	人	人
そのうち、あなたと同居している兄弟姉妹	人	人	人	人

1.6. 現在あなたが通っている学校名 _____

1.7. 自宅の郵便番号_____ - _____

(都道府県)_____ (市区町村)_____ ※番地まで記入する必要はありません。

1.8. あなたは高等学校に進学することを自分で決めましたか。該当数字に○印を付けてください。また、「(3)」を選ぶ場合、その具体的な理由もご記入ください。

(1) はい、自分で決めた。　　(2) いいえ、両親が決めた。

(3) その他の理由（可能であれば、具体的に記入_____）

パート２　あなたの学校、日々の生活、生活環境についてお尋ねいたします。

2.1. 家から学校までの距離はどのくらいですか。該当する数字に○印をつけてください。

(1) 500 m 未満　　(2) 500 m – 1 km　　(3) 1 – 2 km　　(4) 2 – 3 km

(5) 3 – 4 km　　(6) 4 – 5 km　　(7) 5 – 10 km　　(8) 10km 以上

2.2. いま、あなたのクラスには何人の生徒がいますか。_____人

2.3. あなたの自宅から以下の施設までの距離はどれくらいですか。該当する数字に○印をつけてください。

1) 500 m 未満	2) 500 m – 1 km 未満	3) 1km – 2 km 未満
4) 2 km – 3 km 未満	5) 3 – 4 km 未満	6) 4 km – 5 km 未満
7) 5 km – 10 km 未満	8) 10km 以上	9) どこにあるのかわからない

最寄りの銀行もしくは郵便局	1	2	3	4	5	6	7	8	9
最寄りのコンビニ	1	2	3	4	5	6	7	8	9
最寄りのスーパー	1	2	3	4	5	6	7	8	9
最寄りのドラッグストア	1	2	3	4	5	6	7	8	9
最寄りの駅	1	2	3	4	5	6	7	8	9
最寄りのバス停	1	2	3	4	5	6	7	8	9
最寄りのスポーツ施設（運動場など）	1	2	3	4	5	6	7	8	9
最寄りの公園	1	2	3	4	5	6	7	8	9
最寄りのｺﾐｭﾆﾃｨｾﾝﾀｰ（公民館など）	1	2	3	4	5	6	7	8	9
病院/保健所	1	2	3	4	5	6	7	8	9
スイミングプール	1	2	3	4	5	6	7	8	9
ゲームセンター	1	2	3	4	5	6	7	8	9
ボーリングセンター	1	2	3	4	5	6	7	8	9
バッティングセンター	1	2	3	4	5	6	7	8	9
商業施設	1	2	3	4	5	6	7	8	9
衣料品店	1	2	3	4	5	6	7	8	9
本屋	1	2	3	4	5	6	7	8	9
塾	1	2	3	4	5	6	7	8	9
市役所	1	2	3	4	5	6	7	8	9
警察署、交番	1	2	3	4	5	6	7	8	9
幼稚園、保育園	1	2	3	4	5	6	7	8	9

2.4. あなたの普段の通学方法についてお答えください。通学に用いる交通手段とそれぞれの移動にかかる時間を記入してください（記入に際して以下の記入例をご参考ください）。

例1：自宅から学校まで毎日自転車で15分かけて登校する。

交通手段 →	1	2	3	4	5
	所要時間（片道）	所要時間（片道）	所要時間（片道）	所要時間（片道）	所要時間（片道）
徒歩	分	分	分	分	分
自転車	**15 分**	分	分	分	分
バス	分	分	分	分	分
電車	分	分	分	分	分
地下鉄/路面電車	分	分	分	分	分
車	分	分	分	分	分
バイク/原付	分	分	分	分	分
その他	分	分	分	分	分

例2：自宅からバス停まで5分間徒歩で移動し、その後バスに20分間乗車して駅でバスを降りる。そして60分間電車に乗り、到着駅から学校までさらに15分間徒歩で移動する。

交通手段 →	1	2	3	4	5
	所要時間（片道）	所要時間（片道）	所要時間（片道）	所要時間（片道）	所要時間（片道）
徒歩	**5 分**	分	分	**15 分**	分
自転車	分	分	分	分	分
バス	分	**20 分**	分	分	分
電車	分	分	**60 分**	分	分
地下鉄/路面電車	分	分	分	分	分
車	分	分	分	分	分
バイク/原付	分	分	分	分	分
その他	分	分	分	分	分

交通手段 →	1	2	3	4	5
	所要時間（片道）	所要時間（片道）	所要時間（片道）	所要時間（片道）	所要時間（片道）
徒歩	分	分	分	分	分
自転車	分	分	分	分	分
バス	分	分	分	分	分
電車	分	分	分	分	分
地下鉄/路面電車	分	分	分	分	分
車	分	分	分	分	分
バイク/原付	分	分	分	分	分
その他	分	分	分	分	分

注意：普段最も頻繁に用いる通学手段ひとつに関してのみお答えください。縦の列に関して、同じ列に２つ以上回答しないでください。

パート３　あなたの時間に関する意識についてお尋ねいたします。

これらの質問に「自分にどれぐらい当てはまるか」を以下の５段階評価でお答えください。
該当数字に○印をつけてください。

1=まったく当てはまらない　2=当てはまらない　3=どちらとも言えない　4=当てはまる　5=とてもよく当てはまる					
1. 友人とつるむ（遊ぶ）ことは人生の大切な喜びの一つだと思う。	1	2	3	4	5
2. 幼い頃に慣れ親しんだ光景、音、匂いは楽しかった記憶を思い出させる。	1	2	3	4	5
3. 人生で起こりうるすべてのことは運命だと思う。	1	2	3	4	5
4. よく、「あの時ああしていれば…」と人生の選択を後悔することがある。	1	2	3	4	5
5. 私の選択は、周りの人間と事象に左右されていると思う。	1	2	3	4	5
6. 毎朝その日にすることをきちんと計画するべきだと思う。	1	2	3	4	5
7. 過去を振り返ることは私を幸せな気分にさせる。	1	2	3	4	5
8. 私は物事を衝動的に行う。	1	2	3	4	5
9. 私は物事が計画通りの時間に終わらなくても気にしない。	1	2	3	4	5
10. 何かを達成したい時はゴールに向かって細かく目標を設定し、それらに合う手段を考慮に入れる。	1	2	3	4	5
11. 相対的に考えて、私の過去は悲しみやつらかった思い出よりも喜びに満ちている。	1	2	3	4	5
12. 好きな音楽を聞いていると時間を忘れる。	1	2	3	4	5
13. 個人の趣味の時間よりも翌日の締め切りや必要なこと、大事な用事等を優先する。	1	2	3	4	5
14. 人生はなるようになるので、私が何をしようがあまり関わりがないと思う。	1	2	3	4	5
15. 私は「古き良き時代」の話を聞くのが好きだ。	1	2	3	4	5
16. 過去の辛い思い出を繰り返し思い出してしまう。	1	2	3	4	5
17. 私は1日1日を大切に生きている。	1	2	3	4	5
18. 約束に遅れることは私をひどく不安にさせる。	1	2	3	4	5
19. 理想としては、毎日が人生の最後の日であるかのように生きたい。	1	2	3	4	5
20. 楽しかった記憶をすぐに思い出すことができる。	1	2	3	4	5
21. 私は、友人や権威（先輩や先生など）などに対する義務を時間通りに遂行する。	1	2	3	4	5
22. 過去にいじめられたり、他人に拒絶されたりしたことがある。	1	2	3	4	5
23. 私はその時々の気分によって選択をする。	1	2	3	4	5
24. 私はどちらかというと毎日を自由気ままに生きている方である。	1	2	3	4	5
25. 過去は辛い思い出ばかりなのであまり考えないようにしている。	1	2	3	4	5
26. 人生は刺激に満ち溢れているべきだと思う。	1	2	3	4	5
27. 私は過去に過ちを犯したのでできることならやり直したいと思う。	1	2	3	4	5

1=まったく当てはまらない　2=当てはまらない　3=どちらとも言えない 4=当てはまる　5=とてもよく当てはまる					
28. 今を楽しむ事の方が、締め切りなどの時間に捉われることより大事だと思う。	1	2	3	4	5
29. 私は自分の幼少時代を懐かしく感じる。	1	2	3	4	5
30. 私は決断をする前に、その選択から得られるものと失うものを天秤にかける。	1	2	3	4	5
31. リスクをとることは、私の人生が退屈なものにならないようにしてくれると思う。	1	2	3	4	5
32. 私にとって、人生の過程を楽しむことは、目的地にたどり着くことより大事だ。	1	2	3	4	5
33. 計画通りに物事が運ぶことは滅多にない。	1	2	3	4	5
34. 幼い頃のトラウマや不快なイメージを忘れるのは難しいことだ。	1	2	3	4	5
35. 物事のゴールや結果、成果物などについて考えると、その過程を楽しむことができなくなる。	1	2	3	4	5
36. 今現在を楽しんでいる時でも、過去の似たような経験と常に比較してしまう。	1	2	3	4	5
37. 物事や環境は変わるので、未来について計画を立てたり準備をしたりすることは不可能だと思う。	1	2	3	4	5
38. 私の人生は私には干渉できない何か大きな力にコントロールされていると思う。	1	2	3	4	5
39. 未来について心配をする意味がわからない、なぜなら私がそれに対してできることは何もないからだ。	1	2	3	4	5
40. 私はきちんと計画を立てて物事を計画通りに進めることができる。	1	2	3	4	5
41. 私は、家族が「昔はよかったわ。」などと過去を懐かしがっていると自然とそれらの話に耳を傾けないようにしてしまう。	1	2	3	4	5
42. 私は人生を面白みのあるものにするためにはリスクを冒すことも厭わない。	1	2	3	4	5
43. 私はやるべきことをリスト化する。	1	2	3	4	5
44. 私は理性よりも感情に従う方だ。	1	2	3	4	5
45. 私はやるべきことがあるとき、誘惑を断ち切ることができる。	1	2	3	4	5
46. ふと我に帰ると、その時々を狂ったように楽しんでいる自分を見つけることがある。	1	2	3	4	5
47. 今の社会や生活、人生はあまりにも複雑になってしまったので、昔のように単純に生きたいと思う。	1	2	3	4	5
48. 行動パターンが読める普通の友人よりも、奇抜で斬新かつ活動的でなにをしでかすかわからないような友人が欲しいと思う。	1	2	3	4	5

1=まったく当てはまらない　2=当てはまらない　3=どちらとも言えない 4=当てはまる　5=とてもよく当てはまる					
49. 私は繰り返されてきた家族の習慣や伝統が好きだ。	1	2	3	4	5
50. 私は、過去に起こった悲しかった出来事や悪い出来事について考え込んでしまう。	1	2	3	4	5
51. 私は、自分のためになるなら難しくて興味のないことについてもやり続けることができる。	1	2	3	4	5
52. 自分で稼いだお金は、貯めるよりも今やりたいことに使いたいと思う。	1	2	3	4	5
53. 努力よりも運のほうが私をよい結果に導いてくれると思う。	1	2	3	4	5
54. 私は、自分の人生のうちで逃してしまった好機について考えてしまう。	1	2	3	4	5
55. 私は親密な関係にある人たちはお互いに対して情熱的であるべきだと思う。	1	2	3	4	5
56. 仕事や課題等で、できなかったことがあってもそのうちどうにかできると思う。	1	2	3	4	5

パート４　あなたの将来の人生選択についてお尋ねいたします。

4.1.　あなたの将来について、以下の項目についてどのように考えていますか。
これらの質問に「自分にどれぐらい当てはまるか」を以下の５段階評価でお答えください。
該当する数字に○印をつけてください。

1: 絶対にしたくない　2: 考えたことがない　3: いずれ考えてみる 4: 良い機会があったらしてみたい　5: 真剣に考えている					
大学進学	1	2	3	4	5
いい車を持つ	1	2	3	4	5
ペットを飼う	1	2	3	4	5
たくさんのお金を稼ぐ	1	2	3	4	5
企業に就職し、やりがいのある仕事に就く	1	2	3	4	5
家業を継ぐ	1	2	3	4	5
起業する	1	2	3	4	5
パートナーを持つ/結婚する	1	2	3	4	5
子供を一人持つ	1	2	3	4	5
二人以上の子供を持つ	1	2	3	4	5
有名になる	1	2	3	4	5
スポーツや芸術で成果を上げる	1	2	3	4	5
遠いところへ旅行に行く	1	2	3	4	5

4.2. 以下の移住に関する項目の中から、あなたの現在の状態に合うものを一つ選び、該当する数字に○印をつけてください。

(1) 自分の意思ではない理由で将来どこかに移住することが決まっている
(2) 現在の都市で住み続けたい
(3) 将来どこに住むかについてまだ考えていない、あるいは考えたことがない
(4) 将来どこに住むかについて、考えてはいるが迷っている
(5) 将来、日本国内のほかの都市・地域に移住したい
(6) 将来、自分の意思で日本国内のほかの都市・地域に移住すべく準備をすでに始めている
(7) 将来、自分の意思で日本国内のほかの都市・地域に移住することが決まっている
(8) 将来に海外への移住を考えている、準備している、あるいは決めている

4.3. 上記の問 4.2 において、(5), (6), (7)と回答した方にお尋ねいたします。それ以外の方はパート５にお進みください。

4.3.1. 将来、今住んでいる場所に戻りたいですか？該当数字に○印をつけてください。
(1) はい　　(2) いいえ

4.3.2. 問 4.3.1 において「はい」と答えた場合、今から何年後に今住んでいる場所に戻りたいですか？該当数字に○印をつけてください。
(1) 5 年以内　(2) ５～10 年以内　(3)10～20 年以内　(4) 20 年以上

パート５　以下のことについてお尋ねいたします。

それぞれの項目について、1-4 の選択肢の中で当てはまる数字に○印をつけてご回答ください。それぞれの数字の意味は以下のとおりです。

(1) 全くそうではない　2：たまに　3：ときどき　4：全くそうである				
安全面				
近所の道路は安全だと思う	1	2	3	4
毎日移動する区間は安全だと思う	1	2	3	4
自分自身の健康について				
肉体的に健康だと思う	1	2	3	4
精神的に健康だと思う	1	2	3	4
運動を楽しむことができる	1	2	3	4
社会参加及び関与				
集団活動に参加することができる	1	2	3	4
集団における意思決定にかかわることができる	1	2	3	4
自分自身について思うとおりに説明できる	1	2	3	4
いろいろな目的のボランティア活動に参加することが好きだ	1	2	3	4
現在の生活環境に対する印象				

(1) 全くそうではない　2：たまに　3：ときどき　4：全くそうである				
頻繁に緑の空間や自然環境にアクセスすることができる	1	2	3	4
豊かな自然を満喫している	1	2	3	4
今住んでいる場所での生活スタイルが好きだ	1	2	3	4
将来、今とは全く違う生活スタイルで暮らしたい	1	2	3	4
どこか行きたいところに行く際、公共交通機関を使っていくことができる	1	2	3	4
頻繁に行きたいと思う場所の近くに住んでいる	1	2	3	4
日々の通学は自分や家族にとって負担ではない	1	2	3	4
周りからの支援				
必要な時に身近に住んでいる家族から手助けを受けることができる	1	2	3	4
必要な時に遠くに住んでいる家族から手助けを受けることができる	1	2	3	4
必要な時に友達から手助けを受けることができる	1	2	3	4
必要な時に近所の人から手助けを受けることができる	1	2	3	4
制度的支援				
自分の所属するコミュニティの人々は、何か困ったときに地方自治体から支援を受けることができる	1	2	3	4

質問は裏にもあります。

パート６　あなたの健康と生活習慣についてお尋ねいたします。

以下の活動があなたの将来の生活向上にどのくらい重要かについて、該当する数字に○印をつけてご回答ください。それぞれの数字の意味は以下のとおりである。

1：全く重要でない　2：ときどき重要　3：わからない 4：重要　5：とても重要					
毎朝朝食を食べる	1	2	3	4	5
十分な睡眠をとる	1	2	3	4	5
バランスの取れた健康的な食事をとる	1	2	3	4	5
喫煙しない	1	2	3	4	5
運動をする	1	2	3	4	5
平和な環境で暮らす	1	2	3	4	5
公園に行く	1	2	3	4	5
スポーツをする	1	2	3	4	5
クラブ活動に参加する	1	2	3	4	5
その他の社会活動（ボランティア）	1	2	3	4	5
近所の人と知り合いになる	1	2	3	4	5
文化施設に定期的に行くこと（博物館、映画館、図書館）	1	2	3	4	5
いろいろな活動に参加すること	1	2	3	4	5
家族と過ごす	1	2	3	4	5
友達と過ごす、一緒に遊ぶ	1	2	3	4	5

パート７　あなたの生活に対する満足度についてお尋ねいたします。

該当する数字に○印をつけてご回答ください。それぞれの数字の意味は以下のとおりです。

1：全く満足していない・・・・・・・・・10：とても満足している生活環境										
家計	1	2	3	4	5	6	7	8	9	10
自分自身の健康	1	2	3	4	5	6	7	8	9	10
家族の健康	1	2	3	4	5	6	7	8	9	10
近所の人との関係	1	2	3	4	5	6	7	8	9	10
そのほかのソーシャルネットワーク	1	2	3	4	5	6	7	8	9	10
教育	1	2	3	4	5	6	7	8	9	10
家族の生活	1	2	3	4	5	6	7	8	9	10
余暇や社会生活	1	2	3	4	5	6	7	8	9	10
生活水準	1	2	3	4	5	6	7	8	9	10
人生において達成したいこと	1	2	3	4	5	6	7	8	9	10
どれだけ安全だと感じるか	1	2	3	4	5	6	7	8	9	10
将来の安心	1	2	3	4	5	6	7	8	9	10
宗教や精神面	1	2	3	4	5	6	7	8	9	10
生活全体	1	2	3	4	5	6	7	8	9	10

ご協力、ありがとうございました！

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Appendix C: Measuring instruments. The Zimbardo Time Perspective Inventory (ZTPI) and the SF-36 Survey

Zimbardo Time Perspective Inventory

From: http://www.thetimeparadox.com/research/

Read each item and, as honestly as you can, answer the question: "How characteristic or true is this of me?" Of the total 61 questions, you must answer all 56 of the required questions marked with a * in order for your survey to be submitted and for you to get results.

1: Very untrue, 2: Untrue, 3: Neutral, 4: True, 5: Very true					
	1	2	3	4	5
1. I believe that getting together with one's friends to party is one of life's important pleasures.					
2. Familiar childhood sights, sounds, smells often bring back a flood of wonderful memories.					
3. Fate determines much in my life.					
4. I often think of what I should have done differently in my life.					
5. My decisions are mostly influenced by people and things around me.					
6. I believe that a person's day should be planned ahead each morning.					
7. It gives me pleasure to think about my past.					
8. I do things impulsively.					
9. If things don't get done on time, I don't worry about it.					
10. When I want to achieve something, I set goals and consider specific means for reaching those goals.					
11. On balance, there is much more good to recall than bad in my past.					
12. When listening to my favourite music, I often lose all track of time.					
13. Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play.					
14. Since whatever will be will be, it doesn't really matter what I do.					
15. I enjoy stories about how things used to be in the "good old times."					
16. Painful past experiences keep being replayed in my mind.					
17. I try to live my life as fully as possible, one day at a time.					
18. It upsets me to be late for appointments.					
19. Ideally, I would live each day as if it were my last.					

1: Very untrue, 2: Untrue, 3: Neutral, 4: True, 5: Very true					
	1	2	3	4	5
20. Happy memories of good times spring readily to mind.					
21. I meet my obligations to friends and authorities on time.					
22. I've taken my share of abuse and rejection in the past.					
23. I make decisions on the spur of the moment.					
24. I take each day as it is rather than try to plan it out.					
25. The past has too many unpleasant memories that I prefer not to think about.					
26. It is important to put excitement in my life.					
27. I've made mistakes in the past that I wish I could undo.					
28. I feel that it's more important to enjoy what you're doing than to get work done on time.					
29. I get nostalgic about my childhood.					
30. Before making a decision, I weigh the costs against the benefits.					
31. Taking risks keeps my life from becoming boring.					
32. It is more important for me to enjoy life's journey than to focus only on the destination.					
33. Things rarely work out as I expected.					
34. It's hard for me to forget unpleasant images of my youth.					
35. It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products.					
36. Even when I am enjoying the present, I am drawn back to comparisons with similar past experiences.					
37. You can't really plan for the future because things change so much.					
38. My life path is controlled by forces I cannot influence.					
39. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.					
40. I complete projects on time by making steady progress.					
41. I find myself tuning out when family members talk about the way things used to be.					
42. I take risks to put excitement in my life.					
43. I make lists of things to do.					
44. I often follow my heart more than my head.					
45. I am able to resist temptations when I know that there is work to be done.					

1: Very untrue, 2: Untrue, 3: Neutral, 4: True, 5: Very true					
	1	2	3	4	5
46. I find myself getting swept up in the excitement of the moment.					
47. Life today is too complicated; I would prefer the simpler life of the past.					
48. I prefer friends who are spontaneous rather than predictable.					
49. I like family rituals and traditions that are regularly repeated.					
50. I think about the bad things that have happened to me in the past.					
51. I keep working at difficult, uninteresting tasks if they will help me get ahead.					
52. Spending what I earn on pleasures today is better than saving for tomorrow's security.					
53. Often luck pays off better than hard work.					
54. I think about the good things that I have missed out on in my life.					
55. I like my close relationships to be passionate.					
56. There will always be time to catch up on my work.					

The Zimbardo Time Perspective Inventory (ZTPI) Psychometrics and Scoring Key

(5-Factor Solution; 36.0% of variance explained)

(N=606)

(CSM Fall 1996 (205), Stanford Preselection Winter 1996 (76) and Spring 1996 (224) Samples), Winter 1997 (99)

Scoring Instructions

Before scoring the ZTPI, 5 items must be reverse coded. For the items that are reverse coded (9, 24, 25, 41, & 56):

"1" becomes a "5"
"2" becomes a "4"
"3" becomes a "3"
"4" becomes a "2"
"5" becomes a "1"

After reverse coding the 5 items, add your scores for the items that comprise

each factor. After adding your scores for each factor, divide the total score by the number of questions that comprise each factor. This results in an average score for each of the five factors. These are the formulas:

Past Negative

Add your scores on items 4, 5, 16, 22, 27, 33, 34, 36, 50, & 54. Then divide this number by 10.

Present Hedonistic

Add your scores on items 1, 8, 12, 17, 19, 23, 26, 28, 31, 32, 42, 44, 46, 48, & 55. Then divide this number by 15.

Future

Add your scores on items 6, 9 (reverse coded), 10, 13, 18, 21, 24 (reverse coded), 30, 40, 43, 45, 51, 56 (reverse coded). Then divide this number by 13.

Past Positive

Add your scores on items 2, 7, 11, 15, 20, 25 (reverse coded), 29, 41 (reverse coded), & 49. Then divide this number by 9.

Present Fatalistic

Add your scores on items 3, 14, 35, 37, 38, 39, 47, 52, & 53. Then divide this number by 9.

KMO Measure of Sampling Adequacy = .83

Factor #1: Past Negative (Eigen = 6.86; 12.3% of var; n = 10; α = .82)

Mean=2.98 SD=.72 Min=1.00 Max=5.00

No.	Loading	Question
50	.759	I think about the bad things that have happened to me in the past.
16	.694	Painful past experiences keep being replayed in my mind.
34	.674	It's hard for me to forget unpleasant images of my youth.
04	.657	I often think of what I should have done differently in my life.
54	.630	I think about the good things that I have missed out on in my life.
27	.547	I've made mistakes in the past that I wish that I could undo.
22	.490	I've taken my share of abuse and rejection in the past.
36	.472	Even when I am enjoying the present, I am drawn back to comparisons with similar past experiences.

33	.434	Things rarely work out as I expected.
05	.407	My decisions are mostly influenced by people and things around me.

Factor # 2: Present Hedonistic (Eigen = 5.01; 8.9% of var; n = 15; α = .79)

Mean=3.44 SD=.51 Min=2.00 Max=4.80

No.	Loading	Question
42	.707	I take risks to put excitement in my life.
31	.702	Taking risks keeps my life from becoming boring.
26	.558	It is important to put excitement in my life.
23	.515	I make decisions on the spur of the moment.
08	.506	I do things impulsively.
17	.501	I try to live my life as fully as possible, one day at a time.
48	.454	I prefer friends who are spontaneous rather than predictable.
32	.452	It is more important for me to enjoy life's journey than to focus only on the destination.
44	.448	I often follow my heart more than my head.
55	.445	I like my close relationships to be passionate.
46	.445	I find myself getting swept up in the excitement of the moment.
01	.424	I believe that getting together with one's friends to party is one of life's important pleasures.
19	.381	Ideally, I would live each day as if it were my last.
28	.360	I feel that it's more important to enjoy what you are doing than to get work done on time.
12	.323	When listening to my favorite music, I often lose all track of time.

Factor #3: Future (Eigen = 3.54; 6.3% var; n = 13; α = .77)

Mean=3.47 SD=.54 Min=1.62 Max=4.85

No.	Loading	Question
13	.628	Meeting tomorrow's deadline and doing other necessary work comes before tonight's play.
40	.614	I complete projects on time by making steady progress.
45	.611	I am able to resist temptations when I know that there is work to be done.
10	.556	When I want to achieve something, I set goals and consider specific means for reaching those goals.
51	.507	I keep working at difficult uninteresting work if it will help me get ahead.
18	.478	It upsets me to be late for appointments.
06	.463	I believe that a person's day should be planned ahead each morning.
21	.461	I meet my obligations to friends and authorities on time.

43	.455	I make lists of things to do.
30	.374	Before making a decision, I weight the costs against the benefits.
09	-.335	If things don't get done on time, I don't worry about it.
56	-.365	There will always be time to catch up on my work.
24	-.491	I take each day as it is rather than try to plan it out.

Factor #4: Past Positive (Eigen = 2.53; 4.5% var; n = 9; α = .80)

Mean=3.71 SD=.64 Min=1.56 Max=5.00

No.	Loading	Question
07	.677	It gives me pleasure to think about my past.
29	.645	I get nostalgic about my childhood.
20	.637	Happy memories of good times spring readily to mind.
11	.627	On balance, there is much more good to recall that bad in my past.
15	.627	I enjoy stories about how things used to be in the "good old times".
02	.620	Familiar childhood sights, sounds, and smells often bring back a flood of wonderful memories.
49	.470	I like family rituals and traditions that are regularly repeated.
41	-.448	I find myself tuning out when family members talk about the way things used to be.
25	-.522	The past has too many unpleasant memories that I prefer not to think about.

Factor #5: Present Fatalistic (Eigen = 2.21; 3.9% var; n = 9; α = .74)

Mean=2.37 SD=.60 Min=1.0 Max=4.67

No.	Loading	Question
38	.731	My life path is controlled by forces I cannot influence.
39	.682	It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.
14	.636	Since whatever will be will be, it doesn't really matter what I do.
37	.588	You can't really plan for the future because things change so much.
53	.455	Often luck pays off better than hard work.
03	.443	Fate determines much in my life.
35	.421	It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products.
47	.420	Life today is too complicated; I would prefer the simpler life of the past.
52	.338	Spending what I earn of pleasures today is better than saving for tomorrow's security.

36-Item Short Form Survey (SF-36)

From: https://www.rand.org/health/surveys_tools/mos/36-item-short-form.html

Choose one option for each questionnaire item.

1. In general, would you say your health is:

1 - Excellent
2 - Very good
3 - Good
4 - Fair
5 - Poor

2. Compared to one year ago, how would you rate your health in general now?

1 - Much better now than one year ago
2 - Somewhat better now than one year ago
3 - About the same
4 - Somewhat worse now than one year ago
5 - Much worse now than one year ago

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	Yes, limited a lot (1)	Yes, limited a little (2)	No, not limited at all (3)
3. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports	1	2	3
4. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	1	2	3
5. Lifting or carrying groceries	1	2	3
6. Climbing several flights of stairs	1	2	3
7. Climbing one flight of stairs	1	2	3
8. Bending, kneeling, or stooping	1	2	3
9. Walking more than a mile	1	2	3
10. Walking several blocks	1	2	3
11. Walking one block	1	2	3
12. Bathing or dressing yourself	1	2	3

During the **past 4 weeks**, have you had any of the following problems with your work or

other regular daily activities **as a result of your physical health**?

	Yes	No
13. Cut down the **amount of time** you spent on work or other activities	1	2
14. **Accomplished less** than you would like	1	2
15. Were limited in the **kind** of work or other activities	1	2
16. Had **difficulty** performing the work or other activities (for example, it took extra effort)	1	2

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

	Yes	No
17. Cut down the **amount of time** you spent on work or other activities	1	2
18. **Accomplished less** than you would like	1	2
19. Didn't do work or other activities as **carefully** as usual	1	2

20. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

1 - Not at all
2 - Slightly
3 - Moderately
4 - Quite a bit
5 - Extremely

21. How much **bodily** pain have you had during the **past 4 weeks**?

1 - None
2 - Very mild
3 - Mild
4 - Moderate
5 - Severe
6 - Very severe

22. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

1 - Not at all
2 - A little bit
3 - Moderately
4 - Quite a bit
5 - Extremely

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**...

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23. Did you feel full of pep?	1	2	3	4	5	6
24. Have you been a very nervous person?	1	2	3	4	5	6
25. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
26. Have you felt calm and peaceful?	1	2	3	4	5	6
27. Did you have a lot of energy?	1	2	3	4	5	6
28. Have you felt downhearted and blue?	1	2	3	4	5	6
29. Did you feel worn out?	1	2	3	4	5	6
30. Have you been a happy person?	1	2	3	4	5	6
31. Did you feel tired?	1	2	3	4	5	6

32. During the **past 4 weeks**, how much of the time has **your physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

1 - All of the time
2 - Most of the time
3 - Some of the time
4 - A little of the time
5 - None of the time

How TRUE or FALSE is each of the following statements for you.

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
33. I seem to get sick a little easier than other people	1	2	3	4	5

34. I am as healthy as anybody I know	1	2	3	4	5
35. I expect my health to get worse	1	2	3	4	5
36. My health is excellent	1	2	3	4	5

ABOUT

The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is non-profit, nonpartisan, and committed to the public interest.

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36-Item Short Form Survey (SF-36) Scoring Instructions

Introduction

The RAND 36-Item Health Survey (Version 1.0) taps eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions. It also includes a single item that provides an indication of perceived change in health. These 36 items, presented here, are identical to the MOS SF-36 described in Ware and Sherbourne (1992). They were adapted from longer instruments completed by patients participating in the Medical Outcomes Study (MOS), an observational study of variations in physician practice styles and patient outcomes in different systems of health care delivery (Hays & Shapiro, 1992; Stewart, Sherbourne, Hays, et al., 1992).

Scoring Rules for the RAND 36-Item Health Survey (Version 1.0)

We recommend that responses be scored as described below. A somewhat different scoring procedure for the MOS SF-36 has been distributed by the International Resource Center for Health Care Assessment (located in Boston, MA). Because the scoring method described here (a simpler and more straightforward procedure) differs from that of the

MOS SF-36, persons using this scoring method should refer to the instrument as RAND 36-Item Health Survey 1.0.

Scoring the RAND 36-Item Health Survey is a two-step process. First, precoded numeric values are recoded per the scoring key given in Table 1. Note that all items are scored so that a high score defines a more favourable health state. In addition, each item is scored on a 0 to 100 range so that the lowest and highest possible scores are 0 and 100, respectively. Scores represent the percentage of total possible score achieved. In step 2, items in the same scale are averaged together to create the 8 scale scores. Table 2 lists the items averaged together to create each scale. Items that are left blank (missing data) are not taken into account when calculating the scale scores. Hence, scale scores represent the average for all items in the scale that the respondent answered.

Example: Items 20 and 32 are used to score the measure of social functioning. Each of the two items has 5 response choices. However, a high score (response choice 5) on item 20 indicates the presence of limitations in social functioning, while a high score (response choice 5) on item 32 indicates the absence of limitations in social functioning. To score both items in the same direction, Table 1 shows that responses 1 through 5 for item 20 should be recoded to values of 100, 75, 50, 25, and 0, respectively. Responses 1 through 5 for item 32 should be recoded to values of 0, 25, 50, 75, and 100, respectively. Table 2 shows that these two recoded items should be averaged together to form the social functioning scale. If the respondent is missing one of the two items, the person's score will be equal to that of the non-missing item.

Table 3 presents information on the reliability, central tendency, and variability of the scales scored using this method.

Table 1

Step 1: Recoding Items

Item numbers	**Change original response category ***	**To recoded value of:**
1, 2, 20, 22, 34, 36	1 →	100
	2 →	75
	3 →	50
	4 →	25
	5 →	0
3, 4, 5, 6, 7, 8, 9, 10, 11, 12	1 →	0
	2 →	50
	3 →	100

13, 14, 15, 16, 17, 18, 19	1 →	0
	2 →	100
21, 23, 26, 27, 30	1 →	100
	2 →	80
	3 →	60
	4 →	40
	5 →	20
	6 →	0
24, 25, 28, 29, 31	1 →	0
	2 →	20
	3 →	40
	4 →	60
	5 →	80
	6 →	100
32, 33, 35	1 →	0
	2 →	25
	3 →	50
	4 →	75
	5 →	100

* Precoded response choices as printed in the questionnaire.

Table 2

Step 2: Averaging Items to Form Scales

Scale	**Number of items**	**After recoding per Table 1, average the following items**
Physical functioning	10	3 4 5 6 7 8 9 10 11 12
Role limitations due to physical health	4	13 14 15 16
Role limitations due to emotional problems	3	17 18 19
Energy/fatigue	4	23 27 29 31
Emotional well-being	5	24 25 26 28 30
Social functioning	2	20 32
Pain	2	21 22
General health	5	1 33 34 35 36

Table 3

Reliability, Central Tendency, and Variability of Scales in the Medical Outcomes Study

Scale	Items	Alpha	Mean	SD
Physical functioning	10	0.93	70.61	27.42
Role functioning/physical	4	0.84	52.97	40.78
Role functioning/emotional	3	0.83	65.78	40.71
Energy/fatigue	4	0.86	52.15	22.39
Emotional well-being	5	0.90	70.38	21.97
Social functioning	2	0.85	78.77	25.43
Pain	2	0.78	70.77	25.46
General health	5	0.78	56.99	21.11
Health change	1	—	59.14	23.12

Note: Data is from baseline of the Medical Outcomes Study (N=2471), except for "Health change," which was obtained one year later.

Appendix D: Report to High Schools in Hiroshima Prefecture

はじめに

広島県立千代田高等学校 様
広島県立賀茂高等学校 様
広島県立向原高等学校 様
広島県立吉田高等学校 様

この度のアンケート調査実施に際するご協力に誠に感謝申し上げます。

このレポートの目的は、この度のアンケート調査より得られたデータの分析結果を皆様にお示しすることです。
教育的な目的の観点からもこれらのデータが皆様にとって有益であることを願います。

このレポートの構成は大きく２つに分けられます。集計された情報と、さらに詳細な情報です。
前者ではデータと関連する図表と一般的な傾向を示します。後者では学校別、そして学年別の詳細なデータを示します。

レポートに関する質問やコメントがある場合はいつでもご連絡ください。

Dear Sir / Madam:

We appreciate enormously all the collaboration you provided us for conducting this survey.

The purpose of this report is to show some of the most relevant results that we obtained from the data analysis. We specially focus on the results of the last parts of the survey (part 3 to part 7), since we consider this information might be as new for you as it is for us. These parts are: time perspectives, future life and migration plans, social participation, life and health habits and happiness regarding various life domains.

The structure of this report is divided in 2 basic parts: summarized information and detailed information. In the first part we show some relevant charts and the general tendency of the data. In the second part, we show the detailed results for the questions sorted by school and school year.

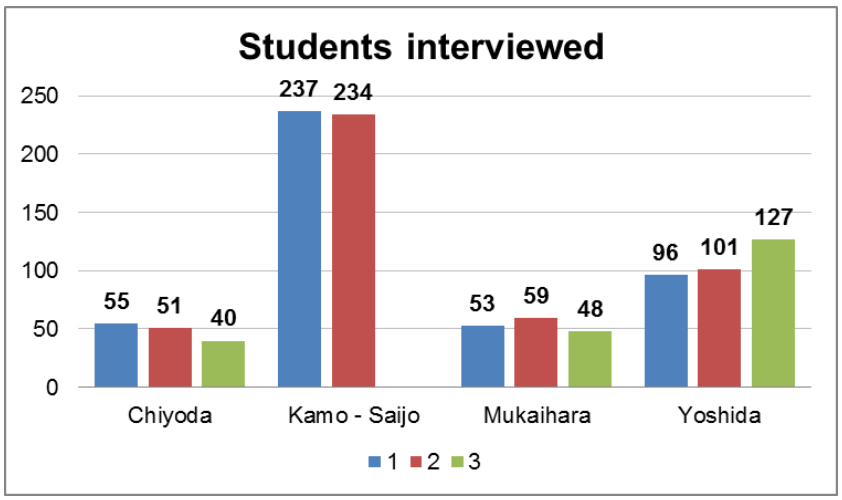
We hope this information can be of interest for your own educational or institutional purposes. In case that you have any further questions or comments, please do not hesitate in contacting us.

Yours sincerely,
David Perez Barbosa
Graduate School for International Development and Cooperation
Hiroshima University
December 2016

Translation into Japanese by: Yamashita Masafumi

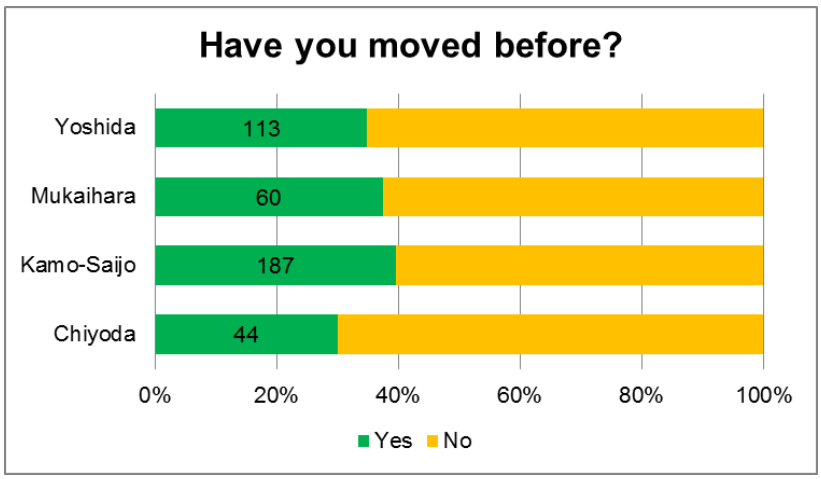
集計データ / Summarized information

このパートでは、いくつかの図表を用いて最も関連性が高いデータを示します。
これは各高等学校における学年ごとのアンケート回答者の人数です。
有効回答のものだけを表示しています。
In this part of the questionnaire we display some relevant charts and provide the most relevant information in a summarized format. This is the number of students that were interviewed by school and school year respectively, with valid questionnaire answers.



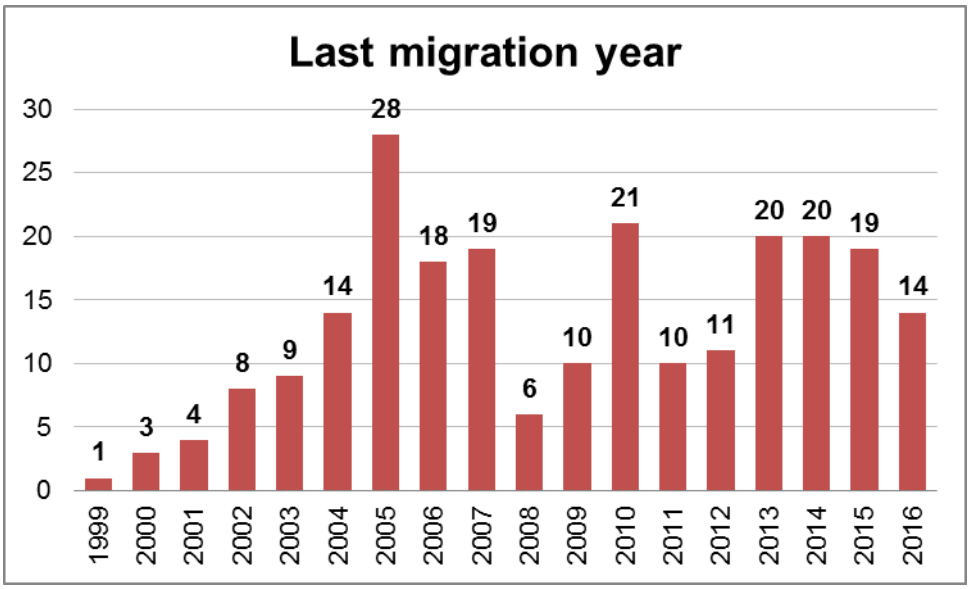
パート 1 - 個人属性 / Part 1 – Personal information

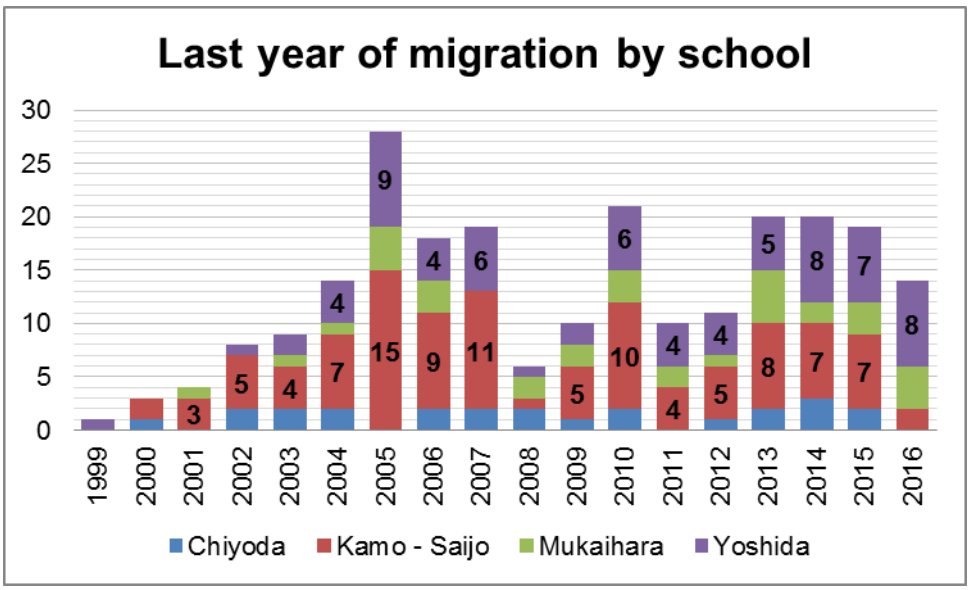
あなたの移住経験について教えてください。
下図は学校ごとの移住経験がある生徒の数を表します。
おおよそ 30%から 40%の生徒が過去に移住を経験したことがあります。
Please tell us about your previous migration history. The chart below displays the number of students in each school that have previously migrated. We can observe that between 30% and 40% percent of the students have previously moved from a different residential location.



次の図からは年ごと、学校ごとの移住経験がある生徒の数がわかります。
全体では計 235 人の生徒が過去に移住をしたことがあります。
（千代田高等学校：24 人、賀茂高等学校：105 人、向原高等学校：34 人、吉田高等学校：72 人）

A total of 235 students who have migrated before (24 in Chiyoda, 105 in Kamo-Saijo, 34 in Mukaihara and 72 in Yoshida respectively).





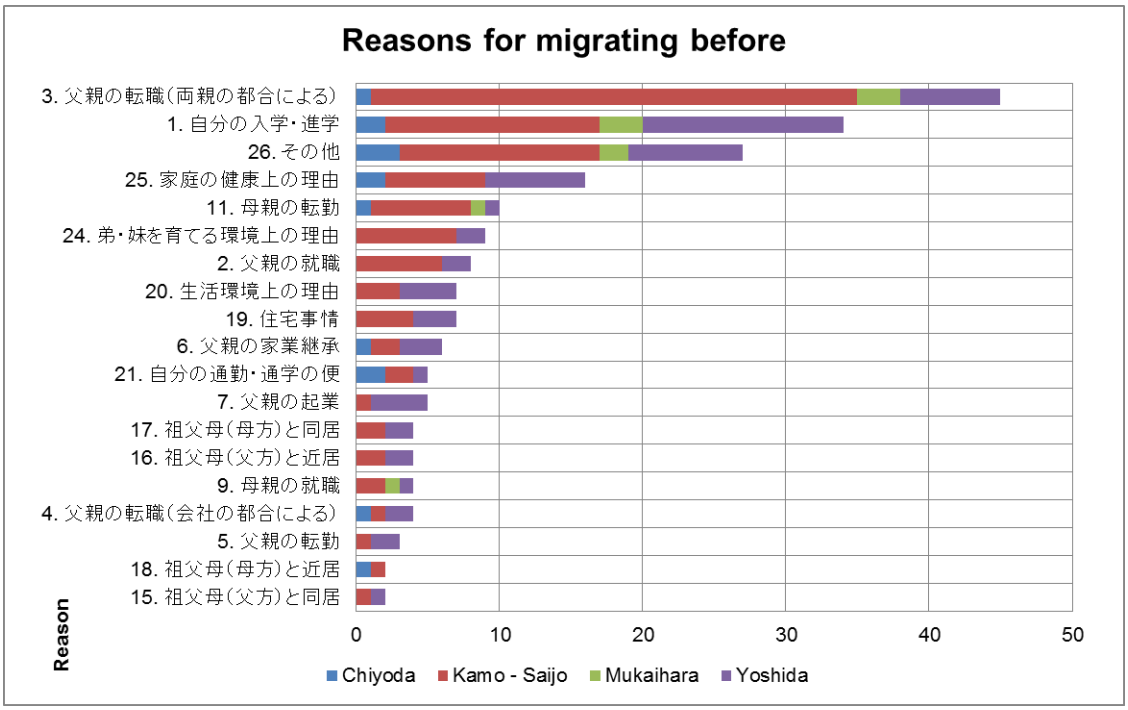
この他にも過去に移住を経験したことがあるが、移住した年については明記しなかった生徒も存在します。

Other students who migrated did not provide specific information about their previous year(s) when they changed their residential location.

移住の理由 / Reasons for migration

生徒ごとの移住理由は下の図で示されます。回答数の多かった理由から順に上から並べられます。

The reasons for previous migration by students are listed in the chart below, from the most frequent to the less frequent.

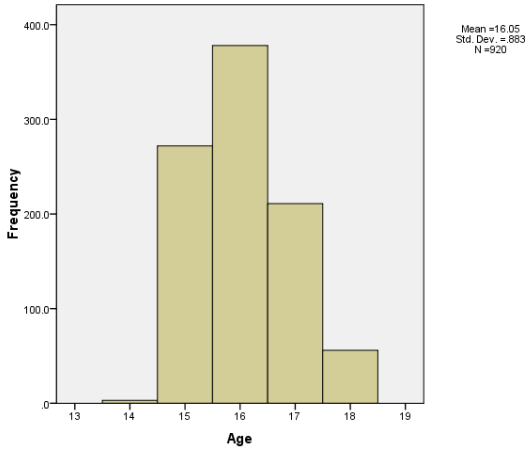


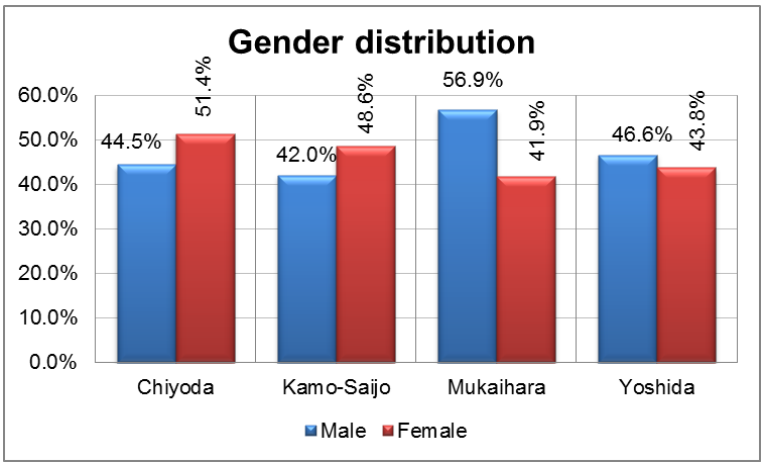
List of reasons: father's change of job (due to the convenience of the parents), own admission or enrolment, others, health condition of HH members, mother's relocation, living environment to raise siblings, father's employment, housing conditions, living environment, business inheritance – father, entrepreneurship by father, own convenience for commuting / schooling, father's change of job (by Company of convenience), mother's employment, stay close to grandparents (paternal), live with grandparents (maternal), relocation of father, live with grandparents (paternal), stay close to grandparents (maternal).

生徒の年齢と性別 / Age and gender of the students

生徒の年齢と性別の分布については下図で示されます。

The distribution of age and gender of the students is shown in the charts below.

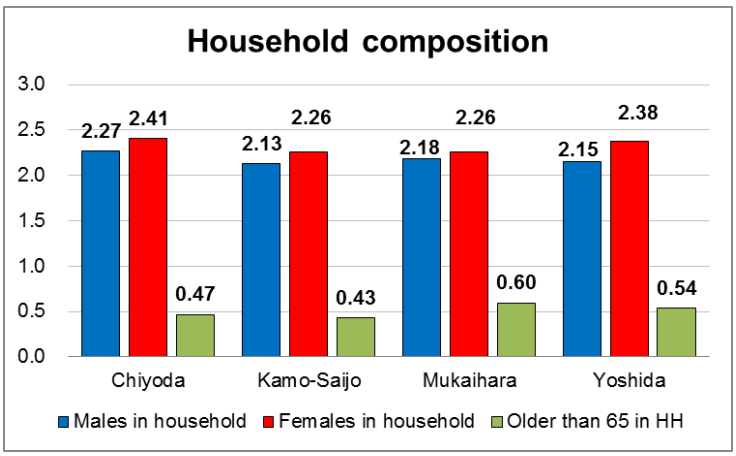


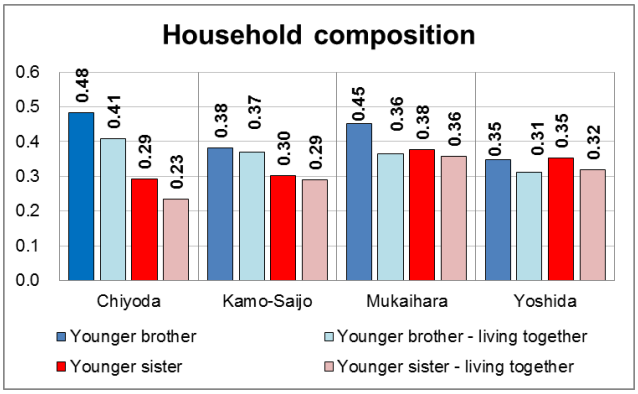


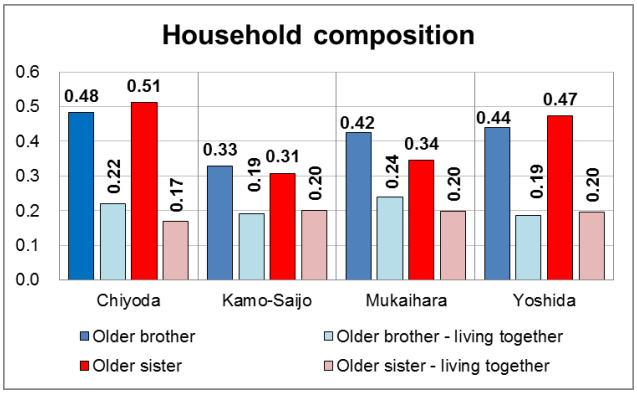
世帯構造 / Household composition

下の表と図では、学校ごとの生徒の世帯構成員の標準偏差値が示されます。
In the table and charts below the mean and standard deviation values of household members of the students, separated by school.

School →	Chiyoda		Kamo-Saijo		Mukaihara		Yoshida		Grand Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Males in household	2.27	1.22	2.13	1.05	2.18	1.30	2.15	1.16	2.16	1.14
Females in household	2.41	1.21	2.26	1.03	2.26	1.07	2.38	1.15	2.31	1.10
Older than 65 in HH	0.47	0.75	0.43	0.94	0.60	0.95	0.54	0.85	0.49	0.89
Older brother	0.48	0.82	0.33	0.58	0.42	0.63	0.44	0.65	0.40	0.65
Younger brother	0.48	0.71	0.38	0.61	0.45	0.70	0.35	0.59	0.40	0.63
Older sister	0.51	0.75	0.31	0.61	0.34	0.53	0.47	0.66	0.39	0.64
Younger sister	0.29	0.56	0.30	0.53	0.38	0.59	0.35	0.59	0.33	0.56
Older brother - living together	0.22	0.45	0.19	0.44	0.24	0.46	0.19	0.41	0.20	0.44
Younger brother - living together	0.41	0.66	0.37	0.66	0.36	0.64	0.31	0.57	0.36	0.63
Older sister - living together	0.17	0.39	0.20	0.47	0.20	0.43	0.20	0.42	0.19	0.44
Younger sister - living together	0.23	0.49	0.29	0.52	0.36	0.58	0.32	0.56	0.30	0.54

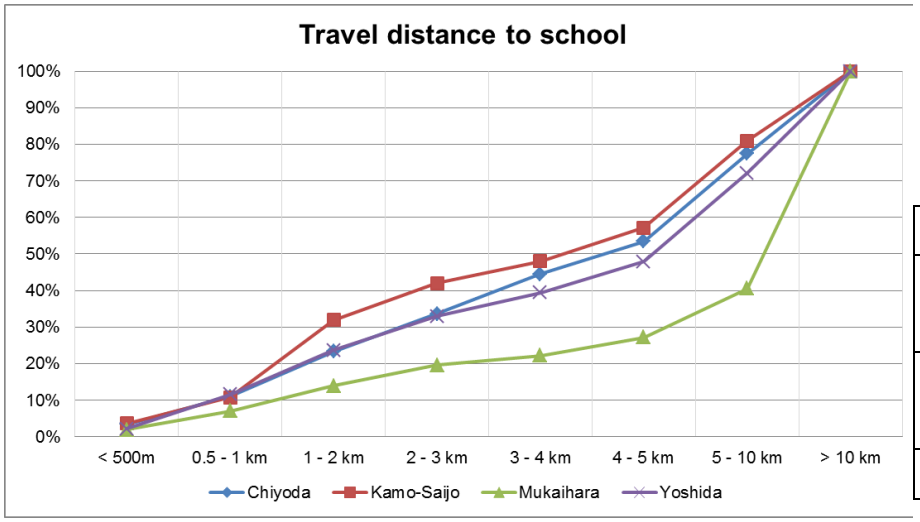






パート 2 - 通学 / Part 2 - Daily travel to school

学校までの通学距離の累積度数と、学校ごとの通学方法が下図で示されます。
The accumulated frequency for the travel distance to school and the modal share by school are shown in the charts below.

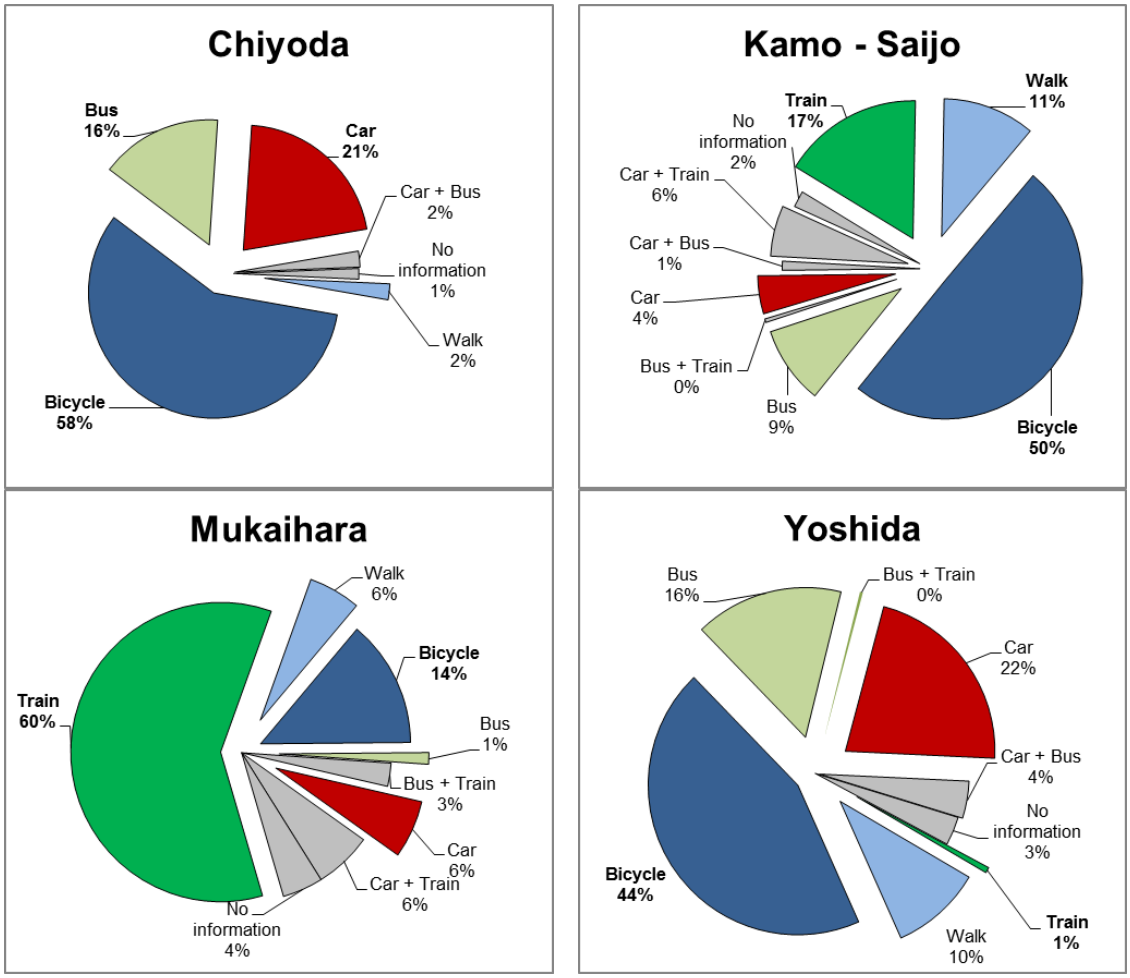


Average distance traveled by students (km)

Chiyoda	6.48
Kamo-Saijo	5.90
Mukaihara	10.53
Yoshida	7.10

学校ごとの主な通学手段 / Main travel mode to school – by school

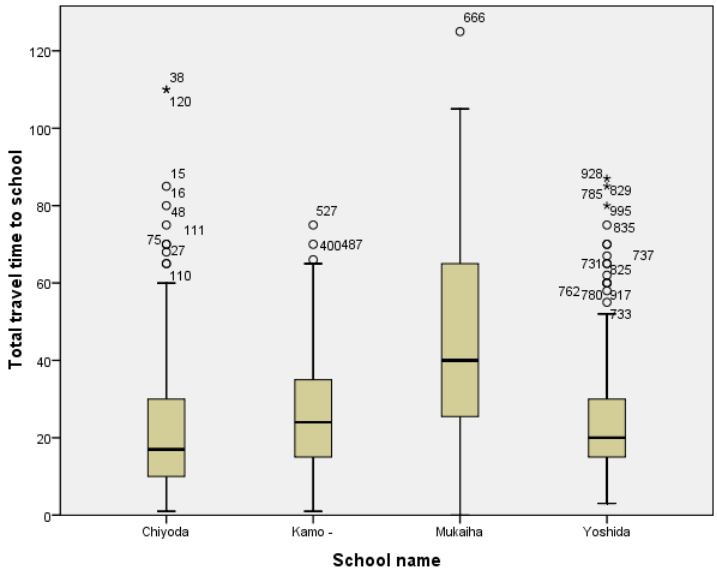
各学校における、複数の交通機関を用いる通学方法も考慮した主な通学手段を下図で示します。
Considering the combinations of travel modes the students use to attend each school we summarize the results in the charts below.



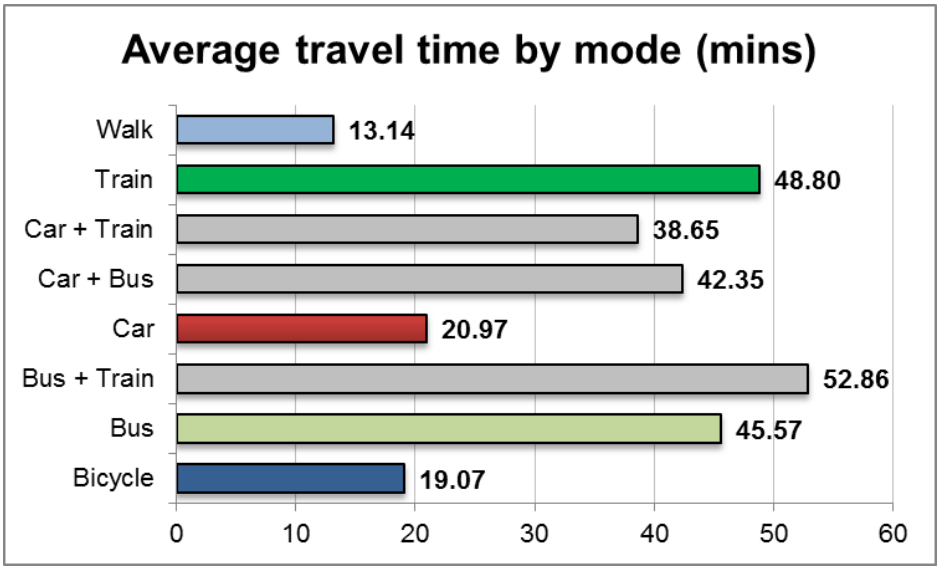
下の図表では、学校ごとの各通学方法における平均通学時間を示します。

The charts and the table below show the average travel time by each school and by each travel mode.

Travel time to school – average by school

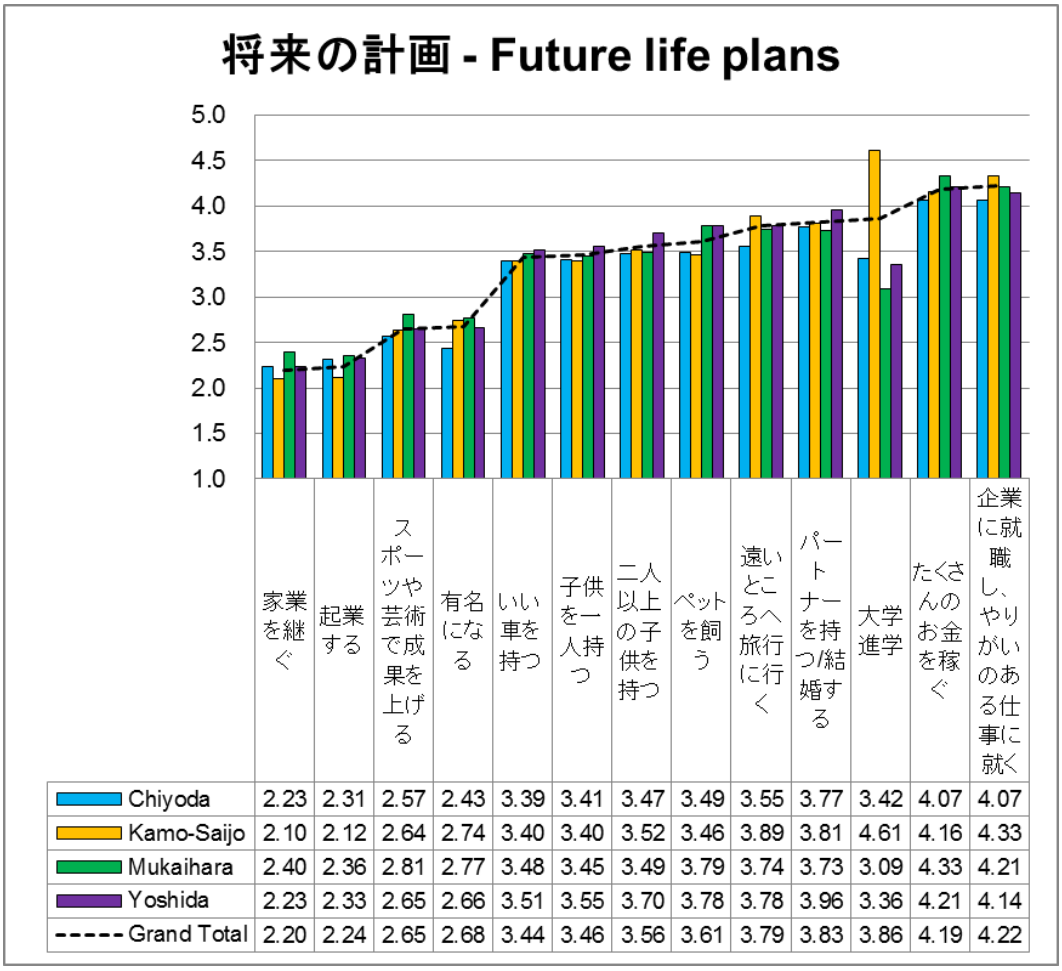


	Chiyoda	Kamo-Saijo	Mukaihara	Yoshida
Average travel time (in mins) by school	25.86	25.24	45.38	24.28
S.D.	21.20	14.72	27.46	15.41



パート４- 将来の計画 / Part 4 - Plans for the future

選択肢が用意されたいくつかの将来計画への希望は下図で表されます。
結果は学校ごとで示され、全ての学校による平均との比較ができるようになっています。
値が大きいほど、それが強い希望であることを表します。
The desirability for the different future plans that were originally listed are shown in the charts below sorted by school and compared to the average for all the schools. A higher score represents more possible consideration of each plan in the future.

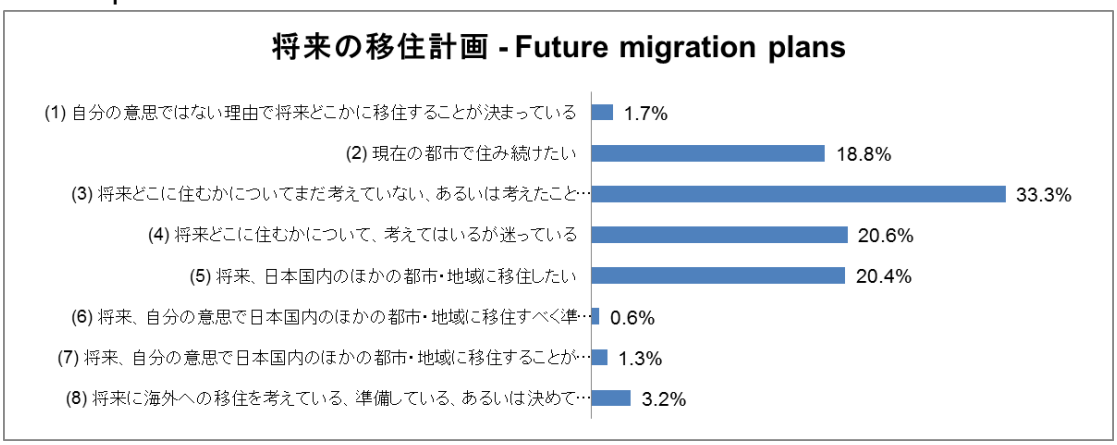


	家業を継ぐ	起業する	スポーツや芸術で成果を上げる	有名になる	いい車を持つ	子供を一人持つ	二人以上の子供を持つ	ペットを飼う	遠いところへ旅行に行く	パートナーを持つ/結婚する	大学進学	たくさんのお金を稼ぐ	企業に就職し、やりがいのある仕事に就く
Chiyoda	2.23	2.31	2.57	2.43	3.39	3.41	3.47	3.49	3.55	3.77	3.42	4.07	4.07
Kamo-Saijo	2.10	2.12	2.64	2.74	3.40	3.40	3.52	3.46	3.89	3.81	4.61	4.16	4.33
Mukaihara	2.40	2.36	2.81	2.77	3.48	3.45	3.49	3.79	3.74	3.73	3.09	4.33	4.21
Yoshida	2.23	2.33	2.65	2.66	3.51	3.55	3.70	3.78	3.78	3.96	3.36	4.21	4.14
Grand Total	2.20	2.24	2.65	2.68	3.44	3.46	3.56	3.61	3.79	3.83	3.86	4.19	4.22

将来の移住計画 - Future migration plans

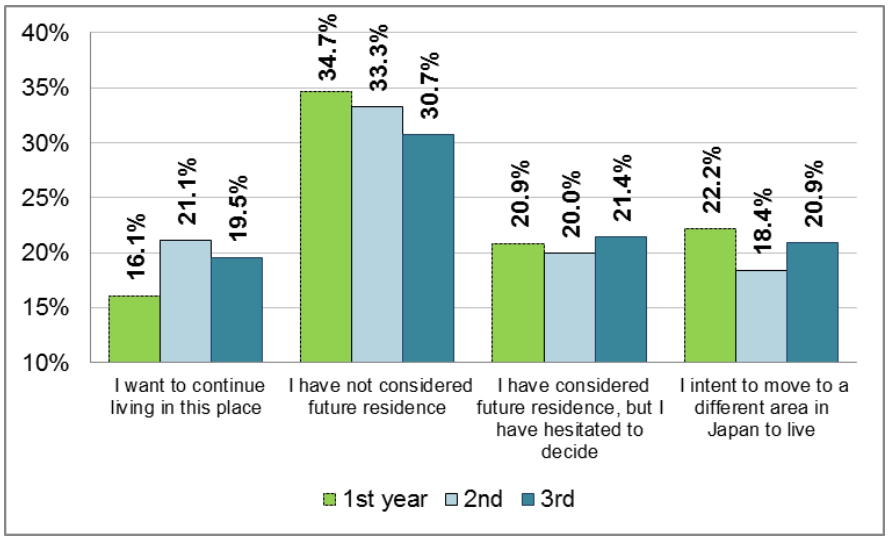
下図では各校における全学年を通しての将来の移住計画に関する希望が表されます。

In the chart below we can observe the preference for future migration plans among all the respondents in the 4 schools.



将来の移住計画に関する希望に関して、各校の学年ごとの分布は下図のようになります。

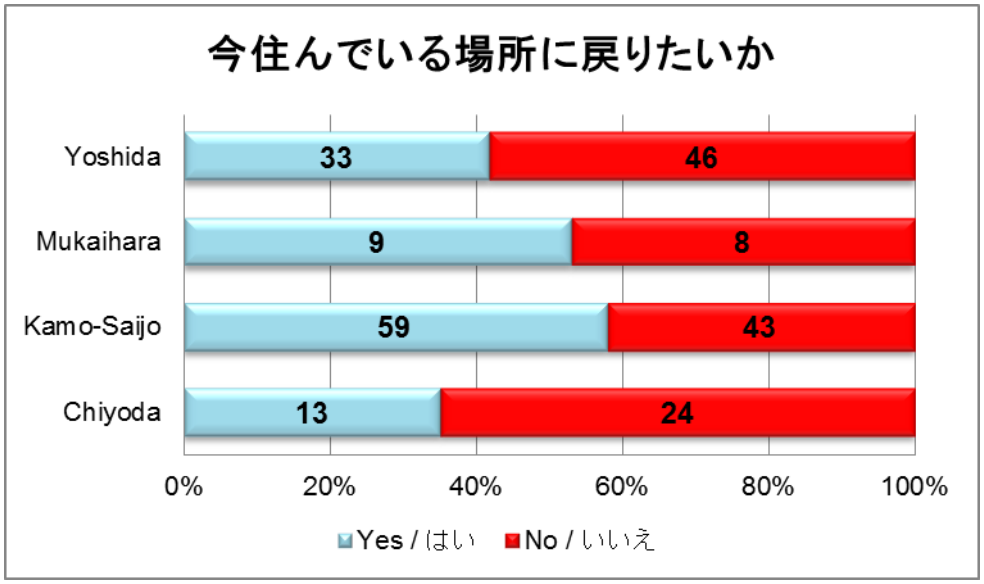
The following figure shows the distribution by school year among the 4 most selected migration choices.

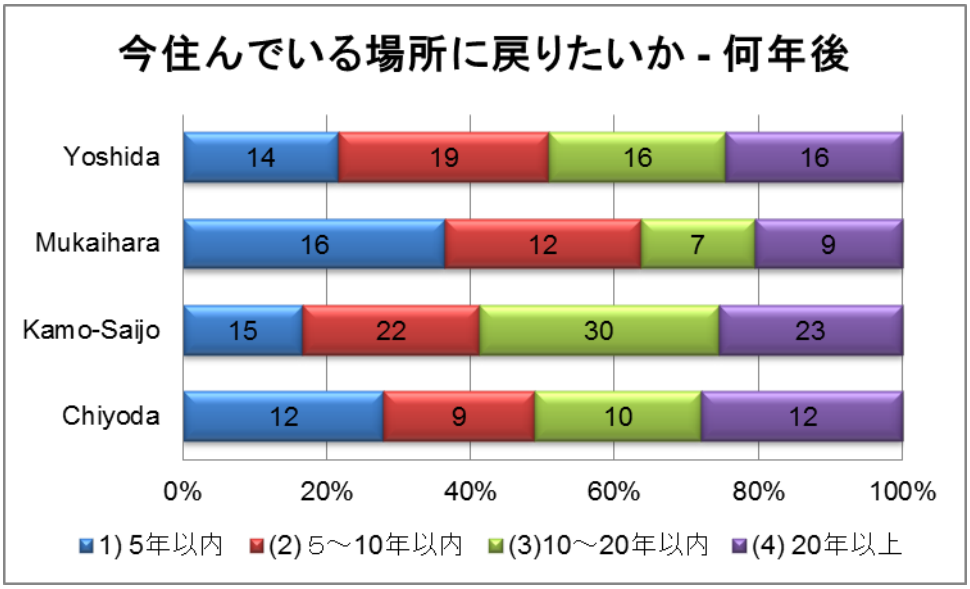


故郷への帰還意志 - Willingness to return

下表は「4.3.1. 将来、今住んでいる場所に戻りたいですか？」「4.3.2.（問 4.3.1 において「はい」と答えた場合）今から何年後に今住んでいる場所に戻りたいですか？」の問いに対する生徒の回答を示す。

The following charts show the responses of the students to the following questions: if you intend to migrate, do you want to return where you live now? (Q_4.3.1) If so, when? (Q_4.3.2)





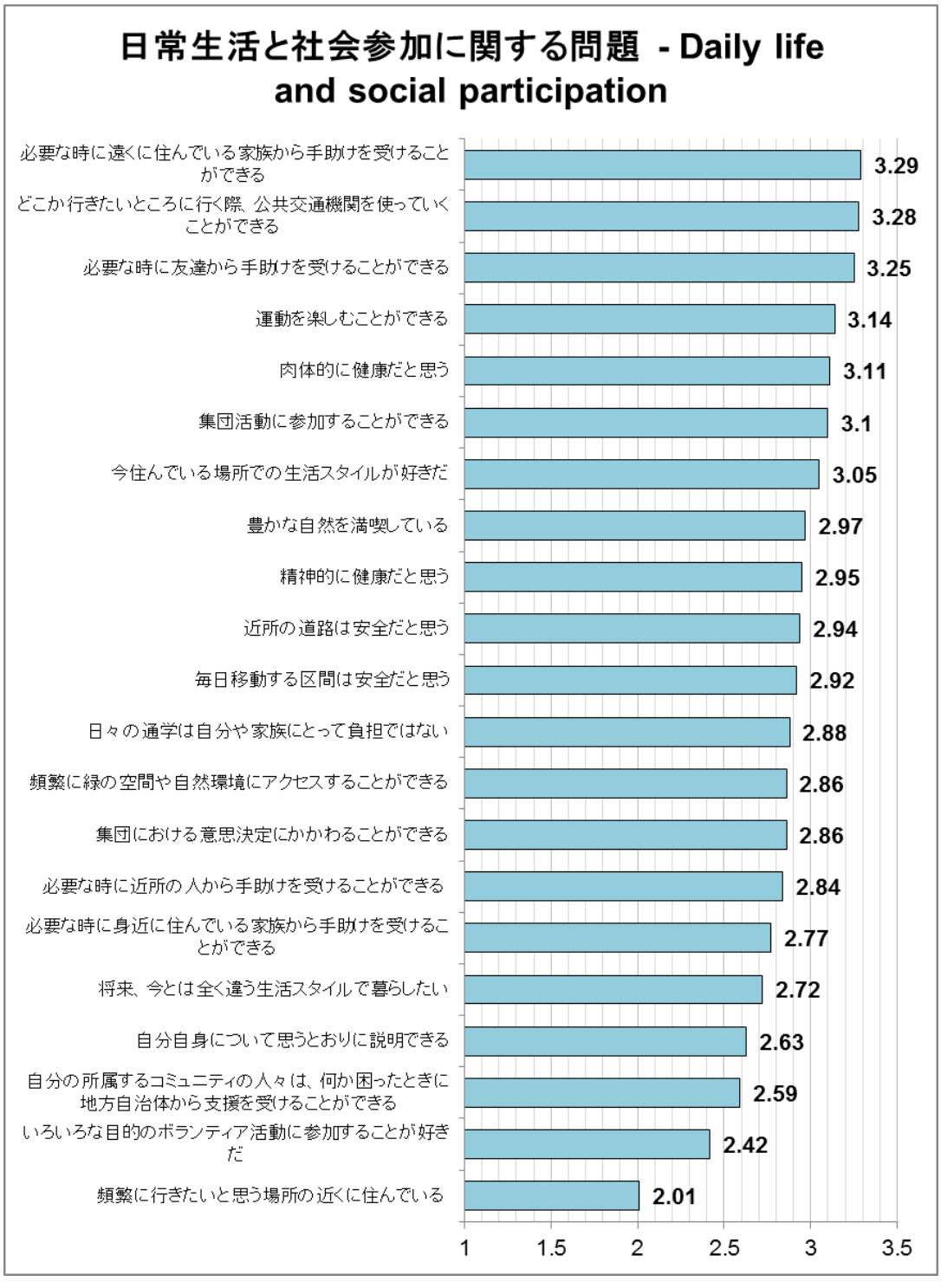
注：これら２つの表に関して、学校ごとの回答生徒数が必ずしも一致していないが、これは生徒の回答をそのまま結果に反映したからである。この差を生み出す原因として、前問では将来の移住は考えていないと回答しているにも関わらず、この問 4.3.1 と 4.3.2 に回答している生徒が見受けられたことが挙げられる。

Note: Although the number of students by school may not add up exactly between the upper and lower charts, we report the results just the same way as the students provided the answers. The basic reason for such disparity is that the students answered the questions 4.3.1 and 4.3.2 in the survey questionnaire even though they declared previously that they do not consider migrating in the future.

パート５- 日常生活と社会参加に関する問題 / Part 5 - Daily life and social participation related issues

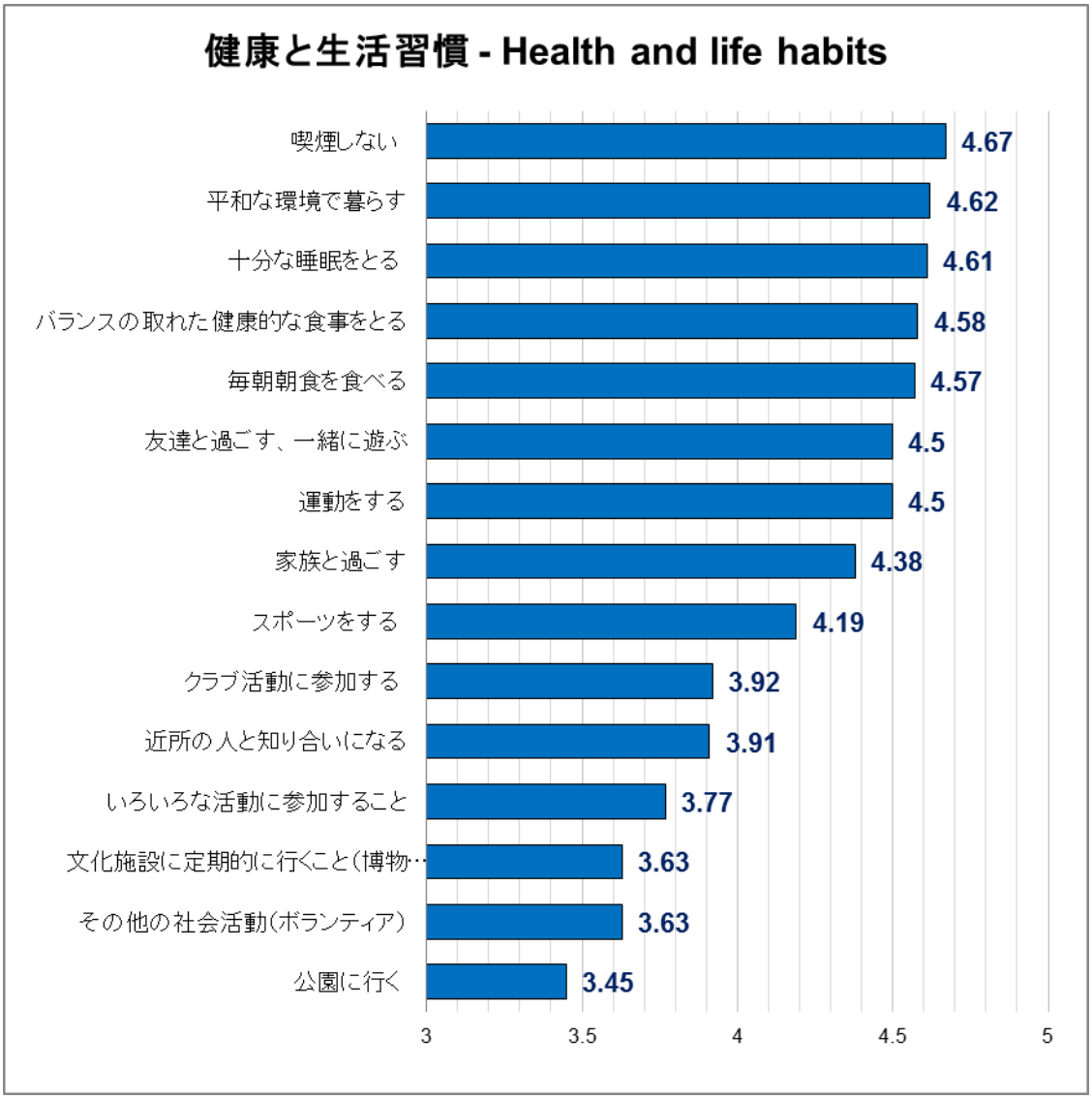
日常生活と社会参加に関する問題の結果は、アンケートに回答した全ての生徒の平均値で表されます。ここでは平均値の高いものから順に表示しています。この値が大きいほど各項目に関する同意がより強いことを表します。

The results for the daily life and social participation related issues are listed by average score among all the students who were interviewed, from the highest to the lowest. A higher score means a higher degree of agreement, while a lower score


日常生活と社会参加に関する問題 - Daily life and social participation
必要な時に遠くに住んでいる家族から手助けを受けることができる
3.29
どこか行きたいところに行く際、公共交通機関を使っていくことができる
3.28
必要な時に友達から手助けを受けることができる
3.25
運動を楽しむことができる
3.14
肉体的に健康だと思う
3.11
集団活動に参加することができる
3.1
今住んでいる場所での生活スタイルが好きだ
3.05
豊かな自然を満喫している
2.97
精神的に健康だと思う
2.95
近所の道路は安全だと思う
2.94
毎日移動する区間は安全だと思う
2.92
日々の通学は自分や家族にとって負担ではない
2.88
頻繁に緑の空間や自然環境にアクセスすることができる
2.86
集団における意思決定にかかわることができる
2.86
必要な時に近所の人から手助けを受けることができる
2.84
必要な時に身近に住んでいる家族から手助けを受けることができる
2.77
将来、今とは全く違う生活スタイルで暮らしたい
2.72
自分自身について思うとおりに説明できる
2.63
自分の所属するコミュニティの人々は、何か困ったときに地方自治体から支援を受けることができる
2.59
いろいろな目的のボランティア活動に参加することが好きだ
2.42
頻繁に行きたいと思う場所の近くに住んでいる
2.01
1
1.5
2
2.5
3
3.5

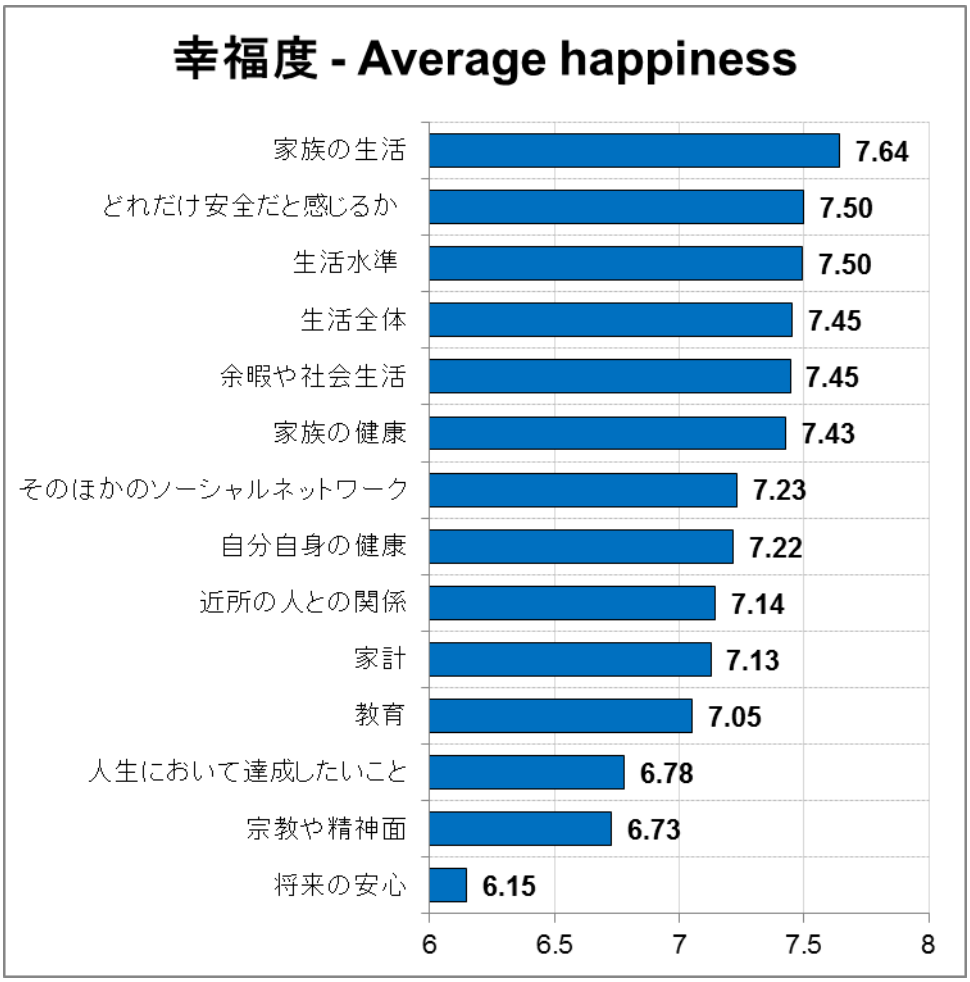
パート６- 健康と生活習慣 / Part 6 – Health and life habits

下図では健康と生活習慣に関して満点である 5 に近いものから順に並べられています。
これはアンケートに回答した全ての生徒のサンプルを用いて算出されています。
The following listed health and life habits are sorted from the most valued (score closer to 5) to the least valued by all the students in the sample.



パート 7 - 幸福度 / Part 7 – Happiness

生活内における各項目に対する幸福度の平均を下図で示します。
これはアンケートに回答した全ての生徒のサンプルを用いて算出されています。
The average happiness score in each one of the following life domains is displayed in the chart below, based on the average scores given by all the students in the sample.



付録 – 詳細結果/ Detailed results

パート 3 - 時間的展望試験の結果/ Part 3 - Results of the time-perspective test

以下の質問に対する回答を学校ごと、学年ごとで示します。
Results of the following question are sorted by school and school year.

- 千代田高等学校

Chiyoda: School year →		1	2	3
1.	友人とつるむ（遊ぶ）ことは人生の大切な喜びの一つだと思う。	4.33	4.24	4.35
2.	幼い頃に慣れ親しんだ光景、音、匂いは楽しかった記憶を思い出させる。	3.78	3.72	3.78
3.	人生で起こりうるすべてのことは運命だと思う。	3.43	3.61	3.51
4.	よく、「あの時ああしていれば…」と人生の選択を後悔することがある。	4.09	3.87	4.00
5.	私の選択は、周りの人間と事象に左右されていると思う。	3.19	3.11	3.65
6.	毎朝その日にすることをきちんと計画するべきだと思う。	3.19	2.48	3.27
7.	過去を振り返ることは私を幸せな気分にさせる。	2.67	2.52	2.68
8.	私は物事を衝動的に行う。	3.02	3.04	3.30
9.	私は物事が計画通りの時間に終わらなくても気にしない。	2.89	3.41	2.86
10.	何かを達成したい時はゴールに向かって細かく目標を設定し、それらに合う手段を考慮に入れる。	2.94	2.70	2.81
11.	相対的に考えて、私の過去は悲しみやつらかった思い出よりも喜びに満ちている。	2.87	2.89	2.92
12.	好きな音楽を聞いていると時間を忘れる。	3.96	3.98	3.78
13.	個人の趣味の時間よりも翌日の締め切りや必要なこと、大事な用事等を優先する。	3.44	2.96	3.27
14.	人生はなるようになるので、私が何をしようがあまり関わりがないと思う。	2.74	2.85	2.73
15.	私は「古き良き時代」の話を聞くのが好きだ。	2.35	2.70	2.51
16.	過去の辛い思い出を繰り返し思い出してしまう。	3.50	3.09	3.08
17.	私は1日1日を大切に生きている。	3.69	3.26	3.32
18.	約束に遅れることは私をひどく不安にさせる。	3.54	3.24	3.46
19.	理想としては、毎日が人生の最後の日であるかのように生きたい。	2.89	2.74	3.14
20.	楽しかった記憶をすぐに思い出すことができる。	3.39	3.41	3.46
21.	私は、友人や権威（先輩や先生など）などに対する義務を時間通りに遂行する。	3.41	3.26	3.46
22.	過去にいじめられたり、他人に拒絶されたりしたことがある。	2.85	2.59	2.30
23.	私はその時々の気分によって選択をする。	3.65	3.76	3.68
24.	私はどちらかというと毎日を自由気ままに生きている方である。	3.57	3.61	3.46
25.	過去は辛い思い出ばかりなのであまり考えないようにしている。	2.98	2.96	3.19
26.	人生は刺激に満ち溢れているべきだと思う。	3.07	3.15	3.32
27.	私は過去に過ちを犯したのでできることならやり直したいと思う。	3.02	2.59	2.84
28.	今を楽しむ事の方が、締め切りなどの時間に捉われることより大事だと思う。	3.56	3.59	3.22
29.	私は自分の幼少時代を懐かしく感じる。	3.72	3.24	3.22

Chiyoda: School year →	1	2	3
30. 私は決断をする前に、その選択から得られるものと失うものを天秤にかける。	3.46	3.13	3.19
31. リスクをとることは、私の人生が退屈なものにならないようにしてくれると思う。	2.89	2.70	2.97
32. 私にとって、人生の過程を楽しむことは、目的地にたどり着くことより大事だ。	3.20	3.35	3.32
33. 計画通りに物事が運ぶことは滅多にない。	3.41	3.41	3.27
34. 幼い頃のトラウマや不快なイメージを忘れるのは難しいことだ。	3.70	3.48	3.51
35. 物事のゴールや結果、成果物などについて考えると、その過程を楽しむことができなくなる。	3.02	3.13	2.81
36. 今現在を楽しんでいる時でも、過去の似たような経験と常に比較してしまう。	3.13	3.04	2.95
37. 物事や環境は変わるので、未来について計画を立てたり準備をしたりすることは不可能だと思う。	2.91	2.96	2.78
38. 私の人生は私には干渉できない何か大きな力にコントロールされていると思う。	2.57	2.59	2.54
39. 未来について心配をする意味がわからない、なぜなら私がそれに対してできることは何もないからだ。	2.50	2.59	2.32
40. 私はきちんと計画を立てて物事を計画通りに進めることができる。	2.85	2.52	2.78
41. 私は、家族が「昔はよかったわ。」などと過去を懐かしがっていると自然とそれらの話に耳を傾けないようにしてしまう。	2.91	2.72	2.65
42. 私は人生を面白みのあるものにするためにはリスクを冒すことも厭わない。	2.87	2.87	3.27
43. 私はやるべきことをリスト化する。	2.59	2.24	2.41
44. 私は理性よりも感情に従う方だ。	3.20	3.11	3.08
45. 私はやるべきことがあるとき、誘惑を断ち切ることができる。	2.81	2.85	2.95
46. ふと我に帰ると、その時々を狂ったように楽しんでいる自分を見つけることがある。	3.50	3.13	3.43
47. 今の社会や生活、人生はあまりにも複雑になってしまったので、昔のように単純に生きたいと思う。	2.93	3.30	3.49
48. 行動パターンが読める普通の友人よりも、奇抜で斬新かつ活動的でなにをしでかすかわからないような友人が欲しいと思う。	3.17	3.02	3.19
49. 私は繰り返されてきた家族の習慣や伝統が好きだ。	3.26	3.13	3.00
50. 私は、過去に起こった悲しかった出来事や悪い出来事について考え込んでしまう。	3.35	3.04	3.27
51. 私は、自分のためになるなら難しくて興味のないことについてもやり続けることができる。	2.78	2.61	2.68
52. 自分で稼いだお金は、貯めるよりも今やりたいことに使いたいと思う。	2.89	3.02	3.16
53. 努力よりも運のほうが私をよい結果に導いてくれると思う。	3.00	3.04	2.92
54. 私は、自分の人生のうちで逃してしまった好機について考えてしまう。	3.04	2.91	3.16
55. 私は親密な関係にある人たちはお互いに対して情熱的であるべきだと思う。	3.26	2.91	3.38
56. 仕事や課題等で、できなかったことがあってもそのうちどうにかできると思う。	3.24	3.26	3.16

- 賀茂高等学校

	Kamo: School year →	1	2	3
1.	友人とつるむ（遊ぶ）ことは人生の大切な喜びの一つだと思う。	4.57	4.46	
2.	幼い頃に慣れ親しんだ光景、音、匂いは楽しかった記憶を思い出させる。	4.11	4.02	
3.	人生で起こりうるすべてのことは運命だと思う。	3.66	3.59	
4.	よく、「あの時ああしていれば…」と人生の選択を後悔することがある。	4.11	4.19	
5.	私の選択は、周りの人間と事象に左右されていると思う。	3.44	3.62	
6.	毎朝その日にすることをきちんと計画するべきだと思う。	3.28	3.35	
7.	過去を振り返ることは私を幸せな気分にさせる。	2.93	2.88	
8.	私は物事を衝動的に行う。	3.26	3.30	
9.	私は物事が計画通りの時間に終わらなくても気にしない。	3.01	3.03	
10.	何かを達成したい時はゴールに向かって細かく目標を設定し、それらに合う手段を考慮に入れる。	2.95	2.90	
11.	相対的に考えて、私の過去は悲しみやつらかった思い出よりも喜びに満ちている。	2.76	2.74	
12.	好きな音楽を聞いていると時間を忘れる。	4.04	4.03	
13.	個人の趣味の時間よりも翌日の締め切りや必要なこと、大事な用事等を優先する。	3.52	3.47	
14.	人生はなるようになるので、私が何をしようがあまり関わりがないと思う。	2.89	2.78	
15.	私は「古き良き時代」の話を聞くのが好きだ。	2.70	2.82	
16.	過去の辛い思い出を繰り返し思い出してしまう。	3.50	3.46	
17.	私は1日1日を大切に生きている。	3.51	3.51	
18.	約束に遅れることは私をひどく不安にさせる。	3.76	3.61	
19.	理想としては、毎日が人生の最後の日であるかのように生きたい。	2.75	2.65	
20.	楽しかった記憶をすぐに思い出すことができる。	3.76	3.66	
21.	私は、友人や権威（先輩や先生など）などに対する義務を時間通りに遂行する。	3.84	3.65	
22.	過去にいじめられたり、他人に拒絶されたりしたことがある。			
23.	私はその時々の気分によって選択をする。	3.87	3.96	
24.	私はどちらかというと毎日を自由気ままに生きている方である。	3.93	3.85	
25.	過去は辛い思い出ばかりなのであまり考えないようにしている。			
26.	人生は刺激に満ち溢れているべきだと思う。	3.45	3.37	
27.	私は過去に過ちを犯したのでできることならやり直したいと思う。			
28.	今を楽しむ事の方が、締め切りなどの時間に捉われることより大事だと思う。	3.24	3.23	
29.	私は自分の幼少時代を懐かしく感じる。	3.65	3.69	
30.	私は決断をする前に、その選択から得られるものと失うものを天秤にかける。	3.41	3.23	
31.	リスクをとることは、私の人生が退屈なものにならないようにしてくれると思う。	3.15	3.06	
32.	私にとって、人生の過程を楽しむことは、目的地にたどり着くことより大事だ。	3.53	3.29	
33.	計画通りに物事が運ぶことは滅多にない。	3.49	3.52	

Kamo: School year →	1	2	3
34. 幼い頃のトラウマや不快なイメージを忘れるのは難しいことだ。			
35. 物事のゴールや結果、成果物などについて考えると、その過程を楽しむことができなくなる。	3.00	2.94	
36. 今現在を楽しんでいる時でも、過去の似たような経験と常に比較してしまう。	3.09	3.04	
37. 物事や環境は変わるので、未来について計画を立てたり準備をしたりすることは不可能だと思う。	2.80	2.89	
38. 私の人生は私には干渉できない何か大きな力にコントロールされていると思う。	2.56	2.75	
39. 未来について心配をする意味がわからない、なぜなら私がそれに対してできることは何もないからだ。	2.54	2.41	
40. 私はきちんと計画を立てて物事を計画通りに進めることができる。	2.68	2.63	
41. 私は、家族が「昔はよかったわ。」などと過去を懐かしがっていると自然とそれらの話に耳を傾けないようにしてしまう。	2.59	2.60	
42. 私は人生を面白みのあるものにするためにはリスクを冒すことも厭わない。	3.09	3.06	
43. 私はやるべきことをリスト化する。	2.27	2.55	
44. 私は理性よりも感情に従う方だ。	3.15	3.15	
45. 私はやるべきことがあるとき、誘惑を断ち切ることができる。	2.83	2.82	
46. ふと我に帰ると、その時々を狂ったように楽しんでいる自分を見つけることがある。	3.55	3.39	
47. 今の社会や生活、人生はあまりにも複雑になってしまったので、昔のように単純に生きたいと思う。	3.13	3.22	
48. 行動パターンが読める普通の友人よりも、奇抜で斬新かつ活動的でなにをしでかすかわからないような友人が欲しいと思う。	3.32	3.24	
49. 私は繰り返されてきた家族の習慣や伝統が好きだ。	3.25	3.37	
50. 私は、過去に起こった悲しかった出来事や悪い出来事について考え込んでしまう。			
51. 私は、自分のためになるなら難しくて興味のないことについてもやり続けることができる。	2.62	2.68	
52. 自分で稼いだお金は、貯めるよりも今やりたいことに使いたいと思う。	2.94	2.88	
53. 努力よりも運のほうが私をよい結果に導いてくれると思う。	2.94	2.82	
54. 私は、自分の人生のうちで逃してしまった好機について考えてしまう。	3.47	3.52	
55. 私は親密な関係にある人たちはお互いに対して情熱的であるべきだと思う。	3.34	3.33	
56. 仕事や課題等で、できなかったことがあってもそのうちどうにかできると思う。	3.26	3.27	

- 向原高等学校

	Mukaihara: School year →	1	2	3
1.	友人とつるむ（遊ぶ）ことは人生の大切な喜びの一つだと思う。	4.10	4.11	4.31
2.	幼い頃に慣れ親しんだ光景、音、匂いは楽しかった記憶を思い出させる。	3.86	4.02	4.02
3.	人生で起こりうるすべてのことは運命だと思う。	3.54	3.48	3.58
4.	よく、「あの時ああしていれば…」と人生の選択を後悔することがある。	4.10	4.05	3.78
5.	私の選択は、周りの人間と事象に左右されていると思う。	3.48	3.61	3.27
6.	毎朝その日にすることをきちんと計画するべきだと思う。	3.12	3.07	3.27
7.	過去を振り返ることは私を幸せな気分にさせる。	2.72	2.59	3.09
8.	私は物事を衝動的に行う。	3.14	3.20	3.33
9.	私は物事が計画通りの時間に終わらなくても気にしない。	3.10	3.21	2.78
10.	何かを達成したい時はゴールに向かって細かく目標を設定し、それらに合う手段を考慮に入れる。	2.86	3.04	3.40
11.	相対的に考えて、私の過去は悲しみやつらかった思い出よりも喜びに満ちている。	3.02	2.79	3.38
12.	好きな音楽を聞いていると時間を忘れる。	3.92	4.00	3.89
13.	個人の趣味の時間よりも翌日の締め切りや必要なこと、大事な用事等を優先する。	3.26	3.25	3.80
14.	人生はなるようになるので、私が何をしようがあまり関わりがないと思う。	2.80	2.95	2.93
15.	私は「古き良き時代」の話を聞くのが好きだ。	2.44	2.84	3.20
16.	過去の辛い思い出を繰り返し思い出してしまう。	3.30	3.45	3.20
17.	私は1日1日を大切に生きている。	3.32	3.46	3.47
18.	約束に遅れることは私をひどく不安にさせる。	3.20	3.45	3.58
19.	理想としては、毎日が人生の最後の日であるかのように生きたい。	2.94	2.93	3.20
20.	楽しかった記憶をすぐに思い出すことができる。	3.68	3.66	3.69
21.	私は、友人や権威（先輩や先生など）などに対する義務を時間通りに遂行する。	3.30	3.39	3.60
22.	過去にいじめられたり、他人に拒絶されたりしたことがある。	2.56	3.18	2.44
23.	私はその時々の気分によって選択をする。	3.68	3.66	3.51
24.	私はどちらかというと毎日を自由気ままに生きている方である。	4.02	3.79	3.64
25.	過去は辛い思い出ばかりなのであまり考えないようにしている。	2.88	3.12	2.96
26.	人生は刺激に満ち溢れているべきだと思う。	3.34	3.18	3.29
27.	私は過去に過ちを犯したのでできることならやり直したいと思う。	2.94	3.25	3.40
28.	今を楽しむ事の方が、締め切りなどの時間に捉われることより大事だと思う。	3.12	3.27	3.18
29.	私は自分の幼少時代を懐かしく感じる。	3.62	3.63	3.56
30.	私は決断をする前に、その選択から得られるものと失うものを天秤にかける。	3.08	3.21	3.38
31.	リスクをとることは、私の人生が退屈なものにならないようにしてくれると思う。	3.16	3.02	3.24
32.	私にとって、人生の過程を楽しむことは、目的地にたどり着くことより大事だ。	3.52	3.21	3.40
33.	計画通りに物事が運ぶことは滅多にない。	3.38	3.18	3.27
34.	幼い頃のトラウマや不快なイメージを忘れるのは難しいことだ。	3.36	3.66	3.47
35.	物事のゴールや結果、成果物などについて考えると、その過程を楽しむことができなくなる。	2.92	3.20	3.11

Mukaihara: School year →	1	2	3
36. 今現在を楽しんでいる時でも、過去の似たような経験と常に比較してしまう。	3.02	3.29	3.11
37. 物事や環境は変わるので、未来について計画を立てたり準備をしたりすることは不可能だと思う。	2.90	2.98	3.00
38. 私の人生は私には干渉できない何か大きな力にコントロールされていると思う。	2.38	2.93	2.84
39. 未来について心配をする意味がわからない、なぜなら私がそれに対してできることは何もないからだ。	2.68	2.89	2.67
40. 私はきちんと計画を立てて物事を計画通りに進めることができる。	2.66	2.87	3.07
41. 私は、家族が「昔はよかったわ。」などと過去を懐かしがっていると自然とそれらの話に耳を傾けないようにしてしまう。	2.62	2.62	2.78
42. 私は人生を面白みのあるものにするためにはリスクを冒すことも厭わない。	2.90	2.79	2.98
43. 私はやるべきことをリスト化する。	2.50	2.70	2.80
44. 私は理性よりも感情に従う方だ。	3.20	3.30	3.20
45. 私はやるべきことがあるとき、誘惑を断ち切ることができる。	2.92	3.02	3.13
46. ふと我に帰ると、その時々を狂ったように楽しんでいる自分を見つけることがある。	3.46	3.55	3.18
47. 今の社会や生活、人生はあまりにも複雑になってしまったので、昔のように単純に生きたいと思う。	3.38	3.41	3.42
48. 行動パターンが読める普通の友人よりも、奇抜で斬新かつ活動的でなにをしでかすかわからないような友人が欲しいと思う。	3.54	3.18	3.24
49. 私は繰り返されてきた家族の習慣や伝統が好きだ。	3.08	3.48	3.27
50. 私は、過去に起こった悲しかった出来事や悪い出来事について考え込んでしまう。	3.12	3.66	3.20
51. 私は、自分のためになるなら難しくて興味のないことについてもやり続けることができる。	2.60	3.02	3.36
52. 自分で稼いだお金は、貯めるよりも今やりたいことに使いたいと思う。	3.14	2.91	3.02
53. 努力よりも運のほうが私をよい結果に導いてくれると思う。	3.14	2.73	2.84
54. 私は、自分の人生のうちで逃してしまった好機について考えてしまう。	3.30	3.39	3.24
55. 私は親密な関係にある人たちはお互いに対して情熱的であるべきだと思う。	3.30	3.39	3.04
56. 仕事や課題等で、できなかったことがあってもそのうちどうにかできると思う。	3.34	3.32	2.98

- 吉田高等学校

	Yoshida: School year →	1	2	3
1.	友人とつるむ（遊ぶ）ことは人生の大切な喜びの一つだと思う。	4.48	4.22	4.26
2.	幼い頃に慣れ親しんだ光景、音、匂いは楽しかった記憶を思い出させる。	4.15	3.99	4.07
3.	人生で起こりうるすべてのことは運命だと思う。	3.72	3.43	3.59
4.	よく、「あの時ああしていれば…」と人生の選択を後悔することがある。	4.18	4.15	4.22
5.	私の選択は、周りの人間と事象に左右されていると思う。	3.45	3.30	3.55
6.	毎朝その日にすることをきちんと計画するべきだと思う。	3.53	3.09	3.27
7.	過去を振り返ることは私を幸せな気分にさせる。	2.85	2.61	2.95
8.	私は物事を衝動的に行う。	3.13	3.28	3.28
9.	私は物事が計画通りの時間に終わらなくても気にしない。	3.02	2.97	3.03
10.	何かを達成したい時はゴールに向かって細かく目標を設定し、それらに合う手段を考慮に入れる。	3.13	3.24	3.08
11.	相対的に考えて、私の過去は悲しみやつらかった思い出よりも喜びに満ちている。	3.33	2.95	3.22
12.	好きな音楽を聞いていると時間を忘れる。	4.15	4.18	3.98
13.	個人の趣味の時間よりも翌日の締め切りや必要なこと、大事な用事等を優先する。	3.43	3.50	3.51
14.	人生はなるようになるので、私が何をしようがあまり関わりがないと思う。	2.61	2.86	2.92
15.	私は「古き良き時代」の話を聞くのが好きだ。	2.72	2.72	2.94
16.	過去の辛い思い出を繰り返し思い出してしまう。	3.26	3.23	3.42
17.	私は1日1日を大切に生きている。	3.46	3.38	3.58
18.	約束に遅れることは私をひどく不安にさせる。	3.80	3.74	3.74
19.	理想としては、毎日が人生の最後の日であるかのように生きたい。	3.03	2.84	3.10
20.	楽しかった記憶をすぐに思い出すことができる。	3.80	3.50	3.61
21.	私は、友人や権威（先輩や先生など）などに対する義務を時間通りに遂行する。	3.57	3.52	3.64
22.	過去にいじめられたり、他人に拒絶されたりしたことがある。	2.71	2.60	2.36
23.	私はその時々の気分によって選択をする。	3.77	3.79	3.73
24.	私はどちらかというと毎日を自由気ままに生きている方である。	3.72	3.80	3.68
25.	過去は辛い思い出ばかりなのであまり考えないようにしている。	2.89	2.78	2.92
26.	人生は刺激に満ち溢れているべきだと思う。	3.30	3.25	3.34
27.	私は過去に過ちを犯したのでできることならやり直したいと思う。	3.23	2.88	3.02
28.	今を楽しむ事の方が、締め切りなどの時間に捉われることより大事だと思う。	3.18	3.03	3.41
29.	私は自分の幼少時代を懐かしく感じる。	3.74	3.74	3.71
30.	私は決断をする前に、その選択から得られるものと失うものを天秤にかける。	3.22	3.35	3.40
31.	リスクをとることは、私の人生が退屈なものにならないようにしてくれると思う。	3.16	3.12	3.21
32.	私にとって、人生の過程を楽しむことは、目的地にたどり着くことより大事だ。	3.32	3.28	3.40
33.	計画通りに物事が運ぶことは滅多にない。	3.53	3.41	3.52
34.	幼い頃のトラウマや不快なイメージを忘れるのは難しいことだ。	3.58	3.62	3.73

Yoshida: School year →	1	2	3
35. 物事のゴールや結果、成果物などについて考えると、その過程を楽しむことができなくなる。	3.05	2.98	3.15
36. 今現在を楽しんでいる時でも、過去の似たような経験と常に比較してしまう。	3.10	3.32	3.19
37. 物事や環境は変わるので、未来について計画を立てたり準備をしたりすることは不可能だと思う。	2.82	2.93	3.09
38. 私の人生は私には干渉できない何か大きな力にコントロールされていると思う。	2.68	2.41	2.93
39. 未来について心配をする意味がわからない、なぜなら私がそれに対してできることは何もないからだ。	2.35	2.37	2.82
40. 私はきちんと計画を立てて物事を計画通りに進めることができる。	2.69	2.75	2.95
41. 私は、家族が「昔はよかったわ。」などと過去を懐かしがっていると自然とそれらの話に耳を傾けないようにしてしまう。	2.48	2.80	3.00
42. 私は人生を面白みのあるものにするためにはリスクを冒すことも厭わない。	3.06	2.90	3.14
43. 私はやるべきことをリスト化する。	2.63	2.65	2.72
44. 私は理性よりも感情に従う方だ。	3.25	3.27	3.21
45. 私はやるべきことがあるとき、誘惑を断ち切ることができる。	2.83	2.99	2.96
46. ふと我に帰ると、その時々を狂ったように楽しんでいる自分を見つけることがある。	3.39	3.28	3.33
47. 今の社会や生活、人生はあまりにも複雑になってしまったので、昔のように単純に生きたいと思う。	3.56	3.27	3.29
48. 行動パターンが読める普通の友人よりも、奇抜で斬新かつ活動的でなにをしでかすかわからないような友人が欲しいと思う。	3.32	3.43	3.22
49. 私は繰り返されてきた家族の習慣や伝統が好きだ。	3.37	3.32	3.44
50. 私は、過去に起こった悲しかった出来事や悪い出来事について考え込んでしまう。	3.23	3.21	3.40
51. 私は、自分のためになるなら難しくて興味のないことについてもやり続けることができる。	2.86	2.75	3.21
52. 自分で稼いだお金は、貯めるよりも今やりたいことに使いたいと思う。	2.86	3.02	3.18
53. 努力よりも運のほうが私をよい結果に導いてくれると思う。	2.76	2.86	3.03
54. 私は、自分の人生のうちで逃してしまった好機について考えてしまう。	3.09	3.33	3.32
55. 私は親密な関係にある人たちはお互いに対して情熱的であるべきだと思う。	3.56	3.23	3.27
56. 仕事や課題等で、できなかったことがあってもそのうちどうにかできると思う。	3.20	2.93	3.40

パート 7 - 幸福度 / Part 7 – Happiness

各学校の学年ごとの詳細を下表に示します。

回答に際して、1 が最も幸福度が低く、10 が最も幸福度が高い状態を表します。

The detailed average results by school and school year are listed in the tables below. Students gave a score to their happiness in a scale where 1 is the lowest and 10 the highest possible value.

	School name	Chiyoda							
	School year / 学年	1		2		3		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
家計	Family finances - Happiness	7.02	2.42	6.52	2.12	6.57	2.10	6.73	2.23
自分自身の健康	Health	7.09	2.72	6.30	1.98	6.43	1.99	6.65	2.32
家族の健康	Family's health	7.61	2.48	7.04	1.83	6.73	1.88	7.18	2.14
近所の人との関係	Relations with your neighbours	7.06	2.49	7.04	2.19	6.49	2.00	6.90	2.26
そのほかのソーシャルネットワーク	Relations in other social networks	6.70	2.79	7.02	1.99	6.78	1.90	6.83	2.31
教育	Education	7.15	2.24	6.07	2.03	6.46	1.54	6.60	2.04
家族の生活	Family life	7.26	2.44	7.04	2.31	7.00	1.89	7.12	2.24
余暇や社会生活	Leisure and social life	7.09	2.15	7.02	2.11	6.89	1.79	7.01	2.03
生活水準	Standard of living	7.06	2.18	7.28	1.97	6.95	1.87	7.10	2.02
人生において達成したいこと	What you are achieving in life	6.78	2.78	5.72	2.22	6.54	2.05	6.36	2.44
どれだけ安全だと感じるか	Current safety	7.09	2.47	7.17	1.98	7.19	1.85	7.15	2.14
将来の安心	Future safety	6.07	2.71	5.61	2.03	5.70	2.15	5.82	2.34
宗教や精神面	Spirituality / religion	6.46	2.35	6.61	2.24	5.65	2.00	6.29	2.24
生活全体	Life as a whole - Happiness	7.20	2.33	7.07	2.06	6.89	2.03	7.07	2.15
	Total students	**54**		**46**		**37**		**137**	

	School name	Kamo					
	School year / 学年	1		2		Total	
		Mean	SD	Mean	SD	Mean	SD
家計	Family finances - Happiness	7.39	2.29	7.57	2.23	7.48	2.26
自分自身の健康	Health	7.59	2.25	7.65	2.22	7.62	2.23
家族の健康	Family's health	7.70	2.13	7.77	2.03	7.74	2.08
近所の人との関係	Relations with your neighbours	7.43	2.24	7.56	1.84	7.50	2.04
そのほかのソーシャルネットワーク	Relations in other social networks	7.63	2.04	7.51	2.00	7.57	2.02
教育	Education	7.56	2.11	7.22	2.13	7.38	2.12
家族の生活	Family life	7.98	2.13	8.05	2.13	8.01	2.13
余暇や社会生活	Leisure and social life	7.73	2.10	7.92	2.09	7.83	2.10
生活水準	Standard of living	7.87	2.00	8.04	1.80	7.96	1.90
人生において達成したいこと	What you are achieving in life	6.90	2.35	6.86	2.23	6.88	2.29

	School name	Kamo					
	School year / 学年	1		2		Total	
		Mean	SD	Mean	SD	Mean	SD
どれだけ安全だと感じるか	Current safety	7.74	1.94	7.79	1.85	7.77	1.89
将来の安心	Future safety	6.23	2.52	6.25	2.45	6.24	2.48
宗教や精神面	Spirituality / religion	6.94	2.56	7.22	2.19	7.09	2.38
生活全体	Life as a whole - Happiness	7.70	2.19	7.88	2.01	7.79	2.10
	Total students	**210**		**223**		**433**	

	School name	Mukaihara							
	School year / 学年	1		2		3		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
家計	Family finances - Happiness	7.34	2.41	6.21	2.63	7.22	2.30	6.89	2.50
自分自身の健康	Health	6.98	2.83	6.30	2.46	6.84	2.54	6.69	2.61
家族の健康	Family's health	7.48	2.37	6.52	2.44	7.00	2.34	6.98	2.40
近所の人との関係	Relations with your neighbours	7.24	2.49	6.25	2.24	6.91	2.38	6.77	2.39
そのほかのソーシャルネットワーク	Relations in other social networks	6.64	2.38	6.45	2.30	7.18	2.17	6.73	2.30
教育	Education	7.30	2.27	6.14	2.17	7.11	1.92	6.81	2.18
家族の生活	Family life	7.70	2.39	6.91	2.33	7.69	1.96	7.40	2.27
余暇や社会生活	Leisure and social life	7.50	2.13	6.71	2.36	7.40	2.13	7.18	2.23
生活水準	Standard of living	7.64	2.21	6.66	2.26	7.38	2.09	7.20	2.22
人生において達成したいこと	What you are achieving in life	6.88	2.30	6.45	2.26	7.11	2.05	6.79	2.22
どれだけ安全だと感じるか	Current safety	7.12	2.50	6.95	2.31	7.31	2.02	7.11	2.29
将来の安心	Future safety	5.58	2.81	5.80	2.32	6.42	2.36	5.91	2.51
宗教や精神面	Spirituality / religion	6.42	2.67	5.57	2.30	6.91	2.23	6.25	2.46
生活全体	Life as a whole - Happiness	7.22	2.53	6.68	2.27	7.27	2.08	7.03	2.31
	Total students	**50**		**56**		**45**		**151**	

	School name	Yoshida							
	School year / 学年	1		2		3		Total	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
家計	Family finances - Happiness	6.84	2.21	6.78	2.55	7.10	2.17	6.92	2.30
自分自身の健康	Health	7.22	1.97	6.73	2.59	7.46	2.35	7.16	2.33
家族の健康	Family's health	7.47	1.91	6.98	2.36	7.45	2.14	7.31	2.15
近所の人との関係	Relations with your neighbours	6.90	2.20	6.71	2.62	7.14	2.32	6.93	2.38
そのほかのソーシャルネットワーク	Relations in other social networks	7.05	2.13	7.20	2.25	7.29	2.22	7.19	2.20
教育	Education	6.81	2.47	6.90	2.36	6.97	2.31	6.90	2.37
家族の生活	Family life	7.38	2.14	7.32	2.35	7.66	2.16	7.46	2.21
余暇や社会生活	Leisure and social life	7.05	2.24	7.13	2.39	7.43	2.24	7.22	2.29
生活水準	Standard of living	7.15	2.10	7.10	2.18	7.21	2.29	7.16	2.19

人生において達成したいこと	What you are achieving in life	6.97	2.11	6.68	2.27	6.82	2.20	6.82	2.19
どれだけ安全だと感じるか	Current safety	7.44	1.82	7.43	2.06	7.52	2.18	7.47	2.03
将来の安心	Future safety	6.29	2.28	5.87	2.40	6.66	2.30	6.30	2.34
宗教や精神面	Spirituality / religion	6.70	2.23	6.43	2.49	6.81	2.30	6.66	2.33
生活全体	Life as a whole - Happiness	7.43	2.02	7.15	2.26	7.45	2.24	7.35	2.18
	Total students	**93**		**92**		**111**		**296**	

Appendix E: Survey of Health-related Quality of Life in Japanese cities

List of question items

SC1　あなたの性別を教えてください。　Gender

SC2_1　あなたの年齢を教えてください。／歳　Age

SC3　あなたのお住まいの地域を教えてください。　Residence

1	札幌市（北海道）	Sapporo city (Hokkaido prefecture)
2	仙台市　（宮城県）	Sendai city (Miyagi prefecture)
3	さいたま市（埼玉県）	Saitama city (Saitama prefecture)
4	千葉市　（千葉県）	Chiba city (Chiba prefecture)
5	東京２３区（東京都）	Tokyo metropolitan area (Tokyo prefecture)
6	横浜市（神奈川県）	Yokohama City (Kanagawa prefecture)
7	川崎市（神奈川県）	Kawasaki city (Kanagawa prefecture)
8	相模原市（神奈川県）	Sagamihara city (Kanagawa prefecture)
9	新潟市（新潟県）	Niigata city (Niigata prefecture)
10	静岡市（静岡県）	Shizuoka city (Shizuoka prefecture)
11	浜松市（静岡県）	Hamamatsu city (Shizuoka prefecture)
12	名古屋市（愛知県）	Nagoya city (Aichi prefecture)
13	京都市（京都府）	Kyoto city (Kyoto prefecture)
14	大阪市（大阪府）	Osaka city (Osaka prefecture)
15	堺市（大阪府）	Sakai city (Osaka prefecture)
16	神戸市（兵庫県）	Kobe city (Hyogo prefecture)
17	岡山市（岡山県）	Okayama city (Okayama prefecture)
18	広島市（広島県）	Hiroshima city (Hiroshima prefecture)
19	北九州市（福岡県）	Kita-Kyushu city (Fukuoka prefecture)
20	福岡市（福岡県）	Fukuoka city (Fukuoka prefecture)
21	上記には住んでいない	Others

SC4　あなたの職業を教えてください。　occupation

1	会社員	an office worker
2	公務員・教職員	a government employee
3	自営業	independent business
4	パート・アルバイト	part -timer
5	専業主婦・専業主夫	homemaker
6	学生	student
7	無職	unemployed
8	その他	others

SC5　あなたと世帯主との関係は以下のどれにあてはまりますか。　relation between householder and you

1	世帯主本人	householder
2	世帯主の配偶者	householder's spouse
3	世帯主の子	householder's child
4	世帯主の子の配偶者	child's spouse (son/daughter-in-law)
5	世帯主の孫	grandchild
6	世帯主の父母	father/mother
7	世帯主の配偶者の父母	spouse's father/mother (father/mother-in-law)
8	世帯主の祖父母	grandfather/grandmother
9	世帯主の兄弟・姉妹	brother/sister
10	その他	others

SC6_1　あなたの同居家族の人数を、あなたご自身を含めて教えてください。／人　The number people living together (including you)

SC7_1　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／未就学児童　In your household, how many pre-schoolers are there?

SC7_2　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えくださ

い。／小学生　In your household, how many elementary schoolchildren are there?
SC7_3　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／中学生　In your household, how many junior high school students are there?
SC7_4　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／高校生　In your household, how many senior high school students are there?
SC7_5　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／短大・高専生　In your household, how many junior college students/students at a college of technology are there?
SC7_6　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／大学・大学院生　In your household, how many college students/graduate students are there?
SC7_7　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／有職者　In your household, how many knowledgeable people are there?
SC7_8　あなたの世帯内に、以下の項目に該当する方はいらっしゃいますか。人数をお答えください。／６５歳以上の方　In your household, how many persons age 65 or older are there?
SC8　あなたは現在どの程度幸せだと感じていますか。「とても幸せ」を１０点、「とても不幸」を０点とすると、何点くらいになると思いますか。いずれかの数字を選択してください。/　How do you feel that you are happy now? Assuming 'very happy' being 10 points and 'very unhappy' being 0 point, how much is your current happiness?

SC9_1　自動車免許　Do you have a driving license?
SC9_2　専用自動車　Do you have a private automobile?

SC10_1　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／市役所　the distance between your house and a city hall
SC10_2　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／郵便局・銀行　the distance between your house and a post office/a bank
SC10_3　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／幼稚園・保育園　the distance between your house and a kindergarten/a nursery school
SC10_4　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／小学校　the distance between your house and a primary school
SC10_5　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／中学校　the distance between your house and a junior high school
SC10_6　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／高等学校　the distance between your house and a senior high school
SC10_7　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／病院　the distance between your house and a hospital
SC10_8　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／公民　館　the distance between your house and a public hall
SC10_9　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／ＪＲ・電車などの駅　the distance between your house and a station
SC10_10　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／バス停　the distance between your house and a bus stop
SC10_11　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／スーパー　the distance between your house and a supermarket
SC10_12　あなたの住宅から最寄りの生活関連施設までの、おおよその距離を教えてください。／公園　the distance between your house and a park

Q1_1_1　あなたの住居の郵便番号を教えてください。／郵便番号 zip code
Q1_2_1　現住所での居住年数を教えてください。／年間居住している　the length of residence in your present address
Q1_3_1　あなたがお住まいの住居について、建て方を次の中から選択してください。　a

style of your house

1 一戸建 a detached house
2 長屋建て a row house
3 共同住宅 apartment
4 その他 others

Q1_3_2_1_1 建物の階数／建物の階数／階建 How many stories does your house have?

Q1_3_2_2_1 あなたの住居の階層／あなたの住居の階層／階 Which floor is your apartment on ?

Q1_3_2_3 エレベーターの有無 Is there the elevator in your apartment?

Q1_4 あなたの世帯の年間収入は、おおよそどのくらいですか。次の中から最もあてはまるものを選択してください。 What is your annual income?

1 １００万円未満（月額８万円未満）
2 １００～１９９万円（月額８万円～１６万円）
3 ２００～２９９万円（月額１７万円～２４万円）
4 ３００～３９９万円（月額２５万円～３３万円）
5 ４００～４９９万円（月額３４万円～４１万円）
6 ５００～５９９万円（月額４２万円～４９万円）
7 ６００～６９９万円（月額５０万円～５８万円）
8 ７００～７９９万円（月額５９万円～６６万円）
9 ８００～８９９万円（月額６７万円～７４万円）
10 ９００～９９９万円（月額７５万円～８３万円）
11 １０００～１４９９万円（月額８４万円～１２４万円）
12 １５００万円以上（月額１２５万円以上）
13 答えたくない / Do not respond

Section 2, Health habits

Regarding your lifestyle, for the following items how much it applies to you?

Q2_1_1 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／毎日朝食を食べている You eat breakfast every morning.

Q2_1_2 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／１日平均７～８時間は寝ている You sleep per day for 7-8 hours on the average.

Q2_1_3 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／栄養摂取バランスを考えて食事をしているYou consider the nutrition balance of the meal.

Q2_1_4 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／タバコは吸わない You do not smoke.

Q2_1_5 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／運動や定期的スポーツをしている You play exercise and periodical sports.

Q2_1_6 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／毎日，そんなに多量のお酒を飲んでいないYou do not drink alcohol that much every day.

Q2_1_7 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／労働時間は１日９時間以内にとどめているYou keep working hours within nine hours a day.

Q2_1_8 あなたの生活習慣についてお尋ねします。以下のそれぞれの項目がどのくらいあなたにあてはまりますか。／自覚的なストレスはそんなに多くない You do not feel conscious stress that much.

1 全くそのとおりaffirmative
2 ほぼあてはまるnearly true
3 何とも言えないindefinable

4 ほとんどあてはまらない hardly apply
5 ぜんぜんあてはまらない not applicable

Q2_2_1 過去に事故や病気により、入院や手術を伴う大きな病気にかかったことはありますか。 Have you suffered from any big disease with hospitalization or operation so far?
Q2_2_2_1_1 １つ目／年 When was it?
Q2_3_1 あなたの人との関わり合いについて教えてください。／一般的に人は信頼できると思いますか。 Do you think that a person is generally reliable?
Q2_3_2 あなたの人との関わり合いについて教えてください。／多くの場合、人は他人の役に立とうとすると思いますか。 Do you think that in many cases, a person is going to be helpful for another person?
Q2_3_3 あなたの人との関わり合いについて教えてください。／現在、参加・加入している地域団体（ボランティアのグループや趣味の会など）はありますか。Do you participate in the regional society (including the group of volunteers or hobbies) now?
Q2_3_3_SNT1 あなたの人との関わり合いについて教えてください。／現在、参加・加入している地域団体（ボランティアのグループや趣味の会など）はありますか。／はい In how many activities do you participate?

Section 3
SF-36 health questionnaire
Q3_1 あなたの健康状態は。 the condition of your health
1 最高に良い absolutely good
2 とても良い very good
3 良い g good
4 あまり良くない not good enough
5 良くない bad
Q3_2 １年前と比べて、現在の健康状態はいかがですか。 How is your current health condition compared to the previous year?
1 １年前より、はるかに良い better by far
2 １年前よりは、やや良い a little better
3 １年前と、ほぼ同じ same as before
4 １年前ほど、良くない not so good as before
5 １年前より、はるかに悪い far worse

Q3_3_1 以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／激しい運動、例えば一生懸命走る、重い物を持ち上げる、激しいスポーツをするなど Do you feel that the following activity is difficult by a health reason?/Intense exercise
1 とてもむずかしい very hard
2 少しむずかしい a little hard
3 ぜんぜんむずかしくない not hard
Q3_3_2 以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／適度な運動、例えば、家の庭の掃除をする、１～２時間の散歩をするなど Do you feel that the following activity is difficult by a health reason?/moderate physical activity
Q3_3_3 以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／少し重い物を持ち上げたり、運んだりする（例えば買い物袋など） Do you feel that the following activity is difficult by a health reason?/carry shopping bags
Q3_3_4 以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／階段を数階上までのぼる Do you feel that the following activity is difficult by a health reason?/go up the stairs to some floors
Q3_3_5 以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動を

することがむずかしいと感じますか。／階段を１階上までのぼる　　Do you feel that the following activity is difficult by a health reason?/go up the stairs for one floor

Q3_3_6　以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／体を前に曲げる、ひざまずく、かがむ　Do you feel that the following activity is difficult by a health reason?/bend forward

Q3_3_7　以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／１キロメートル以上歩く　　Do you feel that the following activity is difficult by a health reason?/walk more than 1 kilometre

Q3_3_8　以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／数百メートルくらい歩く　　Do you feel that the following activity is difficult by a health reason?/walk several hundred meters

Q3_3_9　以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／百メートルくらい歩くDo you feel that the following activity is difficult by a health reason?/walk one hundred meters

Q3_3_10以下の質問は日常よく行われている活動です。あなたは健康上の理由で、こうした活動をすることがむずかしいと感じますか。／自分でお風呂に入ったり、着がえたりする　　Do you feel that the following activity is difficult by a health reason?/take a bath and change clothes

Q3_4_1　過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、身体的な理由で次のような問題がありましたか。／仕事やふだんの活動をする時間をへらした　　Did you face the following situation by a physical reason in the past month?/You reduced work time and activity time.

1　いつも　　always
2　ほとんどいつもusually
3　ときどき　　sometimes
4　まれに　　rarely
5　ぜんぜんない　never

Q3_4_2　過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、身体的な理由で次のような問題がありましたか。／仕事やふだんの活動が思ったほど、できなかった　　Did you face the following situation by a physical reason in the past month?/You were not able to do work and everyday activity as expected.

Q3_4_3　過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、身体的な理由で次のような問題がありましたか。／仕事やふだんの活動の内容によっては、できないものがあった　　Did you face the following situation by a physical reason in the past month?/You were not able to do work and everyday activity, depending on the situation.

Q3_4_4　過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、身体的な理由で次のような問題がありましたか。／仕事やふだんの活動をすることがむずかしかった　（例えばいつもより努力を必要としたなど）　　Did you face the following situation by a physical reason in the past month?/You were not able to do work and everyday activity without effort.

Q3_5_1　過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、心理的な理由で（例えば気分が落ち込んだり不安を感じたりしたために）、次のような問題がありましたか。／仕事やふだんの活動をする時間をへらした　　Did you face the following situation by a physical reason in the past month?/You spared less time for work and everyday activity

1　いつも　　always
2　ほとんどいつもusually
3　ときどき　　sometimes
4　まれに　　rarely
5　ぜんぜんない　never

Q3_5_2　過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、心理的な理由で（例えば気分が落ち込んだり不安を感じたりしたために）、次のような問題がありましたか。／仕事やふだんの活動が思ったほど、できなかった　　Did you face the following situation by a

mental reason in the past month?/You were not able to do work and everyday activity as expected.

Q3_5_3 過去１ヶ月間に、仕事やふだんの活動（家事など）をするにあたって、心理的な理由で（例えば気分が落ち込んだり不安を感じたりしたために）、次のような問題がありましたか。／仕事はふだんの活動がいつもほど、集中してできなかった Did you face the following situation by a mental reason in the past month?/It was difficult for you to concentrate on work and everyday activity than usual.

Q3_6 過去１ヶ月間に、家族、友人、近所の人、その他の仲間とのふだんのつきあいが、身体的あるいは心理的な理由でどのくらい妨げられましたか。 How much was your sociability prevented by a physical or mental reason in the past month?

1 ぜんぜん、妨げられなかった not at all
2 わずかに、妨げられた slightly
3 少し、妨げられた a little
4 かなり、妨げられた pretty
5 非常に、妨げられた considerably

Q3_7 過去１ヶ月間に、体の痛みをどのくらい感じましたか。 How much did you feel the pain of the body in the past month?

1 ぜんぜんなかった not at all
2 かすかな痛み dim pain
3 軽い痛み slight pain
4 中くらいの痛み medium pain
5 強い痛み hard pain
6 非常に激しい痛み acute pain

Q3_8 過去１ヶ月間に、いつもの仕事（家事も含みます）が痛みのために、どのくらい妨げられましたか。 How much was your work and everyday activity prevented by the pain reason in the past month?

1 ぜんぜん、妨げられなかった not at all
2 わずかに、妨げられた slightly
3 少し、妨げられた a little
4 かなり、妨げられた pretty
5 非常に、妨げられた considerably

Q3_9_1 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／元気いっぱいでしたか In the past month, how often did you feel?/full of vigour

1 いつも always
2 ほとんどいつも usually
3 ときどき sometimes
4 まれに rarely
5 ぜんぜんない never

Q3_9_2 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／かなり神経質でしたか In the past month, how often did you feel?/very nervous

Q3_9_3 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／どうにもならないくらい、気分がおちこんでいましたか In the past month, how often did you feel?/be hopelessly depressed

Q3_9_4 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／おちついて、おだやかな気分でしたか In the past month, how often did you feel? / composed and calm

Q3_9_5 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／活力（エネルギー）にあふれていましたか In the past month, how often did you feel? / be full of energy

Q3_9_6 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／おちこんで，ゆううつな気分でしたか　In the past month, how did you feel? / be in very low spirits and feel gloomy
Q3_9_7 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／疲れはてていましたか　In the past month, how did you feel?/　exhausted
Q3_9_8 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／楽しい気分でしたか　In the past month, how did you feel?/　good
Q3_9_9 次にあげるのは、過去１ヶ月間に、あなたがどのように感じたかについての質問です。／疲れを感じましたか　In the past month, how did you feel?/　tired
Q3_10　過去１ヶ月間に、友人や親せきを訪ねるなど、人とのつきあいが、身体的あるいは心理的な理由で、時間的にどのくらい妨げられましたか。　How often was your sociability prevented by a physical or mental reason in the past month?

Q3_11_1 次にあげた各項目はどのくらいあなたにあてはまりますか。／私は人に比べて病気になりやすいと思う　You have liability to disease.
1　まったくそのとおり　affirmative
2　ほぼあてはまるnearly true
3　何とも言えないindefinable
4　ほとんどあてはまらない hardly apply
5　ぜんぜんあてはまらない not applicable
Q3_11_2 次にあげた各項目はどのくらいあなたにあてはまりますか。／私は人並みに健康である　You are healthy like others.
Q3_11_3 次にあげた各項目はどのくらいあなたにあてはまりますか。／私の健康は，悪くなるような気がする　You feel that you will become unhealthy.
Q3_11_4 次にあげた各項目はどのくらいあなたにあてはまりますか。／私の健康状態は非常に良い　You are very healthy.

Section 4
Q4_1_1　あなたが以下の活動を行う頻度を教えてください。／接触があり、激しい運動（サッカー、バレーボール、バスケットボール、野球、柔道、スキーなど）frequency of the following activity/hard exercise with collision such as soccer, volleyball, basketball
1　していない　not at all
2　年に１回　once a year
3　年に２，３回　a few times a year
4　半年に１回　once in six months
5　数か月に１回　once every few months
6　月に１回　once a month
7　月に２，３回　a few times a month
8　週に１回　once a week
9　週に２，３回　a few times a meek
10　週に４日以上　four times or over a week
Q4_1_2　あなたが以下の活動を行う頻度を教えてください。／接触のない、激しい運動（テニス、マラソン、器具を使ったトレーニング、バドミントン、ジョギング、卓球、水泳など）　frequency of the following activity/hard exercise without collision such as tennis, marathon
Q4_1_3　あなたが以下の活動を行う頻度を教えてください。／接触のない、穏やかな運動（ゴルフ、ボウリング、ウォーキングなど）　frequency of the following activity/calm exercise without collision such as badminton, jogging, table tennis, swimming
Q4_1_4　あなたが以下の活動を行う頻度を教えてください。／社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など）　frequency of the following activity/social activity such as volunteer, club activities
Q4_1_5　あなたが以下の活動を行う頻度を教えてください。／家族とのコミュニケーション

frequency of the following activity/communication with your family

Q4_2_1 あなたが以下の活動を行う際の、主な活動時間帯を教えてください。／接触があり、激しい運動（サッカー、バレーボール、バスケットボール、野球、柔道、スキーなど）activity period for the following activity/hard exercise with collision such as soccer, volleyball, basketball

1 平日（～９時）before 9:00 on weekdays
2 平日（９時～１２時） from 9:00 to 12:00 on weekdays
3 平日（１２時～１５時）from 12:00 to 15:00 on weekdays
4 平日（１５時～１８時）from 15:00 to 18:00 on weekdays
5 平日（１８時～） after 18:00 on weekdays
6 休日（～９時）before 9:00 on holidays
7 休日（９時～１２時） from 9:00 to 12:00 on holidays
8 休日（１２時～１５時）from 12:00 to 15:00 on holidays
9 休日（１５時～１８時）from 15:00 to 18:00 on holidays
10 休日（１８時～） after 18:00 on holidays

Q4_2_2 あなたが以下の活動を行う際の、主な活動時間帯を教えてください。／接触のない、激しい運動（テニス、マラソン、器具を使ったトレーニング、バドミントン、ジョギング、卓球、水泳など） activity period for the following activity/hard exercise without collision such as tennis, marathon

Q4_2_3 あなたが以下の活動を行う際の、主な活動時間帯を教えてください。／接触のない、穏やかな運動（ゴルフ、ボウリング、ウォーキングなど） activity period for the following activity/calm exercise without collision such as badminton, jogging, table tennis, swimming

Q4_2_4 あなたが以下の活動を行う際の、主な活動時間帯を教えてください。／社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など） activity period for the following activity/social activity such as volunteer, club activities

Q4_2_5 あなたが以下の活動を行う際の、主な活動時間帯を教えてください。／家族とのコミュニケーション activity period for the following activity/communication with your family

Q4_3_1_1 接触があり、激しい運動（サッカー、バレーボール、バスケットボール、野球、柔道、スキーなど）／分 How long do you do the following activity?/hard exercise with collision such as soccer, volleyball, basketball

Q4_3_2_1 接触のない、激しい運動（テニス、マラソン、器具を使ったトレーニング、バドミントン、ジョギ ング、卓球、水泳など）／分 How long do you do the following activity?/hard exercise without collision such as tennis, marathon

Q4_3_3_1 接触のない、穏やかな運動（ゴルフ、ボウリング、ウォーキングなど）／分 How long do you do the following activity?/calm exercise without collision such as badminton, jogging, table tennis, swimming

Q4_3_4_1 社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など）／分 How long do you do the following activity?/social activity such as volunteer, club activities

Q4_3_5_1 家族とのコミュニケーション／分 How long do you do the following activity?/communication with your family

Q4_4_1 あなたが以下の活動を行う際の、主な活動場所を教えてください。／接触があり、激しい運動（サッカー、バレーボール、バスケットボール、野球、柔道、スキーなど）Where do you do the following activity?/hard exercise with ball collision such as soccer, volleyball, basketball

1 自宅 at home
2 公園 park
3 ジム gym
4 室内運動施設（ジム以外） indoor exercise institution except a gym
5 商業施設（スーパー、飲食店など） business space such as supermarket, restaurant
6 屋外施設（公園以外） outdoor institution except a park

7 通勤・通学先 your school or your place of work
8 道路 road
9 山 mountain
10 河川 river
11 海 sea
12 その他 others

Q4_4_2 あなたが以下の活動を行う際の、主な活動場所を教えてください。／接触のない、激しい運動（テニス、マラソン、器具を使ったトレーニング、バドミントン、ジョギング、卓球、水泳など） Where do you do the following activity?/hard exercise without ball collision such as tennis, marathon

Q4_4_3 あなたが以下の活動を行う際の、主な活動場所を教えてください。／接触のない、穏やかな運動（ゴルフ、ボウリング、ウォーキングなど） Where do you do the following activity? / calm exercise without collision such as badminton, jogging, table tennis, swimming

Q4_4_4 あなたが以下の活動を行う際の、主な活動場所を教えてください。／社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など） Where do you do the following activity?/social activity such as volunteer, club activities

Q4_4_5 あなたが以下の活動を行う際の、主な活動場所を教えてください。／家族とのコミュニケーション Where do you do the following activity?/communication with your family

Q4_5_1 あなたが以下の活動を行う際、どなたと一緒に行いますか。あてはまる方全てをお選びください。／接触があり、激しい運動（サッカー、バレーボール、バスケットボール、野球、柔道、スキーなど） Whom do you do the following activities with?/hard exercise with collision such as soccer, volleyball, basketball

1 一人 alone
2 友人 with your friends
3 恋人 with your boyfriend/girlfriend
4 家族（子供） with your children
5 家族（子供以外） with your family except your children
6 学校の団体 school group
7 地域の団体 regional group
8 職場の団体 group of your workplace
9 その他 others

Q4_5_2 あなたが以下の活動を行う際、どなたと一緒に行いますか。あてはまる方全てをお選びください。／接触のない、激しい運動（テニス、マラソン、器具を使ったトレーニング、バドミントン、ジョギング、卓球、水泳など） Whom do you do the following activities with?/hard exercise without collision such as tennis, marathon

Q4_5_3 あなたが以下の活動を行う際、どなたと一緒に行いますか。あてはまる方全てをお選びください。／接触のない、穏やかな運動（ゴルフ、ボウリング、ウォーキングなど） Whom do you do the following activities with?/calm exercise without collision such as badminton, jogging, table tennis, swimming

Q4_5_4 あなたが以下の活動を行う際、どなたと一緒に行いますか。あてはまる方全てをお選びください。／社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など） Whom do you do the following activities with?/social activity such as volunteer, club activities

Q4_5_5 あなたが以下の活動を行う際、どなたと一緒に行いますか。あてはまる方全てをお選びください。／家族とのコミュニケーション Whom do you do the following activities with?/communication with your family

Q4_6_1 あなたが以下の活動を行う際の、活動場所への主な移動手段を教えてください。／接触があり、激しい運動（サッカー、バレーボール、バスケットボール、野球、柔道、スキーなど） mean of transportation to the activity place/hard exercise with collision such as soccer, volleyball, basketball

1 徒歩 walk

2 自転車 bicycle
3 原付・自動二輪車 motorized two-wheeled vehicle
4 自動車（自分で運転） car (you drive)
5 自動車（送迎）car(you are picked up)
6 鉄道 train
7 路面電車 streetcar
8 新交通システム・モノレール monorail
9 バス bus
10 タクシー・ハイヤー taxi
11 その他 others

Q4_6_2 あなたが以下の活動を行う際の、活動場所への主な移動手段を教えてください。／接触のない、激しい運動（テニス、マラソン、器具を使ったトレーニング、バドミントン、ジョギング、卓球、水泳など） mean of transportation to the activity place/hard exercise without collision such as tennis, marathon
Q4_6_3 あなたが以下の活動を行う際の、活動場所への主な移動手段を教えてください。／接触のない、穏やかな運動（ゴルフ、ボウリング、ウォーキングなど） mean of transportation to the activity place/calm exercise without collision such as badminton, jogging, table tennis, swimming
Q4_6_4 あなたが以下の活動を行う際の、活動場所への主な移動手段を教えてください。／社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など） mean of transportation to the activity place/social activity such as volunteer, club activities
Q4_6_5 あなたが以下の活動を行う際の、活動場所への主な移動手段を教えてください。／家族とのコミュニケーション mean of transportation to the activity place/communication with your family

During exercise, from 0% to 100% how much do you feel…?
Q4_7_1 あなたが運動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／不機嫌だ displeased
Q4_7_2 あなたが運動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／少しイライラする irritated.
Q4_7_3 あなたが運動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／楽しく感じるfun.
Q4_7_4 あなたが運動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／非常に気分がいい good.
During social activities, from 0% to 100% how much do you feel…?
Q4_8_1 あなたが社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など）をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／不機嫌だ displeased
Q4_8_2 あなたが社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など）をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／少しイライラする irritated
Q4_8_3 あなたが社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など）をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／楽しく感じる fun.
Q4_8_4 あなたが社会活動（ボランティア活動、自治活動、サークル活動、行事や催し物への参加、人との付き合い、交際など）をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／非常に気分がいい good.
During communication with your family, from 0% to 100% how much do you feel…?
Q4_9_1 あなたが家族とコミュニケーションをされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／不機嫌だ displeased
Q4_9_2 あなたが家族とコミュニケーションをされているとき、あなたが次のように感じるのはど

のくらいありますか。合計が１００％になるようにお答えください。／少しイライラする irritated

Q4_9_3 あなたが家族とコミュニケーションをされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／楽しく感じる fun.

Q4_9_4 あなたが家族とコミュニケーションをされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／非常に気分がいい good.

Q4_10 ２，３年前と比べてあなたの健康づくりのための活動の頻度は増えましたか。 Did the frequency of the activity for the making of your health increase in comparison with a few years ago?

1 かなり増えた considerably increased
2 増えた increased
3 変わらない steady
4 減った decreased
5 かなり減った considerably decreased

Q4_11_1 あなたの現在の身長と体重について、小数点以下１桁までご記入ください。（客観的な健康度を測るためのものです。）／身長／ｃｍ height

Q4_11_2 あなたの現在の身長と体重について、小数点以下１桁までご記入ください。（客観的な健康度を測るためのものです。）／体重／ｋｇ weight

Section 5

Q5_1 あなたの公園で行う活動を教えてください。 Which activities do you do in a park?

1	散歩をする	take a walk
2	犬の散歩をする	take your dog for a walk
3	のんびり休む	take a rest in a relaxed mood
4	子供をあそばせる	look after a child
5	運動をする	exercise
6	花や緑、自然を楽しむ	enjoy nature
7	会話を楽しむ	enjoy talking
8	その他	others . （which ones?）
9	公園で行う活動はない	nothing

Q5_2_1 Ｑ５＿１で選択された活動について、その頻度を教えてください。／散歩をする frequency of the following activity in a park/take a walk

1 していない not at all
2 年に１回 once a year
3 年に２，３回 a few times a year
4 半年に１回 once in six months
5 数か月に１回 once every few months
6 月に１回 once a month
7 月に２，３回 a few times a month
8 週に１回 once a week
9 週に２，３回 a few times a meek
10 週に４日以上 four times or over a week

Q5_2_2 Ｑ５＿１で選択された活動について、その頻度を教えてください。／犬の散歩をする frequency of the following activity in a park/take your dog for a walk

Q5_2_3 Ｑ５＿１で選択された活動について、その頻度を教えてください。／のんびり休む frequency of the following activity in a park/take a rest in a relaxed mood

Q5_2_4 Ｑ５＿１で選択された活動について、その頻度を教えてください。／子供をあそばせる frequency of the following activity in a park/look after a child

Q5_2_5　Ｑ５＿１で選択された活動について、その頻度を教えてください。／運動をする
frequency of the following activity in a park /　exercise
Q5_2_6　Ｑ５＿１で選択された活動について、その頻度を教えてください。／花や緑、自然を楽しむ　frequency of the following activity in a park/enjoy nature
Q5_2_7　Ｑ５＿１で選択された活動について、その頻度を教えてください。／会話を楽しむ
frequency of the following activity in a park/enjoy talking
Q5_2_8　Ｑ５＿１で選択された活動について、その頻度を教えてください。／その他（再掲）
frequency of the following activity in a park/others

Q5_3_1　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／散歩をする　activity period for the following activity/take a walk
1　平日（～９時）before 9:00 on weekdays
2　平日（９時～１２時）　from 9:00 to 12:00 on weekdays
3　平日（１２時～１５時）from 12:00 to 15:00 on weekdays
4　平日（１５時～１８時）from 15:00 to 18:00 on weekdays
5　平日（１８時～）　after 18:00 on weekdays
6　休日（～９時）before 9:00 on holidays
7　休日（９時～１２時）　from 9:00 to 12:00 on holidays
8　休日（１２時～１５時）from 12:00 to 15:00 on holidays
9　休日（１５時～１８時）from 15:00 to 18:00 on holidays
10　休日（１８時～）　after 18:00 on holidays
Q5_3_2　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／犬の散歩をする　activity period for the following activity/take your dog for a walk
Q5_3_3　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／のんびり休む　activity period for the following activity/take a rest in a relaxed mood
Q5_3_4　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／子供をあそばせる　activity period for the following activity/look after a child
Q5_3_5　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／運動をする　activity period for the following activity/take exercise
Q5_3_6　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／花や緑、自然を楽しむ　activity period for the following activity/enjoy nature
Q5_3_7　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／会話を楽しむ　activity period for the following activity/enjoy talking
Q5_3_8　Ｑ５＿１で選択された活動について、その活動の主な時間帯を教えてください。／その他（再掲）　activity period for the following activity/others

For how long do you…?
Q5_4_1_1　散歩をする／分　take a walk
Q5_4_2_1　犬の散歩をする／分　take your dog for a walk
Q5_4_3_1　のんびり休む／分 take a rest in a relaxed mood
Q5_4_4_1　子供をあそばせる／分　look after a child
Q5_4_5_1　運動をする／分　exercise
Q5_4_6_1　花や緑、自然を楽しむ／分 enjoy nature
Q5_4_7_1　会話を楽しむ／分 enjoy talking
Q5_4_8_1　その他（再掲）／分　others

What is the size of the park where you…?　(mention of more than 1 park by activity is possible)
Q5_5_1_1　散歩をする／縦の長さ　take a walk
Q5_5_2_1　犬の散歩をする／縦の長さ　take your dog for a walk
Q5_5_2_2　犬の散歩をする／横　take your dog for a walk
Q5_5_3_1　のんびり休む／縦の長さ　take a rest in a relaxed mood
Q5_5_4_1　子供をあそばせる／縦の長さ　look after a child
Q5_5_5_1　運動をする／縦の長さ　exercise

Q5_5_6_1　　花や緑、自然を楽しむ／縦の長さ　　enjoy nature
Q5_5_7_1　　会話を楽しむ／縦の長さ　　enjoy talking
Q5_5_8_1　　その他（再掲）／縦の長さ　　others

Q5_6_1　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／散歩をする　facilities of the park where you take a walk
　　1　園路・広場　　a path, an open space
　　2　修景施設（植栽、芝生、花壇、いけがき、噴水、池など）　　a flower bed, a fountain, a lake
　　3　休養施設（休憩所、ベンチなど）　a resting place, a bench
　　4　遊戯施設（ブランコ、すべり台、シーソーなど）　　playground equipment
　　5　運動施設（テニスコート、ゲートボール場など運動ができる施設）　　a tennis court, a gate ball field
　　6　便益施設（売店、飲食店、宿泊施設など）　a stand, a restaurant, accommodations
　　7　管理施設（門、さく、管理事務所、倉庫、車庫など）　　maintenance and operation facilities, gate, fence, a warehouse
　　8　その他の施設（展望台、集会所、避難地・避難路など）　　an observation platform, a meeting place, an evacuation route
Q5_6_2　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／犬の散歩をする　　facilities of the park where you take your dog for a walk
Q5_6_3　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／のんびり休む　　facilities of the park where you take a rest in a relaxed mood
Q5_6_4　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／子供をあそばせる　　facilities of the park where you look after a child
Q5_6_5　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／運動をする　facilities of the park where you take exercise
Q5_6_6　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／花や緑、自然を楽しむfacilities of the park where you enjoy nature
Q5_6_7　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／会話を楽しむ　　facilities of the park where you enjoy talking
Q5_6_8　Ｑ５＿１で選択された活動を行う公園について、その公園にどのような施設があるか、あてはまるもの全てを教えてください。／その他（再掲）　　facilities of the park where you others

Q5_7_1　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／散歩をする Whom do you do the following activities with?/take a walk
　　1　一人　alone
　　2　友人　with your friends
　　3　恋人　with your boyfriend/girlfriend
　　4　家族（子供）　with your children
　　5　家族（子供以外）　　with your family except your children
　　6　学校の団体　　school group
　　7　地域の団体　　regional group
　　8　職場の団体　　group of your workplace
　　9　その他　　others
Q5_7_2　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選び

ください。／犬の散歩をする　Whom do you do the following activities with?/take your dog for a walk

Q5_7_3　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／のんびり休む　Whom do you do the following activities with?/take a rest in a relaxed mood

Q5_7_4　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／子供をあそばせる　Whom do you do the following activities with?/look after a child

Q5_7_5　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／運動をする Whom do you do the following activities with?/take exercise

Q5_7_6　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／花や緑、自然を楽しむ　Whom do you do the following activities with?/enjoy nature

Q5_7_7　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／会話を楽しむ　Whom do you do the following activities with?/enjoy talking

Q5_7_8　Ｑ５＿１で選択された活動を、どなたと一緒に行いますか。あてはまる方すべてをお選びください。／その他（再掲）　Whom do you do the following activities with?/others

Q5_8_1　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／散歩をする　mean of transportation to the activity place/take a walk

1	徒歩	walk
2	自転車	bicycle
3	原付・自動二輪車	motorized two-wheeled vehicle
4	自動車（自分で運転）	car (you drive)
5	自動車（送迎）	car(you are picked up)
6	鉄道	train
7	路面電車	streetcar
8	新交通システム・モノレール	monorail
9	バス	bus
10	タクシー・ハイヤー	taxi
11	その他	others

Q5_8_2　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／犬の散歩をする　mean of transportation to the activity place/take your dog for a walk

Q5_8_3　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／のんびり休む　mean of transportation to the activity place/take a rest in a relaxed mood

Q5_8_4　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／子供をあそばせる　mean of transportation to the activity place/look after a child

Q5_8_5　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／運動をする　mean of transportation to the activity place / exercise

Q5_8_6　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／花や緑、自然を楽しむ　mean of transportation to the activity place/enjoy nature

Q5_8_7　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／会話を楽しむ　mean of transportation to the activity place/enjoy talking

Q5_8_8　あなたが以下の活動を行う際の、公園までの主な移動手段を教えてください。／その他（再掲）　mean of transportation to the activity place/others

Q5_9_1_1　散歩をする／移動距離　transfer distance from the home to the park where you take a walk

Q5_9_1_2　散歩をする／移動時間　transit time from the home to the park where you take a walk

Q5_9_2_1　犬の散歩をする／移動距離　transfer distance from the home to the park where you take your dog for a walk

Q5_9_2_2　犬の散歩をする／移動時間 transit time from the home to the park where you take your dog for a walk
Q5_9_3_1　のんびり休む／移動距離 transfer distance from the home to the park where you take a rest in a relaxed mood
Q5_9_3_2　のんびり休む／移動時間 transit time from the home to the park where you take a rest in a relaxed mood
Q5_9_4_1　子供をあそばせる／移動距離 transfer distance from the home to the park where you look after a child
Q5_9_4_2　子供をあそばせる／移動時間 transit time from the home to the park where you look after a child
Q5_9_5_1　運動をする／移動距離 transfer distance from the home to the park where you take exercise
Q5_9_5_2　運動をする／移動時間 transit time from the home to the park where you take exercise
Q5_9_6_1　花や緑、自然を楽しむ／移動距離 transfer distance from the home to the park where you enjoy nature
Q5_9_6_2　花や緑、自然を楽しむ／移動時間 transit time from the home to the park where you enjoy nature
Q5_9_7_1　会話を楽しむ／移動距離 transfer distance from the home to the park where you enjoy talking
Q5_9_7_2　会話を楽しむ／移動時間 transit time from the home to the park where you enjoy talking
Q5_9_8_1　その他／移動距離 transfer distance from the home to the park where you do others
Q5_9_8_2　その他／移動時間 transit time from the home to the park where you do others

During your time in the park, from 0% to 100% how much do you feel…?
Q5_10_1 あなたが公園を利用されているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／不機嫌だ displeased
Q5_10_2 あなたが公園を利用されているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／少しイライラする irritated
Q5_10_3 あなたが公園を利用されているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／楽しく感じる fun
Q5_10_4 あなたが公園を利用されているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／非常に気分がいい good.

Q5_11_1 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園の大きさについて satisfaction for the size of the park
1 不満 dissatisfied
2 やや不満 dissatisfied slightly
3 普通 neutral
4 やや満足 moderately satisfied
5 満足 satisfied
Q5_11_2 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園の持つ機能（健康器具）について satisfaction for the function for health of the park
Q5_11_3 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園の持つ機能（健康器具以外）についてsatisfaction for the function (not for health) of the park
Q5_11_4 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園の自然の豊かさについて satisfaction for the prodigality of nature of the park

Q5_11_5 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園の立地場所について　　satisfaction for the location of the park
Q5_11_6 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園までのアクセスについて　　satisfaction for the access of the park
Q5_11_7 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園での利用者のマナーについて　　satisfaction for the manner of the user of the park
Q5_11_8 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園の管理について　　satisfaction for the management of the park
Q5_11_9 あなたが利用する公園すべてに対してのどの程度満足していますか。以下の項目についてお答えください。／公園利用の総合満足度について　satisfaction for the total of the park

Q5_12　公園利用が健康にとって良いと思いますか。　Do you think a park is good for health?

Q5_13　２，３年前と比較してあなたの来園頻度は増えましたか。　　Does the frequency of you to go to the park increase in comparison with a few years ago?
1 かなり減った　considerably increased
2 減った　　increased
3 変わっていないsteady
4 増えた　　decreased
5 かなり増えた　considerably decreased

Q5_14_1 公園にどのような健康器具があれば公園を利用しますか。(最大３つまで選んでください)／１番目　　If there is what kind of health appliance in the park, do you use a park?
1 休息器具 （背のばしベンチ、腹筋ベンチ等）　　bench for stretching exercises
2 懸垂器具 （パラレルハンガー、懸垂平行棒、ラムダ、スプリングバー等）　　equipment for chinning exercises
3 ストレッチ器具 （前屈台、ツイストボード等）　　equipment for stretching exercises
4 クライム器具 （楽しみながら「登る」ことで、いろいろな筋肉を鍛えられる健康器具）　　equipment for climbing
5 脚力器具 （自分のペースで、脚力の回復や維持、バランス感覚を養える器具）　　equipment for building up the leg strength
6 腕力器具 （雲梯型のアーチラダーなど腕力を鍛えられる健康器具）　　equipment for training the muscle
7 ボール器具 （ボールを使う健康器具）　　health equipment with ball
8 この中にはないothers

Q5_15_1 以下の仮想状況を想定していただき、お答えください。／私は年間最大／円の税金を支払ってもよいと思います。 How much can you pay a tax for the healthy appliance of the park at the most?

Section 6

Q6_1_1　通勤・通学　　moving distance for commuting
Q6_1_1_SNT1　　通勤・通学／ｋｍ
Q6_1_2　業務　　moving distance for business
Q6_1_2_SNT1　　業務／ｋｍ
Q6_1_3　買い物　moving distance for shopping
Q6_1_3_SNT1　　買い物／ｋｍ
Q6_1_4　趣味・娯楽・余暇・社交活動　　moving distance for amusement or social contact
Q6_1_4_SNT1　　趣味・娯楽・余暇・社交活動／ｋｍ
Q6_1_5　運動・スポーツ　　moving distance for sports

Q6_1_5_SNT1　運動・スポーツ／ｋｍ
Q6_1_6 学習・研究（学業以外）　moving distance for self-study
Q6_1_6_SNT1　学習・研究（学業以外）／ｋｍ
Q6_1_7 ボランティアや自治会などの社会活動　moving distance for volunteer
Q6_1_7_SNT1　ボランティアや自治会などの社会活動／ｋｍ
Q6_1_8 通院・診療・療養などのヘルスケア活動　moving distance for health care
Q6_1_8_SNT1　通院・診療・療養などのヘルスケア活動／ｋｍ
Q6_1_9 外食　moving distance for eating out
Q6_1_9_SNT1　外食／ｋｍ
Q6_1_10 金融機関や役所での私事　moving distance for private business at a bank or a city hall
Q6_1_10_SNT1　金融機関や役所での私事／ｋｍ
Q6_1_11 その他の私事　moving distance for other private business
Q6_1_11_SNT1　その他の私事／ｋｍ

Q6_2_1 あなたが日常生活で行う活動について、その頻度を教えてください。／通勤・通学　frequency of commuting
1 していない　not at all
2 年に１回　once a year
3 年に２，３回　a few times a year
4 半年に１回　once in six months
5 数か月に１回　once every few months
6 月に１回　once a month
7 月に２，３回　a few times a month
8 週に１回　once a week
9 週に２，３回　a few times a meek
10　週に４日以上　four times or over a week
Q6_2_2 あなたが日常生活で行う活動について、その頻度を教えてください。／業務　frequency of business
Q6_2_3 あなたが日常生活で行う活動について、その頻度を教えてください。／買い物　frequency of shopping
Q6_2_4 あなたが日常生活で行う活動について、その頻度を教えてください。／趣味・娯楽・余暇・社交活動　frequency of amusement or social contact
Q6_2_5 あなたが日常生活で行う活動について、その頻度を教えてください。／運動・スポーツ　frequency of sports
Q6_2_6 あなたが日常生活で行う活動について、その頻度を教えてください。／学習・研究（学業以外）　frequency of self study
Q6_2_7 あなたが日常生活で行う活動について、その頻度を教えてください。／ボランティアや自治会などの社会活動　frequency of volunteer
Q6_2_8 あなたが日常生活で行う活動について、その頻度を教えてください。／通院・診療・療養などのヘルスケア活動　frequency of health care
Q6_2_9 あなたが日常生活で行う活動について、その頻度を教えてください。／外食　frequency of eating out
Q6_2_10 あなたが日常生活で行う活動について、その頻度を教えてください。／金融機関や役所での私事　frequency of private business at a bank or a city hall
Q6_2_11 あなたが日常生活で行う活動について、その頻度を教えてください。／その他の私事　frequency of other private business

Q6_3_1 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／通勤・通学　mean of transportation for commuting
1 徒歩　walk
2 自転車　bicycle
3 原付・自動二輪車　motorized two-wheeled vehicle

4 自動車（自分で運転） car (you drive)
5 自動車（送迎）car(you are picked up)
6 鉄道 train
7 路面電車 streetcar
8 新交通システム・モノレール monorail
9 バス bus
10 タクシー taxi
11 その他 others

Q6_3_2 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／業務 mean of transportation for business
Q6_3_3 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／買い物 mean of transportation for shopping
Q6_3_4 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／趣味・娯楽・余暇・社交活動 mean of transportation for amusement or social contact
Q6_3_5 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／運動・スポーツ mean of transportation for sports
Q6_3_6 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／学習・研究（学業以外） mean of transportation for self-study
Q6_3_7 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／ボランティアや自治会などの社会活動 mean of transportation for volunteer
Q6_3_8 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／通院・診療・療養などのヘルスケア活動 mean of transportation for health care
Q6_3_9 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／外食 mean of transportation for eating out
Q6_3_10 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／金融機関や役所での私事 mean of transportation for private business at a bank or a city hall
Q6_3_11 あなたが日常生活で行う活動について、その際の主な移動手段を教えてください。／その他の私事 mean of transportation for other private business

In your daily travel, from 0% to 100% how much do you feel?
Q6_4_1 あなたが日常生活で移動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／不機嫌だ displeased'? Q6_4_2 あなたが日常生活で移動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／少しイライラする irritated
Q6_4_3 あなたが日常生活で移動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／楽しく感じる fun.
Q6_4_4 あなたが日常生活で移動をされているとき、あなたが次のように感じるのはどのくらいありますか。合計が１００％になるようにお答えください。／非常に気分がいい good.

Section 7
Please talk about your satisfaction regarding several life domains.

Q7_1 あなたの生活の満足度についてお答えください。／居住環境 satisfaction for your living environment?
1 非常に満足 satisfied
2 満足 moderately satisfied
3 どちらとも言えない neutral
4 少し不満 dissatisfied slightly
5 非常に不満 dissatisfied

Q7_2 あなたの生活の満足度についてお答えください。／家計の状況 satisfaction with your family finances
Q7_3 あなたの生活の満足度についてお答えください。／健康状態 satisfaction with your

health
Q7_4　あなたの生活の満足度についてお答えください。／近隣住民との関係　satisfaction with relations with your neighbours
Q7_5　あなたの生活の満足度についてお答えください。／教育 satisfaction with your education
Q7_6　あなたの生活の満足度についてお答えください。／就業状態　satisfaction with your job
Q7_7　あなたの生活の満足度についてお答えください。／家庭生活　satisfaction with your home life
Q7_8　あなたの生活の満足度についてお答えください。／余暇・娯楽　satisfaction with your leisure activities
Q7_9　あなたの生活の満足度についてお答えください。／総合満足度　overall satisfaction