

STATUS OF THESIS

Title of thesis Investigating the Role of the Companionship Within Activity-Travel Participation on Social and Mental Health.

LIZA EVIANTI TANJUNG

I hereby allow my thesis to be placed at the Information Resource Centre (IRC) of Universiti Teknologi PETRONAS (UTP) with the following conditions:

1. The thesis becomes the property of UTP
2. The IRC of UTP may make copies of the thesis for academic purposes only.
3. This thesis is classified as

Confidential

Non-confidential

If this thesis is confidential, please state the reason:

The contents of the thesis will remain confidential for _____ years.

Remarks on disclosure:

Endorsed by



Signature of Author
Permanent address: _____

Date : 09 May 2025


ASSOC. PROF. IR. DR. BASHAR S MOHAMMED
Civil & Environmental Engineering Department
Universiti Teknologi PETRONAS
32610 Seri Iskandar,
Perak, Darul Ridzuan, Malaysia

Signature of Supervisor
Name of Supervisor
AP. Dr. Ir Bashar S Mohammed

Date : 09 May 2025

UNIVERSITI TEKNOLOGI PETRONAS
INVESTIGATING THE ROLE OF THE COMPANIONSHIP WITHIN
ACTIVITY-TRAVEL PARTICIPATION ON SOCIAL AND MENTAL HEALTH

by

LIZA EVIANTI TANJUNG

The undersigned certify that they have read, and recommend to the Postgraduate Studies Programme for acceptance of this thesis for the fulfilment of the requirements for the degree stated.




ASSOC. PROF. IR. DR. BASHAR S MOHAMMED
Chair,
Civil & Environmental Engineering Department
Universiti Teknologi PETRONAS
32610 Seri Iskandar,
Perak Darul Ridzuan, Malaysia

Signature:

Main Supervisor:

Associate Prof. Ir. Dr. Bashar S Mohammed



DR. NG CHENG YEE
Senior Lecturer
Civil & Environmental Engineering Department
Universiti Teknologi PETRONAS
32610 Bandar Seri Iskandar
Perak Darul Ridzuan

Signature:

Co-Supervisor-I:

Dr. Ng Cheng Yee

Signature:

Co-Supervisor-II:



Assoc. Prof. Ir. Dr. Hisham Mohamad
Chair, Civil & Environmental Engineering
Universiti Teknologi PETRONAS

Signature:

Head of Department:

Associate Prof. Ir. Dr. Hisham B Mohamad

Date:

09 May 2025

INVESTIGATING THE ROLE OF THE COMPANIONSHIPS WITHIN
ACTIVITY-TRAVEL PARTICIPATION ON SOCIAL AND MENTAL HEALTH

By

LIZA EVIANTI TANJUNG

A Thesis

Submitted to the Postgraduate Studies Programme

as a Requirement for the Degree of

DOCTOR OF PHILOSOPHY

CIVIL AND ENVIRONMENTAL ENGINEERING DEPARTMENT

UNIVERSITI TEKNOLOGI PETRONAS

BANDAR SERI ISKANDAR, PERAK

MALAYSIA

MAY 2025

DECLARATION OF THESIS

Title of thesis Investigating the Role of the Companionship Within Activity-
Travel Participation on Social and Mental Health

I LIZA EVIANTI TANJUNG

hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UTP or other institutions.

Witnessed by



Signature of Author
Permanent address: _____



ASSOC. PROF. IR. DR. BASHAR S MOHAMMED
Assoc.
Civil & Environmental Engineering Department
Universiti Teknologi PETRONAS
32610 Seri Iskandar,
Perak Darul Ridzuan, Malaysia

Signature of Supervisor
Name of Supervisor
AP. Dr Ir Bashar S Mohammed

Date : 09 May 2025

Date : 09 May 2025

DEDICATION

This thesis is dedicated to the loving memory of my parents, whose spirit and guidance have shaped the person I am today. Though they are no longer with me, their enduring love, sacrifices, and unwavering belief in my potential have been my guiding light throughout this journey. Mom, Almarhumah Khairana, and Dad, Almarhum Rasyidin Tanjung, your lessons on resilience, compassion, and dedication continue to inspire me every day. This achievement is a testament to your legacy, and I hope it makes you proud. I am profoundly grateful for being my eternal source of strength and inspiration. To my siblings, Fradina Yuliani Tanjung, ST., Mira Rizky Septiana Tanjung, S.Kom, Boy Andi Azahari Tanjung, SE., and Alif Fathar Syah Tanjung, thank you for always being my anchors and confidants. Your support, encouragement, and unwavering belief in me have been invaluable. I am deeply grateful for your presence in my life.

To my main supervisor, Prof. Bashar S. Mohammed, and my co-supervisors, Dr. Dimas Bayu Endrayana Dharmowijoyo and Dr. Cheng Yee. I am deeply grateful for your invaluable guidance, wisdom, and patience. Your dedication to excellence and unwavering support have been instrumental in completing this work. Thank you for inspiring me to push my boundaries and strive for greatness. And to all my friends, thank you for your constant support and understanding throughout this process. Your encouragement and companionship have made this journey more bearable and rewarding. I am deeply grateful for your presence through thick and thin. Additionally, I would like to acknowledge all my colleagues and fellow researchers for their constructive discussions and camaraderie, which have greatly contributed to my academic growth.

Finally, I would like to express my gratitude to everyone who has supported me, directly or indirectly, in the completion of this thesis. Your encouragement and assistance have been invaluable.

CKNOWLEDGEMENTS

The authors acknowledge the Universiti Teknologi Petronas (UTP), Malaysia, for their financial and administrative assistance in running this research. Their support has been crucial in facilitating the progress and completion of this work.

In compliance with the terms of the Copyright Act 1987 and the IP Policy of the university, the copyright of this thesis has been reassigned by the author to the legal entity of the university, Institute of Technology PETRONAS Sdn Bhd.

Due acknowledgement shall always be made of the use of any material contained in or derived from this thesis.

© Liza Evianti Tanjung, 2025

Institute of Technology PETRONAS Sdn Bhd

All rights reserved.

ABSTRACT

This study investigates how different types of social networks within various activities influence social and mental health in Malang City, Indonesia. Although prior research in developing countries has examined the health impacts of social interactions, the subjective quality of these interactions and their specific effects on travel behaviour remain underexplored. Addressing this gap is crucial for developing effective interventions that leverage social networks to enhance mental well-being and optimise travel patterns. This study examines the interrelationships among socio-demographic characteristics, travel parameters, activity-travel participation, and the presence of companions through advanced multivariate analysis. It further investigates how the involvement of other people in activity-travel participation affects social and mental health using bivariate analysis, and finally evaluates how time use within specific social networks, such as household members, relatives, friends, or online contacts, shapes health outcomes.

Data were collected from 420 individuals across 92 households through a survey conducted between August and October 2019, capturing socio-demographic characteristics, travel behaviours, time use, detailed activity diaries, and involvement in different social networks. A multilevel modelling approach with a random slope was applied to analyse time-use and activity-travel participation. Respondents recorded their activities and travel every 15 minutes over five weekdays, categorising them into mandatory, leisure, and maintenance activities, including online interactions, while noting companion presence and type. The findings suggest that social engagement does not universally enhance mental health. In low-income households in developing countries, excessive time spent with household members may negatively impact well-being. In contrast, greater engagement with non-household members, primarily through out-of-home activities, correlates with improved social health. Contributing factors

include higher disposable income, increased leisure time, and interactions with close or online friends, all associated with enhanced mental health.

ABSTRAK

Kajian ini menyiasat bagaimana pelbagai jenis rangkaian sosial dalam pelbagai aktiviti mempengaruhi kesihatan sosial dan mental di Kota Malang, Indonesia. Walaupun penyelidikan terdahulu di negara membangun telah mengkaji kesan kesihatan interaksi sosial, kualiti subjektif interaksi ini dan kesan khususnya terhadap tingkah laku perjalanan masih kurang diterokai. Menangani jurang ini adalah penting untuk membangunkan campur tangan berkesan yang memanfaatkan rangkaian sosial untuk meningkatkan kesejahteraan mental dan mengoptimumkan corak perjalanan. Kajian ini bertujuan untuk mengkaji perkaitan antara ciri sosio-demografi, parameter perjalanan, penyertaan aktiviti-perjalanan, dan kehadiran sahabat melalui analisis multivariate lanjutan. Ia seterusnya menyiasat bagaimana penglibatan orang lain dalam penyertaan aktiviti-perjalanan mempengaruhi kesihatan sosial dan mental menggunakan analisis bivariat dan akhirnya Ia menilai cara penggunaan masa dalam rangkaian sosial tertentu, seperti ahli isi rumah, saudara mara, rakan atau kenalan dalam talian, membentuk hasil kesihatan.

Data dikumpul daripada 420 individu merentas 92 isi rumah melalui tinjauan yang dijalankan antara Ogos dan Oktober 2019, menangkap ciri sosio-demografi, gelagat perjalanan, penggunaan masa, diari aktiviti terperinci dan penglibatan dalam rangkaian sosial yang berbeza. Pendekatan pemodelan pelbagai peringkat dengan cerun rawak telah digunakan untuk menganalisis penggunaan masa dan penyertaan aktiviti-perjalanan. Responden merekodkan aktiviti mereka dan melakukan perjalanan setiap 15 minit selama lima hari bekerja, mengkategorikannya kepada aktiviti wajib, riadah dan penyelenggaraan, termasuk interaksi dalam talian, sambil mencatat kehadiran dan jenis teman. Penemuan menunjukkan bahawa penglibatan sosial tidak secara universal meningkatkan kesihatan mental. Dalam isi rumah berpendapatan rendah di negara membangun, masa yang berlebihan dengan ahli isi rumah boleh memberi kesan negatif kepada kesejahteraan. Sebaliknya, penglibatan yang lebih baik dengan ahli bukan isi

rumah, terutamanya melalui aktiviti luar rumah, berkait rapat dengan kesihatan sosial yang lebih baik. Faktor penyumbang termasuk pendapatan boleh guna yang lebih tinggi, peningkatan masa lapang dan interaksi dengan rakan rapat atau dalam talian, semuanya dikaitkan dengan peningkatan kesihatan mental.

TABLE OF CONTENT

STATUS OF THESIS.....	1
CHAPTER 1 INTRODUCTION	1
1.1 Background of the study:.....	1
1.2 Problem statement:	4
1.3 Research objective:.....	5
1.4 Scope of the study:.....	6
1.5 Method.....	7
CHAPTER 2 LITERATURE REVIEW	8
2.1 The Theoretical Background	8
2.1.1 Time-Space Prism	8
2.1.2 Interaction between individual’s needs and desires	10
2.2 Time Use and Activity Diary.....	12
2.3 The day-to-day variability in individuals’ activity-travel pattern.....	14
2.4 Social Intensity	16
2.5 Transport and health.	20
2.6 The Lack of Studies Involving Others in Activity – Travel Behaviour and Its Effects on Health.....	22
2.7 Factor Analysis	23
2.8 The Multiple Linear Regression Model.....	25
2.9 Multilevel Modelling	28
2.10 Activity-travel patterns, social networks, and health	29
CHAPTER 3 METHODOLOGY	34
3.1 Study area	34
3.2 Flowchart	37
3.3 Data Collection	39
3.3.1 Population and sample.....	39
3.3.2 Data Sources	39
3.3.3 Survey Method.....	40
3.1.1.1 Households and Individuals Characteristics Question.....	41
3.1.1.2 Activity Diary Survey	43

3.1.1.3 Psychological variables related questions Psychological	44
3.1.1.4 Involving another person in certain activities	44
3.1.1.5 Health-related quality of life questions	45
3.2 Procedures of Analysis	47
3.1.4 Data Input	47
3.1.5 Data Analysis	48
CHAPTER 4	53
4.1 Data Description	53
4.1.1 Socio-Demography	53
4.1.2 Travel Parameter	54
4.1.3 Time-Use Activity Travel Participation	59
4.1.4 The Percentages involved other persons (household members, Relatives, Friends, and Online Friends) in specific Activities.	62
4.1.5 The Percentages involved other persons in all activities	65
4.2 Data Descriptive Analysis	67
4.3 Model Estimation Result	71
4.3.1 Random Slope Model	71
4.3.2 The effects of socio-demographics, travel, activity types and durations and companionship within different activities	75
4.3.3 Engaging other people in activity-travel behaviour may contribute for Transport policy	80
CHAPTER 5	82
5.1 Summary of Novel	84
REFERENCES	86
APPENDIX	124

LIST OF FIGURES

Figure 2.1: Hägerstrand's Space and Time Prism (Source: Hägerstrand, 1970).....	9
Figure 2.2: Health-related QOL with a three-factor structure	20
Figure 2.3: CFA versus PCA. Note: The direction of narrow is different in CFA and PCA.....	25
Figure 2.4: Literature tree	33
Figure 3.1: Malang City (modified from Land Use Planning of Malang City, 2010 and Land Use Planning of Malang Municipality, 2010).	36
Figure 3.2: Project Flowchart	38
Figure 3.3: Health-Related Quality of Life (Source: Zhang, 2013) [35]	46
Figure 3.4: Proposed Model Structure	50
Figure 4.1: Percentages of travel parameters	55
Figure 4.2 : Percentages of time use with social networks.	66
Figure 4.3: Social and mental health index by socio-demographics	67
Figure 4.4: Percentages of involved others person for leisure activity and online activity based on people's social health.....	69
Figure 4.5: Percentages of involved others person for leisure activity and online activity based on people's mental health.	70

LIST OF TABLES

Table 2.1: Summary Literature Review	31
Table 3.1: The variables used in the study are listed in the following	41
Table 3.2: Activity classification in the survey	43
Table 3.3: Health-related Questions (source: Zhang, 2013 [31])	46
Table 4.1: Profile of participants as samples used in this study (377 individuals)	54
Table 4.2: Trips engagements and travel time spent	55
Table 4.3: Percentages of travel parameter.	55
Table 4.4: Perceived travel time using private vehicle	57
Table 4.5: Perceived travel time using public Transport	58
Table 4.6: Activities used in the research.	61
Table 4.7: The percentages involving social networks	64
Table 4.8: Model estimation result for mental and social health conditions (using standardised coefficients)	72

CHAPTER 1

INTRODUCTION

1.1 Background of the study:

The time-space prism, developed by Hägerstrand in 1970, serves as the core framework for temporal geography [1], [2]. This approach provides a distinct perspective on the spatial-temporal constraints that influence people's decision-making in their daily lives and travel. The interaction of restrictions and individual requirements within the framework of time and space reveals the complex process by which people shape their *daily activity patterns* [3]–[5] by exploring these restrictions and requirements, time geography sheds light on the dynamic and complicated character of human behaviour in both the spatial and temporal dimensions, enriching our understanding of how people live their lives. Three types of constraints compose the individual's activity-travel behaviour, mainly capability, coupling, and authority constraints; that is, the individual is a subject of these constraints. [6]–[8].

The time-space prism concept has been useful in determining the impact of coupling constraints on the structuring of travel and activities, with a focus on contacts with specific individuals or materials. This includes an investigation into how social networks hinder or facilitate out-of-home and in-home activities, hence influencing the generation or limitation of travel. Notably, research has shown that the presence of family members and friends during a person's social contact increases the frequency of social activities. Furthermore, the age distribution of social networks appears to have an important effect, with older social networks being associated with increased engagement in social interactions [9]. This discovery emphasises the complex dynamics of social ties and their significance in determining people's activity-travel patterns within the context of the time-space prism. Increasing telephone interactions are found to correlate with face-to-face social interactions negatively [10] and network size [11].

In contrast, the frequency of interaction with the internet shows positive correlations with face-to-face social interactions [12]. Moreover, increasing distance between social networks and those low-income significantly reduces the number of social interactions, whereas household members and those who are rich and own cars positively correlate with giving an individual a ride [13].

Different types of social networks are also found to correlate with subjective well-being or emotional support, help, and creating job opportunities [13]–[15]. Being accompanied by household members shows better activity episodes [14]. Distance from social networks and low income reduce emotional support and money loans [13], [16]. Then, being accompanied by friends, co-workers, and online friends. Social network members may contribute to shaping a person’s mental map and social network geography, and thus may affect individuals’ activity-travel behaviour [17].

Since the effects of social networks have been found to correlate with subjective well-being or its proxies, it is also hypothesised that social networks also positively correlate with Health-related Quality of Life (HQL), particularly social and mental health. Health-related Quality of Life (HQL) broadens health measurements from the absence of disease and infirmity to include physical, mental, emotional, and social functioning [18]–[20]. Perceiving high integration with society, adequate access to various public amenities, and more transport, social, time, and geographical advantages to engage in various social activities show positive and negative results on social and mental health, respectively [21], [22] which raises the research question whether companionship during multiple activities can explain social and mental health. Different types of social networks, such as household members, close friends, relatives, and online friends, are hypothesised to have different effects on social and mental health. Moreover, the activities in which the social networks accompany individuals might also correlate with social and mental health. These research gaps are investigated in this study. A dataset collected in the Malang Greater Area, Indonesia at 2019 (MGA 2019) was used in this study. The dataset also includes offline social networks and online social networks for various activities. When individuals have the same activity, travel participation with one of the social networks, such as household members, close friends, relatives, or online friends, is hypothesised to have different effects on social and mental health. As an example, allocating time for working in the office with the

officemate (friends) only as an out-of-home mandatory activity or spending time with household members for discretionary activities such as going for recreation and visiting other family members [14], [23], [24], those activities have different effects on an individual's mental or social health. Moreover, spending time with more than two or with all social networks might also correlate with social and mental health, such as cleaning the house with household members and relatives together for in-home maintenance activity or allocating more time with friends and online friends for office work [21], [25].

According to Zhu and Fan [26], travel-related emotional well-being may be influenced by land use policy and urban design strategies, based on the findings that emotional experiences during travel are significantly related to travel duration, purpose, and companionship during travel. Trips with family members and friends are associated with higher levels of emotional well-being than travel alone. A study of the social contexts of activity-travel behaviour can also have significant policy implications. For instance, the development of transportation policies aimed at increasing accessibility should address not only accessibility to facilities and places but also accessibility to individuals' social network members so that social interactions between individuals can be facilitated. [9]. This interaction is essential to foster a sense of belonging and social cohesion. Moreover, it can help reduce social isolation, which is a major risk factor for mental health issues. The policy-makers may be able to reduce motorised travel demand by facilitating social interactions between people who live in the same neighbourhood or nearby.

This study contributes to the existing body of research by investigating the intricate relationship between social networks and health-related quality of life (HQL), with a specific emphasis on social and mental health dimensions. Prior research has already indicated a connection between social networks and subjective well-being, leading us to hypothesise a positive correlation between social networks and health-related quality of life (HQL). This investigation expands the conventional understanding of health measurements, incorporating physical, mental, emotional, and social functioning as essential components of HQL, consistent with the perspectives of [18]–[20]. Hence, this research seeks to comprehend how various aspects of an individual's social network influence these multifaceted dimensions of health.

Transportation affects people's mental and social health in both positive and negative ways[27]–[29]. On the plus side, it fosters connections, allowing people to nurture relationships, access career and educational possibilities, participate in leisure activities outside of their homes, and gain autonomy. It is especially advantageous to elders, assisting them in maintaining active lifestyles and community involvement. However, there is a potential drawback. Individuals who devote more time to obligatory and commuting tasks may find themselves with less time for social engagements and interactions. Furthermore, people with families, particularly those with children, may experience limitations in participating in social activities compared to those without children. This interaction with the dimension of time-use leads to the subtle dynamics of transportation-related social inclusion/exclusion, affecting social and mental health. Given these considerations, it becomes crucial to investigate whether the involvement of other people in activity-travel patterns has a discernible impact on their mental and social well-being. The influence of social networks on mental and social health varies depending on the nature of the activity and the type of social interaction involved. Specifically, mandatory out-of-home activities, such as working in the office with colleagues, and discretionary activities, such as recreational outings or family visits with household members, are hypothesized to differentially impact individuals' mental and social health outcomes. This differential impact is attributed to the distinct social dynamics and support systems associated with each network of household members, close friends, relatives, or online friends during shared activities.

Regarding the organisation of this thesis, Section 2 offers a comprehensive literature review, followed by the presentation of the dataset and its analysis in Sections 3 and 4, respectively. Section 5 will delve into the discussion and conclusions drawn from the findings.

1.2 Problem statement:

The interplay between social networks and transportation systems significantly influences mental health and activity-travel behaviours [16], [20], [30], [31]. However, this relationship remains underexplored, particularly in developing countries like Indonesia. Existing studies predominantly focus on objective indicators

of social engagement and travel behaviour, such as the size of social networks and travel frequency, while often neglecting the subjective quality of interpersonal interactions [32]. Social networks shape individuals' mental maps and the geography of their social connections, influencing activity-travel behaviour in complex ways [17]. Understanding the subjective components of social connections is thus essential for unravelling the intricate processes that influence activity-travel patterns and identifying spatiotemporal factors that indirectly affect mental and social health [33]–[35]. Additionally, studies have indicated that the involvement of others in activity-travel contexts impacts mobility [14], [26], [32] and social health. The presence of others in travel and daily activities is predicted to correlate with social and mental health outcomes. Despite these findings, the nuanced relationship between social network dynamics and mental health within activity-travel contexts remains insufficiently analysed. This gap is particularly evident in developing urban settings like Malang City, Indonesia, where socio-demographic diversity and evolving urban mobility trends present unique challenges.

This study addresses these gaps by utilising survey data from Malang City and employing multilevel modelling to examine the impact of social networks within activity-travel contexts on mental health. Specifically, it investigates how the involvement of others influences social and mental health outcomes while considering socio-demographic characteristics, activity-travel participation, travel parameters, and household quality of life. The findings of this study are expected to inform transportation, land-use, and time-use policies that promote healthier and more socially inclusive urban environments.

1.3 Research objective:

This study aims to examine the influence of social interactions on individuals' social and mental health issues, taking into account factors like socio-demographic characteristics, activity-travel participation, travel parameters, and Household Quality of Life. It explores how daily activity-travel participation, including interactions with others (companionship), can significantly affect time use, transportation, and land use policies. These policies, in turn, impact people's daily travel routines and overall

health outcomes. This approach underscores the interplay between social behaviours, policy-making, and public health. To accomplish this broad goal, the following specific objectives have been established:

1. To investigate the interrelationships among various factors, such as socio-demographic variables, travel parameters, activity travel participation, and the presence of companions, using advanced multivariate analysis on social and mental health.
2. To determine the relationship between the involvement of other people in activity-travel participation and its impact on social and mental health through bivariate analysis.
3. To determine a bivariate analysis between time-use involvement in specific social networks (such as interactions with household members, or relatives, or friends, or online friends) within activity-travel participation on social and mental health

1.4 Scope of the study:

1. This dataset was collected by the survey that was conducted in 2019 and has been used in Author's studies (e.g. [16] [31][30]). During the period gaps since the dataset was collected, no new regulations have been discovered that would significantly affect the collected data. Therefore, the dataset was still adequate for this study.
2. In this study, we examine whether others' involvement affects a person's mental and social health. The involvement of other individuals could limit a person's social interactions, which reduces mental health and social inclusion.
3. The percentage of social networks (household members, relatives, friends, and online friends) in certain activities, such as allocating time with household members for in-home mandatory activities or with friends for out-of-home mandatory activities. After that, we study the percentages of engaged social networks for all activities in a day.
4. Furthermore, the scope of this study includes the effects of geographical features, activity patterns, and travel patterns on social and mental health. In the

future, dedicated public transportation systems and ride-hailing services are expected to contribute to better social inclusion and mental health related to transportation. Moreover, a greater physical demand for transport, such as walking and cycling, along with more public services, will lead to better social and mental health.

5. In this study, health comprises social and mental health only. Data were collected using health-related quality of life (QOL) questions and their potential influencing factors to quantify health characteristics. In more than 110 countries, health-related quality of life has been adopted as one of the most widely used generic measures for health-related surveys [34]. Nevertheless, the data in this study may be reference-dependent due to its self-reported nature, meaning that individuals with the same actual (true) health condition could perceive their health conditions. [25], [31], [36].
6. The data on activity-travel participation were collected based on the time-use and activity diary of a panel of respondents. A panel time-use and activity diary was used rather than a travel diary to capture richer information on the participants' travel behaviours and participation in in-home and out-of-home activities [25], [31]. In one day, 96 time slices with 15-minute intervals were used for the diary survey.

1.5 Method

This research has been conducted by using a variety of resources, including literature reviews from journals, books, and articles, as well as online research. It has been ensured that all the sources are trustworthy and up to date to ensure that the information gained is accurate. Additionally, this study involved observation in identifying activity-travel participation, socio-demography, travel parameters, companions, as well as mental and social health conditions. This study is completed using the 2019 Malang Greater Area (MGA).

CHAPTER 2

LITERATURE REVIEW

2.1 The Theoretical Background

2.1.1 Time-Space Prism

A spatial and time prism (STP), a concept commonly used in transportation studies and network studies, is designed to integrate physical transportation networks with commuters' time-dependent activities [37]–[39]. Originally introduced by Hägerstrand in the early 1970s for social scientists, STP is considered one of the most effective approaches to exploring the fundamental interactions between individuals' precise circumstances and large-scale aggregate outcomes, highlighting the constraints within which people make activity and travel decisions. Participation in activities requires trading time for space to access locations at available times to meet needs and desires. The concept of a time-space prism or time geography focuses on the interrelationships among activities in time and space and the constraints imposed by those interrelationships. [5], [40]–[46] as shown in Figure 2.1.

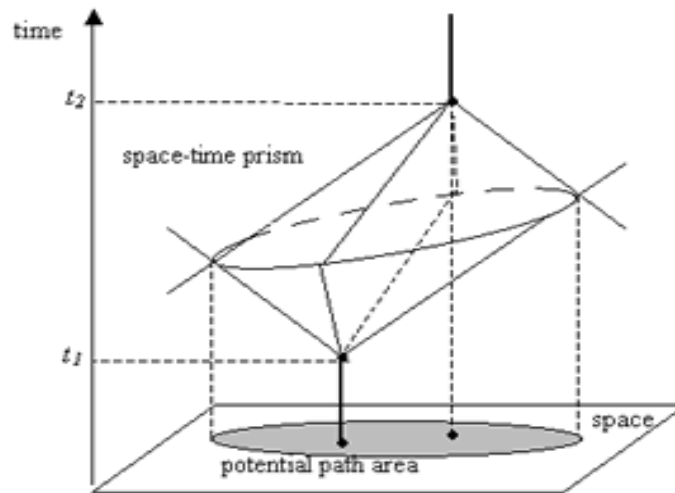


Figure 2.1: Hägerstrand's Space and Time Prism (Source: Hägerstrand, 1970)

Hägerstrand proposed that individuals' behaviour can be described within the dimensions of time and space, bounded by three types of constraints: capability, coupling, and authority constraints. Capability constraints limit individuals' activities through their physical capabilities and available resources. Essential maintenance activities such as eating and sleeping require specific times and places. Additionally, individuals with private automobiles can generally travel faster than those who walk or rely on public transportation. Coupling constraints define when, where, and how individuals must conduct activities jointly in time and space. The selection of activity "bundles," such as work, where multiple individuals' time-space paths intersect, necessarily constrains the remaining available time-space prism for other activities, including work, meetings, and classes. Authority constraints include laws, organisations, locations, or other domains that regulate activity bundles and limit access. For example, a shopping mall or gated community can restrict entry to authorised times, while a public street does not impose such limitations. These resources and constraints significantly shape the space-time prism within which individuals fulfil their needs and desires. Space-time accessibility reflects three

factors: spatial, temporal, and transportation availability [41], [42], [47]. The attractiveness of the space-time approach in measuring individual accessibility lies in its comprehensive coverage of multiple factors and its sensitivity to person-specific conditions. This sensitivity helps explain gender differences in access to urban opportunities, which are influenced by various limiting factors [48]–[53]. Consequently, space-time accessibility has been presented as a promising measure of individuals' access to urban opportunities through a series of comparative and empirical studies [52], [54]–[56].

An individual has only 24 hours available in a given day, much of which is spent on essential subsistence activities such as sleeping, working, and personal/household care. The temporal aspect of these activities tends to be rigid, constraining an individual's potential travel engagement patterns. [5], [46]. Similar constraints apply to space. Based on the time available and the speed of travel, the space-time prism determines the set of accessible locations for travel and activity participation within a bounded expanse of space and a limited interval of time.

2.1.2 Interaction between individual's needs and desires

Engaging in day-to-day activity-travel participation, behaviour, needs, and constraints are influenced by personal and household socio-demographic characteristics as well as socio-environmental conditions [36], [52], [53], [57]–[59]. An individual is shaped by their identity (such as age, gender, employment type, and physical ability) and social identity (such as being part of a household, neighbourhood, company, or community) [20]. These identities illustrate how an individual interacts with other individuals, materials, and societal rules within economic, social-cultural, temporal, and geographical contexts. Consequently, personal and social identities create distinct needs and constraints for each individual [57], which influence their travel and activity patterns to fulfil their needs and desires [60].

In the context of daily routines, individuals may benefit from travel not only because it is necessary for engaging in mandatory and discretionary activities but also because travel itself can be a source of arousal. During travel, individuals may enjoy the scenery, revisit memories, or seek novelty and variety. Travel can also provide a break from routines, offering an opportunity to relax, refresh, and recharge before resuming daily responsibilities and commitments. [7], [61]–[63]. Additionally, travel allows individuals to explore their environment and develop context-dependent activity-travel patterns that help achieve aspirations related to travel times and the quality of daily travel.

Travel is beneficial in developing mental representations of urban systems, which are instrumental, if not necessary, for successfully organising daily activities (e.g.[64], [65]). Travel benefits not only individuals but also society at large. Given the evolution of production processes, travel has become critical in maintaining the functionality of socio-economic systems. The benefits of travel for society can be examined at different spatial scales. In other words, travel is a necessary, albeit not sufficient, condition for quality of life from economic, social, and health perspectives. Lack of accessibility can reduce participation in various activities and, in extreme cases, induce social exclusion (e.g. [20], [66]–[68]).

Moreover, an individual may need money to be involved in certain activities in association with other individuals and materials to fulfil their needs and desires. Having behaviours mode or buying public transport tickets also corresponds with the availability of disposable income [25], [57], [58], [69]–[72]. The availability/unavailability of these external factors may also correlate with different activity-travel behaviours. Each individual is unique, and aggregating an individual's behaviour will oversimplify the understanding and exclude the essential hints from the individual's personal and social roles. [73].

The interaction between needs and constraints due to individuals' personal and social identities within economic, socio-cultural, and geographical contexts shapes their prisms and paths in time and space scales [44], [57], [74]–[76]. This needs-constraints interaction can explain an individual's overt behaviours and why their prisms and paths differ from those of others. Furthermore, varying needs and constraints on different days can account for the day-to-day activity-travel behaviours [60], [74], [77].

2.2 Time Use and Activity Diary.

Participation in activities or trips within economic, social-cultural, and geographical contexts across time and space scales reveals that some activities, such as working/school and child drop-off/pick-up, are temporally and spatially fixed. In contrast, others, such as maintenance and leisure activities, have a higher degree of flexibility. [78]–[80]. Engaging in specific activities can result in varying states of pleasure or displeasure. Leisure, social, and relaxing activities are often rated as the most enjoyable, while work, housework, and commuting are considered less enjoyable by comparison [58], [78], [81]. Additionally, individuals tend to engage in a mix of mandatory and discretionary, in-home and out-of-home activities throughout the day, influenced by their personal and social characteristics.

The built environment provides both opportunities and constraints for individuals in making activity decisions [82], [83]. Traffic conditions and natural environments serve as additional sets of environmental constraints [84]–[86]. Demographic and social environments facilitate human interactions, allowing people to gather, request, receive, and exchange information. It not only enhances human knowledge about choice sets but also shapes individual attitudes and preferences. Demographic and social environments impact decision-making at multiple levels: individual, interpersonal, and community. Furthermore, interactions exist between the

built environment and these other environments, creating a complex web of influences on human behaviour.

Emerging vehicle technologies and infrastructure expansion have increased individuals' mobility and flexibility, allowing them to reach multiple out-of-home activity locations and explore farther or more dispersed locations within their available time budget [60], [79], [87], [88]. As a result, individuals now have more opportunities to undertake out-of-home discretionary and flexible activities in addition to their mandatory activities within their available travel time and out-of-home time budget [55], [61], [89], [90]. Mandatory activities can be categorised into (1) in-home and (2) out-of-home activities. Out-of-home activities are defined as activities that require meeting other individuals or materials with a high degree of temporal and spatial persistence at a location outside the home, such as working at workplaces, studying at school, having business meetings, and dropping off/picking up children from school locations.

Activities undertaken at home to fulfil an individual's basic needs, such as sleeping, eating, and personal care, are defined as in-home mandatory activities, which have a high degree of temporal and spatial persistence [91]. Discretionary activities are categorised into (1) maintenance and (2) leisure activities. Maintenance activities are discretionary activities aimed at satisfying household and personal physiological and biological needs [92]. These include in-home maintenance activities such as housekeeping and nursing, as well as out-of-home maintenance activities such as grocery shopping, health treatment, and other service activities like banking and postal services [93]. Leisure activities, on the other hand, are discretionary activities undertaken within an individual's available time, either in-home or out-of-home, to satisfy cultural and physiological needs [92]. Leisure activities include entertainment, such as watching TV, listening to music or the radio, reading magazines or newspapers, and accessing the Internet. They also encompass

social and family activities, such as meeting with family members and friends, visiting relatives or friends, participating in sports, engaging in leisure and voluntary activities, and going on holiday [36].

2.3 The day-to-day variability in individuals' activity-travel pattern

The concept of an individual's time-space prism [73] is crucial for understanding the decision-making processes underlying individual activity-travel patterns. According to this theory, an individual's personal and social identity forms specific projects that interact with capability, coupling, and authority constraints within spatial and temporal scales, thereby shaping the individual's activity-travel patterns [5], [45], [74], [91]. These patterns tend to vary from day to day due to differing daily needs and constraints. The interaction of individual characteristics across multiple dimensions creates specific needs and constraints, which in turn shape daily activity participation in space and time to meet their needs and desires [20], [94]–[96]. The fundamental motivation for activity participation lies in the satisfaction of human needs and the desire to fulfil tasks associated with specific roles. Opportunities for participation are contingent upon the availability of specialised facilities and resources, such as time, money, and effort, to which an individual can contribute. Travel plays a crucial role in enabling individuals to access these specialised facilities necessary for particular forms of activity participation [25], [34], [52], [97]–[100]. Engaging in activities provides need satisfaction and role accomplishment, influencing immediate priorities for subsequent actions. Activity participation also affects the resources available for future activities, either by depleting them or by augmenting them, such as increasing monetary resources (e.g., through work) or enhancing physical energy levels (e.g., by eating). Some activities, like eating, sleeping, and commuting, are undertaken almost daily, whereas others, such as shopping, personal business, and social recreation, are not necessarily repeated daily [20], [36], [52], [79], [101], [102]. The activity-travel patterns of

individuals often involve interactions with other household members, which influence fundamental decisions regarding activity participation and priorities, situating each activity within a framework of tours and at-home episodes [55], [103]. Furthermore, an individual's engagement with their society, such as being part of a specific company, school, or neighbourhood, also impacts the formation of their activity and travel sets in conjunction with other personal characteristics [20].

Broadly, household-level interactions in an activity-travel context arise from interrelated decision processes associated with (1) the sharing and allocation of responsibilities (maintenance activities) and resources (vehicles); (2) the facilitation of activity participation and travel needs of mobility-dependent household members (e.g., children, older people, and other mobility-constrained members); and (3) joint activity engagement and travel.

Several research challenges persist in the area of intra-household interactions. These include gaining a deeper understanding of activity and vehicle allocation among household members, as well as the negotiation and altruistic processes that lead to observed activity-travel patterns. Such research efforts can be facilitated by collecting data on daily activity patterns, resource allocation, and joint activity-travel engagement. Interactions between household members significantly influence individual activity-travel patterns, as joint activity participation necessitates the synchronisation of the activity patterns of those involved. [32], [102], [104], [105]. Additionally, understanding the relationships among different individuals and their underlying motivations for activity participation can provide insights into the potential impacts of policy measures aimed at changing travel behaviour. This has led to a recent surge in research papers and forecasting models that explicitly account for within-household interactions in activity participation and travel. [106]–[108].

Women, including mothers in younger generations, have become more active in out-of-home non-work activities, and their trip chaining has become more complex

than their male counterparts. While men still drive more than women, this gap is narrowing among younger generations [50]. The interaction between household heads regarding their out-of-home activity-travel behaviour in nuclear families reveals that working women are more likely to own a car, make more total trips but fewer maintenance trips, and participate less in other activities [109], [110]. Adult members of households with young children (six years old or younger) tend to share maintenance and leisure activities with other adult members within the household rather than jointly undertaking these activities [93].

Existing activity-based research has primarily focused on the activity-travel patterns of adults. However, children's travel needs significantly influence the travel patterns of other family members. Children largely depend on household adults or other adults to drive them to after-school activities. Beyond serve-passenger activities, children can also impact adults' activity-travel patterns through joint participation in activities such as shopping, visiting parks, and other social-recreational activities. Considering children's activity-travel patterns is crucial, as they directly contribute to travel by non-drive-alone modes of transportation. Therefore, it is essential to consider and explicitly interlink the activity-travel patterns of children with those of adults. [34], [87].

2.4 Social Intensity

Social intensity, related to the frequency and duration of activities, as well as the number of participants involved in a particular activity, positively correlates with mental and social health [105], [111]. Humans are inherently social beings with a fundamental need to form relationships with others. The importance of interpersonal relationships is well established, as evidenced by the use of social isolation and solitary confinement as punishments for prisoners, leading to mental disintegration without human contact. Maintaining close interpersonal relationships not only keeps

people healthy and stable but also helps them lead fulfilling and prosperous lives [112]–[115]. Social connectedness, defined as having significant interpersonal relationships and feeling a sense of support, connectedness, love, and care, is a key aspect of health as defined by the World Health Organization [116]–[118]. It is widely recognised to have a positive and causal relationship with mental, social, and physical health, as well as longevity. For example, [36], [117], [119] demonstrate that better social connections, including perceived social support and the absence of loneliness, are associated with significant age-adjusted reductions in mortality. Conversely, a lack of social interactions is detrimental to mental health. Social relationships influence a variety of health outcomes, including mental health, social health, physical health, health habits, and mortality risk [120]. The emotional support provided by social connections helps mitigate the damaging effects of stress [121]. Researchers have found that individuals report more positive affect when engaged in social activities compared to non-social ones and experience higher negative affect when alone [106], [122], [123].

Social relationships, contingent on access to social networks, promote engagement in social activities and provide access to social support, as suggested by the framework of [124]. These social factors have been shown to impact health outcomes positively. Social activities include engagement in facilitator-led group discussions, social interactions, field trips, travel or outings, visiting and receiving visitors, participation in voluntary activities, religious activities, membership in community groups or associations, and attending social groups. Social networks encompass living arrangements, marital status, number of social ties, and frequency of contact with friends and family. Social support comprises emotional support, satisfaction with support, positive or negative interactions, instrumental support, informational support, someone to share personal experiences and feelings with, help with decision-making, support with daily tasks, and general ratings of social support. [125].

Having more time to engage in out-of-home discretionary activities, such as leisure, sports, and grocery shopping, through time-use policies and denser land-use planning tends to positively correlate with better daily subjective well-being, as well as improved mental and social health [58]. Health promotion activities include exercise, social activities, and family communication. For each type of activity, factors such as frequency, timing (weekday or weekend, time of day), duration, companions, mode of access to the activity site, and affective experience during participation are considered [20], [34], [105], [125]–[128].

Spending more time working and having less time for leisure activities can lead to increased stress and depressive symptoms. These symptoms may sensitise individuals to everyday experiences of both social rejection and social acceptance. [118]. Engaging in commuting activities through natural environments (NE) can have mental health benefits, as exposure to NE can reduce stress and improve mental health. [129]. Individuals need to participate in various social activities, especially those involving relationships (family, friendships), to enhance their quality of life. [130]. Older adults living in rural counties are less socially engaged than those living in urban areas, and the relationship between social participation and health varies by the type of activity and the rural-urban context. [131].

The study by [132] Reported that many older adults with high participation in social and leisure activities experience positive well-being. Those living in large households also tend to have higher self-reported social health compared to those living in small households. [36]. Social support can decrease stress. [106], [133], [134] And serve as a strategy for protecting mental health during periods of unemployment. [135]. Social relationships fostered through leisure activities are key to preventing the deterioration of mental health status among middle-aged adults, regardless of gender differences. However, social activities alone may not provide mental health benefits. [62], [105], [112], [121], [124], [132], [133], [135]–[137].

Moreover, having a higher income and greater access to motorised modes of transportation tends to provide individuals with more opportunities to engage in out-of-home discretionary activities. [58], [69], [95], [138]. Individuals constantly strive to maintain their well-being in their daily lives. [7], [75], [139], [140]. When an individual feels less positive about a particular activity, they may undertake another activity to improve their well-being. Travel for discretionary purposes (e.g., eating or drinking, leisure, exercise, and community involvement) is generally associated with fewer negative emotions than travel for household maintenance activities. Travel for work or educational purposes is typically more tiring and stressful than travel for household maintenance activities. Both trip duration and trip purpose are more sensitive to stress than to tiredness, sadness, and pain. Travel companionship has no association with tiredness during trips. However, travelling with parents, a spouse/partner, children, and friends is generally associated with less stress, sadness, and pain than travelling alone, with co-workers, or with extended family members. Workday travel is associated with higher levels of tiredness and stress but not with pain or sadness. Rush-hour travel has no association with negative emotions except for a negative relationship with sadness. [141], [142]

More than half of the world's population now lives in cities, making the creation of a healthy urban environment a major policy priority. Cities present both health risks and benefits, but mental health is negatively affected: mood and anxiety disorders are more prevalent among city dwellers [143], [144]; living in central cities is associated with less meaningful trips, while living in rural areas is associated with happier, more meaningful, and less stressful trips. These findings are consistent with research indicating that urban residents are less satisfied with travel than suburban residents [141], [145]. Additionally, traffic congestion may explain the negative relationship between central cities and positive travel-related emotions. For instance, [146] indicated that people in the most significant cities tend to experience less happiness during trips, most likely due to congestion.

2.5 Transport and health.

Since 1946, the World Health Organization (WHO) has not amended its definition of health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. [147] Health is a balance between individuals' physical, mental, and social conditions, which may influence their activity and travel participation. [18], [20], [25], [34], [36], [148]. According to Figure 2.2 [34] Explained that there are three main health parameters—physical, mental, and social health—which encompass eight subscales: physical functioning (PF), limitations on role functioning due to physical health (RP), bodily pain (BP), general health (GH), mental health (MH), limitations on role functioning due to emotional problems (RE), social functioning (SF), and vitality (VT). All these factors can influence activity-travel participation, as noted by [25] Who mentioned that health also serves as a capability constraint.

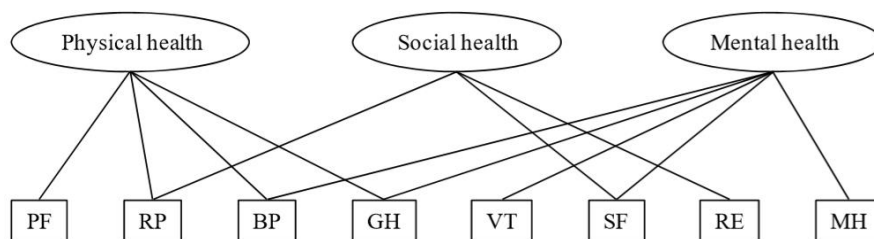


Figure 2.2: Health-related QOL with a three-factor structure

The relationship between individuals' activity-travel behaviour and health is complex and unique. Individuals with better social and mental health tend to use motorised modes of transportation more frequently, while those with better physical health use non-motorized modes. [25]. Spending more time participating in leisure activities and social connections fosters social inclusion and provides mental and physical health benefits. [61], [121], [149]. Social and mental health factors may limit individuals'

participation in certain activities, which can influence their overall well-being. [18], [20], [34]. How individuals experience their daily activities can also indicate whether they face social and mental health problems. [20], [119]. Promoting walking and cycling for transportation, complemented by public transportation or other 'active' modes, presents a promising strategy to address urban traffic strain, environmental pollution, and climate change while providing substantial health benefits. [150]. Despite the associated risks of exposure to traffic and, to a lesser extent, air pollution [151] Active transportation can reduce car dependence and increase physical activity levels [152].

Using motorised modes of transportation can enable individuals to visit destinations with less time and cost and greater comfort than non-motorized modes. However, motorised transportation negatively impacts physical, mental, and social health, as well as the environment, more than non-motorized modes [85], [153]–[158]. Depending on the mode used, the choice of transport mode is associated with different health risks and benefits [65]. Activity participation is strongly related to individuals' self-reported health conditions, but some effects are offset by the trade-offs between time spent on activities and travel. Physical health problems, such as disabilities or illnesses, can become capability constraints that influence activity-travel participation [20]. According to a study [50], self-reported mental health is positively correlated with both in-home and out-of-home mentally intense activities. Understanding the mechanisms underlying various activities will help provide more opportunities for these activities and manage the associated trips. Furthermore, relating these activities to health parameters shows that engaging in social-recreational activities tends to correlate with better social health conditions [21] positively [18], [25], [34], [36], [159]. Additionally, combining grocery shopping as a primary activity with socialising as a secondary purpose encourages individuals to engage in more physical activities, subsequently improving their physical health [25], [57]. The individual who is healthier in terms of physical health tends to use less motorised modes; nonetheless,

no individual's activity behaviour variables influenced their physical health condition. Individuals who are healthier in physical health tend to use motorised modes less frequently; however, no individual activity behaviour variables significantly influenced their physical health condition. It suggests that while physical health positively correlates with daily activity participation, the relationship between individuals' health conditions and their behaviour, as well as the specific travel modes chosen, is complex [20], [25], [36], [74]. Information on individuals' day-to-day activity participation, combined with their panel travel behaviour data, will better enable us to design policies that improve transport network conditions and enhance travellers' physical, mental, and social health.

2.6 The Lack of Studies Involving Others in Activity – Travel Behaviour and Its Effects on Health

The role of social interactions in shaping activity-travel behaviour remains underexplored, despite its critical implications for transport systems and public health [26], [28], [160]. Travelling with others influences mode choice, trip frequency, and travel satisfaction, with significant benefits such as increased use of shared mobility, reduced travel stress, and enhanced physical activity through walking or cycling [26], [161]. However, current transport policies and management practices often neglect these social dynamics, focusing primarily on infrastructure and service efficiency. Addressing this gap could unlock opportunities to create transport systems that support both sustainable mobility and improved health outcomes. Integrating the social dimension of travel into transport policy could encourage active and shared mobility while fostering inclusivity. For instance, promoting carpooling, group cycling programs, and shared micro-mobility options can reduce environmental impacts and improve public health [16], [94], [162]. Infrastructure investments like wider sidewalks, safer cycling lanes, and recreational zones can enhance opportunities

for group travel and social interactions[31], [162], [163]. Moreover, health-integrated transport initiatives, such as "walk-to-school" programs or organized group walks, can align urban mobility strategies with broader health objectives, fostering a more holistic approach to transport management[31].

Transport management strategies can also capitalize on the benefits of social travel through service innovations and data-driven policy implementation. Introducing family-friendly schedules, group discounts, and community-based route designs can encourage socially supportive travel behaviour.[30], [164]. Meanwhile, smart city technologies can collect data on group travel patterns and their health impacts, guiding evidence-based policy adjustments. Public awareness campaigns that emphasize the health and environmental benefits of travelling with others can further promote behaviour change[117], [165]. By prioritizing the integration of social interactions into transport systems, policymakers and managers can enhance sustainability, public health, and community well-being, aligning transport systems with the principles of sustainable development[166]–[169]

2.7 Factor Analysis

Sometimes, it is necessary to reduce the data size while retaining as much original information as possible before computing the entire set [39], [170]. Reasons for this may include the need to visualise the data, the size of the data exceeding processing capabilities, or the presence of irrelevant data that could be merged [39]. Eliminate, it is advantageous to reduce it to an appropriate and manageable size without losing significant original information [170], [171]. Factor analysis can be used to perform this computation. Factor analysis procedures are statistical methods used to determine the relationships among a group of observed variables measured by questions or items [171]–[173]. To determine the factorability among the observed variables, an assessment of the strength of their relationships is required. This evaluation helps

identify any statistically significant relationships between the variables. Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Test of sampling adequacy are commonly used to establish the existence of linear combinations, according to Theodoridis and Kramer [174]. Bartlett's Test of Sphericity is used to verify the significance of test results, while the KMO test is employed to determine the shared variance between items. Both tests are necessary to ensure the validity of the results.

For an acceptable relationship, the factor score should be valued above 0.6 [175]. Factor analysis is particularly useful when it is challenging to measure a large number of variables or when there is a need to measure numerous variables. It can help reduce the complexity of the data, making it easier to analyse. Additionally, Tabachnick and Fidell [176] Note that the concept of factor analysis is commonly used in two distinct methods of statistical analysis: Principal Component Analysis (PCA) and Common Factor Analysis (CFA). The primary difference between these methods lies in the causal relationships they depict.

In this context, Principal Component Analysis (PCA) is used to summarise many variables into a smaller number of components, a process known as data reduction. In contrast, Common Factor Analysis (CFA) identifies a factor model that best reproduces the observed correlations, explaining the relationships between variables.[174], [177]. The difference between components and factors can be stated as follows: variables create components, while factors create variables. [176], shown in Figure 2.3.

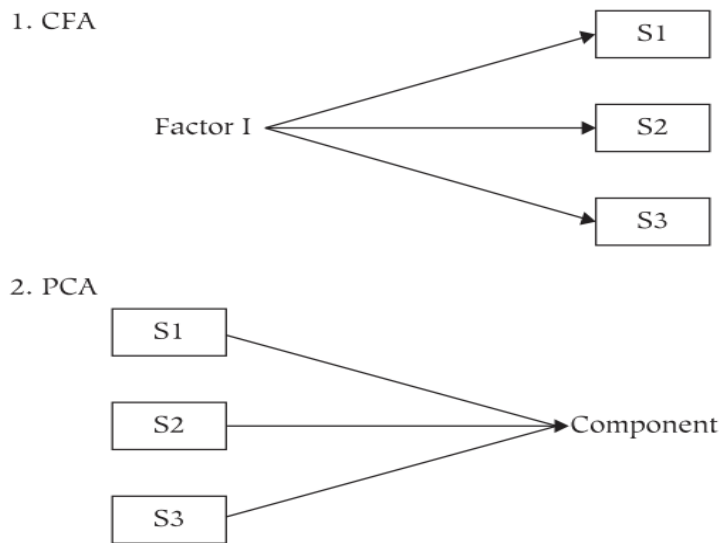


Figure 2.3: CFA versus PCA. Note: The direction of narrow is different in CFA and PCA

2.8 The Multiple Linear Regression Model

In various fields of science, regression is a statistical method used to define the relationships between variables by formulating an equation to estimate parameter values, the strength, and the direction of the relationship. [178], [179]. Regression helps scientists determine the strength of the relationship between variables. By estimating parameter values, scientists can gain insight into which variables are most important in predicting the behaviour of other variables.

A regression model is a mathematical equation describing the relationship between two or more variables, often called a regression equation. A linear regression model assumes a linear relationship between two or more variables. The types of linear regression models include:

- **Simple Linear Regression:** A statistical method used to analyse the relationship between a dependent and independent variable.

- **Multiple Linear Regression:** A statistical method used to analyse the relationship between a dependent and independent variable.
- **Multivariate Linear Regression:** A statistical method used to analyse the relationship between more than one dependent variable and one independent variable.

Moreover, there are four types of correlations in statistics:

- **Correlations analysis:** A statistical method used to measure the degree of correlation between variables. Correlation is a linear association between two quantities or variables, where one variable tends to increase or decrease as the other increases or decreases, following a straight-line trend. Both correlation analysis and regression analysis are concerned with the relationships between variables.
- **The correlation coefficient** (also known as Pearson Linear Correlation Coefficient): This provides a numerical measure of the strength of the relationship between two variables. The values of the correlation coefficient range from -1 to +1. A correlation coefficient of +1 indicates that the variables are perfectly correlated in a positive linear relationship. A correlation coefficient of -1 indicates that the two variables have a completely negative linear relationship. A correlation coefficient of 0 indicates no linear relationship between the two variables.
- **The population correlation coefficient:** This measures the strength and direction of the linear association between the variables in the entire population.
- **The sample correlation coefficient, r :** this is an estimate of ρ and is used to calculate the strength of the linear relationship in the sample observations. The closer r is to +1, the stronger the positive correlation. The closer r is to -1, the stronger the negative correlation. If $|r| = 1$ exactly, the two variables are perfectly correlated. A value of zero for r does not necessarily mean that

there is no correlation is an estimate of ρ and is used to calculate the strength of the linear relationship in the sample observations. The closer r is to $+1$, the stronger the positive correlation is. The closer r is to -1 , the stronger the negative correlation is. If $|r| = 1$ exactly, the two variables are perfectly correlated. A value of zero for r does not mean that there is no correlation.

The simple regression equation takes the algebraic form of a straight line: $y = mx + b$, where m is the slope of the line, and b is the y -intercept. In algebra, a line is identified by its slope (the angle describing the change in y per unit x) and intercept (the point at which it crosses the y -axis). Therefore, the regression describes the relation between x and y using such a line. The simple linear regression model involves only one dependent variable (y) and one independent variable (x), and it states that the true mean of the dependent variable changes at a constant rate as the value of the independent variable increases or decreases. The specification for the linear regression model is:

$$y = \beta_0 + \beta_1 x + \varepsilon$$

Note:

Y = the dependent (respond) variable

X = the independent (explanatory) variable

β_0 = the y -intercept, the value of y when $x = 0$

β_1 = the slope, the expected change in y relative to the unit increase in X

ε = the random error

The regression models with one dependent variable and more than one independent variable are known as multivariate analysis models. [175], [180], [181]. As part of a multivariate regression analysis, independent variables are considered simultaneously with dependent variables. [175], [182]. Therefore, the multivariate regression analysis model is formulated as follows:

$$y = \beta_0 + \beta_1 x_1 + \cdots + \beta_n x_n + \varepsilon$$

Note:

$y =$ *dependent variable*

$x_i =$ *independent variable*

$\beta_i =$ *parameter*

$\varepsilon =$ *error*

Furthermore, the t ratio, a component of the regression output, is commonly used to estimate the significance of observed independent variables. [176]. To identify significances, the t value, which, for most cases, uses the featured column in the table. Although the most commonly used confidence level is 95%, other levels are appropriate for some situations. [183], [184]. Several studies have used linear regression models to analyse travel behaviour in various situations, including single analysis, structural equation modelling, and path analysis. [140], [153], [185], [186].

2.9 Multilevel Modelling

In most statistical techniques, the observations within a dataset are assumed to be independent of each other. However, when groups of observations share some similar characteristics, they cease to be independent observations. When data includes information at different levels, such as individual, neighbourhood, and region, it is called hierarchical, nested, or grouped data. Generally, multilevel models—also known as mixed-effects, hierarchical, or random coefficient models—are useful when cross-level interaction is of interest. In the social sciences, nesting data is common because we often deal with people, geographic locations, and environments involving people.

For example, within the complex environment of a school, different factors can yield different outcomes. Students' performance within the same school class, with the same teacher and teaching environment, will likely be more similar than those of students from different classes. Additionally, students with similar socioeconomic backgrounds often perform more similarly than those from different socioeconomic

backgrounds. The importance of the predictors or factors will depend on the specific outcome being measured. When analysing test scores from students in different classes within various school districts, we assume that students within the same district perform similarly due to the economic situation, which influences their access to resources such as teachers, textbooks, and learning opportunities. As shown in the example above, we can have predictors at each level of the nested model.

2.10 Activity-travel patterns, social networks, and health

In time-space prism and activity-based analysis, it has been revealed that scheduling decisions, such as the frequency, duration, type of activities and with whom these activities are undertaken, are some of the reasons why people are willing to engage in activities [127], [187], [188]. In social life, people cannot avoid coming into daily contact with other persons, for either working, leisure, or other purposes. Social capital is argued to be the reason why people want to connect with each other in the economic, social, technological, and cultural dimensions [7], [17], [24], [189]. The United Nations Sustainable Development Goals (SDG) (United Nations, 2015) have suggested health and well-being as alternative performance indicators of new developments and services. A growing affluent population [190] and the development of transport technology may increase the opportunities to satisfy people's higher needs such as love and self-actualisation (Dharmowijoyo and Joewono, 2020; Friman et al., 2017; Nordbakke and Schwanen, 2015) which corresponds with optimising social capital in every situation. Health may be another component of capability restrictions that typical time-space prism variables overlook. Nonetheless, numerous studies indicate that the impact of activity-travel patterns on health is indirect or influenced by more specific factors such as physical and social intensities (Dharmowijoyo et al., 2015; Friman et al., 2017; Susilo and Liu, 2017; van Wee and Ettema, 2016; Zhang, 2013; Zhang and Timmermans, 2010). Social intensities can be interpreted as how people optimise their

social capital during the various activities and travels they perform in their daily life [14], [32]. According to several studies (Budiarto et al., 2022; Dharmowijoyo and Joewono, 2020; Friman et al., 2017; Kariuki et al., 2020; Tanjung et al., 2023; Wicaksono et al., 2023) the presence of others during these activities and travels is thought to reflect social intensities or social capital. It is anticipated that these factors will significantly correlate with social and mental health. Others' participation in various activities is regarded to have an impact on health outcomes, both favourably and negatively. Furthermore, various types of social networks whether with household members, relatives, friends/colleagues, or online friends are thought to have a positive or negative impact on social and mental health [14], [20], [26], [149], [197].

Transport and health are intricately connected [197] and can have both positive and negative impacts on an individual's well-being. Transport provides access to employment, education, commerce, recreation, family and social networks, health care facilities, and everyday physical activity through walking and cycling [16], [105], [129], [198]. Engaging in out-of-home discretionary activities and interacting with different people are positively correlated with better physical, social, and mental health. As [25] noted, health can act as a capability constraint; individuals with disabilities or health conditions may desire to participate in activities but are unable to do so due to their health, illustrating how health influences activity-travel participation. Furthermore, the World Health Organisation (WHO) defines health more broadly than the absence of disease or infirmity¹. Health measurement will be much more detailed than self-reported health as measured by the OECD Better Life Index² which includes the measurement of general health, physical and role functioning due to physical and emotional problems, social functioning, bodily pain, vitality, and mental health. Thus, those detailed measurements will be used to define physical, social, and mental health. Social health refers to interpersonal relationships, while mental health concerns an

¹ <http://www.who.int/about/definition/en/print.html>

² <https://www.oecdbetterlifeindex.org/>

individual's thinking, behaviour, and feelings [18]. The past of the investigation is presented in Table 2.1 and Figure 2.4.

Table 2.1: Summary Literature Review

No	Authors	Aims/Findings
A	[5], [25], [34], [36], [46], [199]	Hägerstrand developed the space-time prism concept in the 1970s to better analyse people's capacity for movement and activity across locales. It emphasises how personal and demographic factors, formed by specific demands and limitations, influence everyday travel and activity participation. These patterns are affected by three key constraints: capability, coupling, and authority.
B	[16], [18], [19], [74], [200]	Travel behaviour studies investigate the patterns and motivations behind people's moves outside of their typical contexts. It examines how people allocate their time from the moment they leave home until they return, creating their daily routines. Individuals make daily decisions about the extent, mode, and timing of their travel, which can have both a direct and indirect impact on their health. This field of study assists transportation specialists in devising strategies to improve passenger experiences with transportation services, as well as health professionals in discovering innovative ways to promote public health.
C	[18], [20], [21], [34], [50]	Since 1948, health has been a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity [201]. Both our physical and mental health can affect how active we are and our willingness to travel. Our health and level of participation in activities, particularly those that require social interaction outside the home, are inextricably linked. Being physically active and socially engaged can improve our overall health. Individuals who are physically impaired or experiencing emotional anguish may wish to participate in these activities but are unable to do so, demonstrating how health directly affects our ability to engage in diverse activities.
D	[26], [32], [97], [165], [202]	Social connections have a significant impact on many elements of health, such as emotional and physical well-being, lifestyle choices, and life expectancy. The nature of social interactions and individual relationships heavily influences the duration of social activities. Individuals who participate in social activities with

		groups, family, friends, people of the same gender, close contacts, or those who live a long distance may find that these activities last longer. Prioritising work above pleasure might lead to greater stress and sadness. Furthermore, participation in social activities is critical for sustaining health and well-being, especially among older persons.
E	[16], [26], [141], [161], [163], [203], [204]	Social relationships impact a wide range of health outcomes, including mental, social, and physical health, as well as health habits and mortality risk. The characteristics of social activities and the nature of relationships between participants are highly significant in explaining the duration of social interactions. Social activities tend to last longer if they are conducted with a group, with a household member or a friend, with someone of the same gender, with close ties, or with individuals who live farther away. Spending more time working and having less time for leisure activities can lead to stress and depression. Engaging in social participation is an important correlate of health and well-being, especially in older adults.

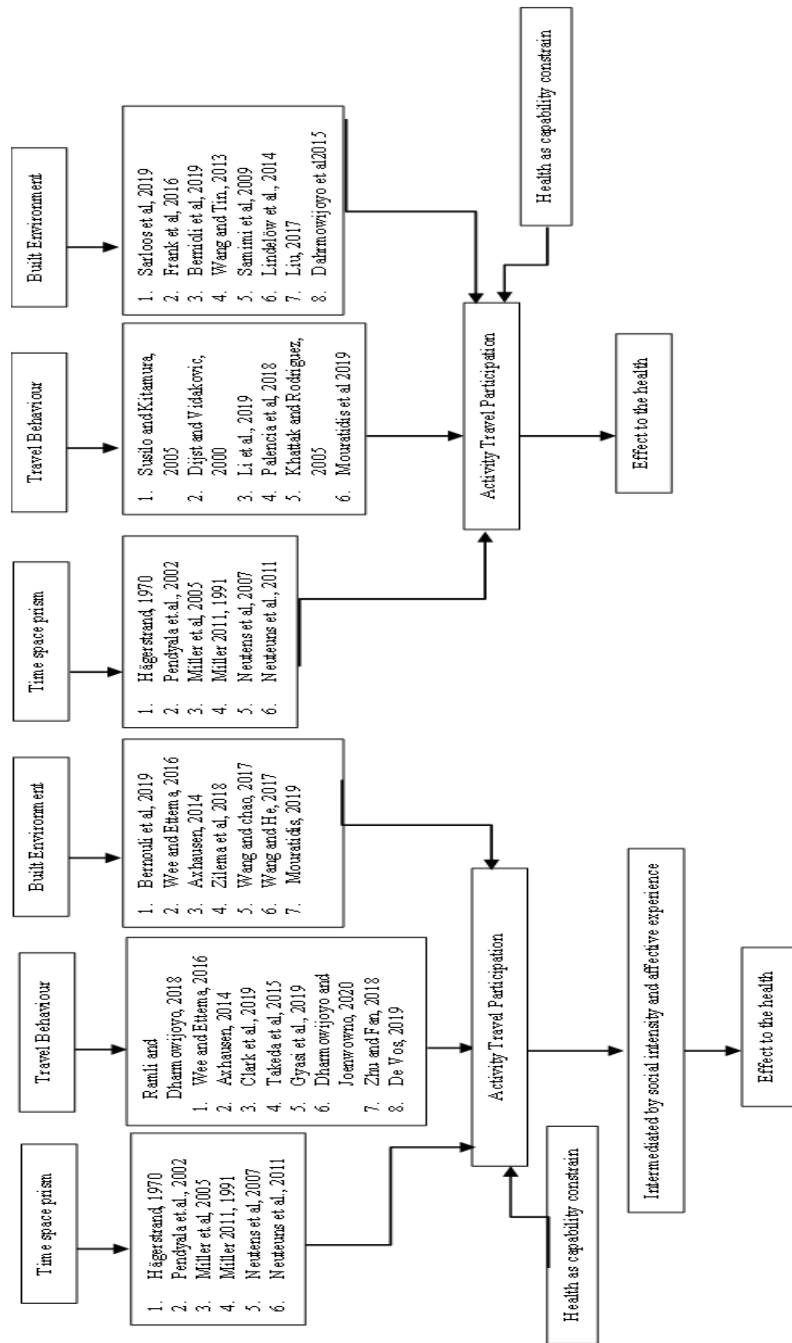


Figure 2.4: Literature tree

CHAPTER 3

METHODOLOGY

3.1 Study area

Various articles and journals have been gathered and utilised for this research, with a thorough review conducted to enhance comprehension of the topic. All data is sourced from reputable and verified sources to guarantee the reliability of the information for review. The data was collected as a part of the study by Tanjung et al. 2023, 2024 [16], [203], and Wicaksono, et al [31]. This study investigates the complexity and variability of individuals' activity-travel behaviours in the Malang Greater Area (MGA), Indonesia. The MGA dataset comprises multidimensional data about household characteristics, travel parameters, social activity, individual's subjective characteristics, time-use activity diary and health performance.

Each individual has unique constraints, needs, and resources, leading to distinct time-space trajectories [205]. In developing countries with low to middle-income populations, individuals often face additional challenges such as limited financial means, restricted access to private vehicles, inadequate transport infrastructure and public transit systems. These factors can hinder participation in discretionary out-of-home activities [33], [60], [206], [207]. Most research on transport and travel behaviour focuses on weekdays, as travel behaviours are more routine, solid, and accessible to modelling, primarily influenced by commuting to work and school. The weekday patterns are essential for planning infrastructure for transportation, managing peak-hour congestion, and developing public transit services. On the other hand, weekend travel is sometimes more unpredictable, influenced by leisure or social activities, making generalisations difficult. Nonetheless, with the increasing emphasis on well-being, flexible work arrangements, and social inclusion, there is a growing interest in understanding weekend travel behaviours to enhance equitable transport planning. Furthermore, Raux et al. [208] observed that travel behaviour tends to be more consistent on workdays or weekdays compared to weekends. This regularity is a key

reason this study focuses on weekdays, particularly in the context of Indonesia, a developing country. To gather detailed data on time-use and activity-travel patterns, respondents were asked to document their activities and travel in 15-minute intervals every day (24 hours), for five consecutive weekdays.

Malang Greater Area (MGA) comprises Malang City and three neighbouring suburban areas (Batu, Pasuruan, and Probolinggo), representing one of Indonesia's metropolitan areas. It is located approximately 80 km south of the provincial capital, Surabaya. Moreover, it is the second largest metropolitan area in the Eastern Java region after Surabaya Metropolitan Area. MGA is inhabited by more than 3.7 million residents [179] and is still counting. As the core of the region, Malang City's population is 872,000, which constitutes 23.5% of the total population of MGA (3.7 million) while only encompassing 4.34% of the MGA area [209]. Batu City is known as the centre of tourism in East Java, which also makes the western part of Malang City part of the tourism region, with Batu City as its core area. MGA has three economic activities: education, industry, and tourism [210]. As an education centre, Malang City is home to 58 private universities and four state universities, and it was a place of study for more than 300,000 students in 2018 [209]. The standard salary base for MGA workers is typically around IDR 3,27 million (\$210.46) per month [211], and the standard individual living cost is approximately IDR 2.50 million (\$160.98). At the same time, a family of 4 would require IDR 5-10 million (\$321.97-644.00)³. The industrial areas are located in the northern part of MGA, linked to Surabaya city as the hub port of East Java Province by highways and an expressway. Due to their connections with Surabaya and Batu City, the northern and western parts of the MGA naturally have a higher level of economic development than the southern and eastern parts of the area. The area of the study is shown in Figure 3.1.

Malang City offers a compelling alternative to Jakarta for studying transportation due to its unique characteristics and research advantages. As a mid-sized city, Malang provides a more manageable and focused environment compared to the vast complexity of Jakarta's transportation network. Its emerging transportation challenges, such as growing traffic congestion and public transport inefficiencies, make

³<https://livingcost.org/cost/indonesia/malang>

it an ideal case study for understanding the dynamics of medium-sized cities transitioning to larger urban centres. Additionally, research in Malang allows for the exploration of policies like non-motorized transport strategies and sustainable urban mobility without the overwhelming variables present in a megacity like Jakarta. Lessons learned from Malang are often more applicable to other similarly sized cities across Indonesia, making the findings highly replicable. Furthermore, Malang's cost-effective setting and easier access to local stakeholders and data make it a practical choice for researchers with limited resources. By focusing on Malang, researchers can contribute valuable insights into the development of tailored and sustainable transportation policies that address the needs of Indonesia's diverse urban landscape.

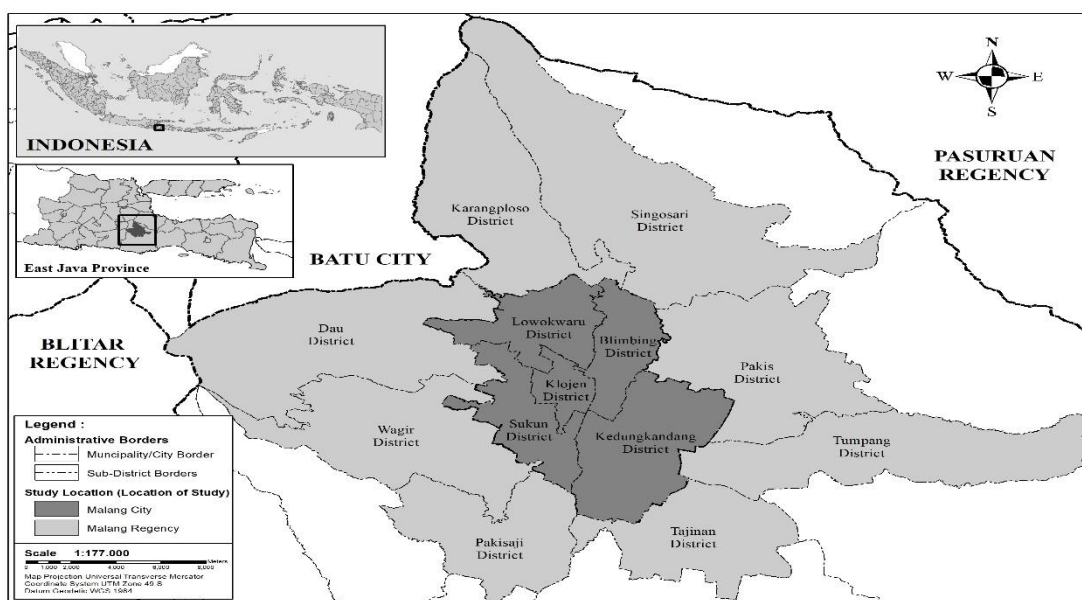


Figure 3.1: Malang City (modified from Land Use Planning of Malang City, 2010 and Land Use Planning of Malang Municipality, 2010).

The MGA transportation system is dominated by road transport, with a marginal public transport system in *Angkor*. *Angkots* serve as a road-based indigenous public transport system in Indonesia that operates as a paratransit system. This means that an angkot can stop anywhere (see [212] And 2013 for further descriptions of this paratransit system in Indonesia). Since 2010, ride-sourcing modes have become established in various cities in Indonesia, serving 50 cities (including MGA) and providing 5 billion kilometres of travel in 2019 [213]. Ride-sourcing modes were forecast to achieve US\$ 4,369 million, with a market share of around 22.3% in 2020 [214]. However, this figure needs to be

re-estimated in light of the COVID-19 pandemic. The new mode provides alternatives for people to travel without driving themselves, with more attractive and transparent travel costs, more accessibility, and better reliability than taxis when requesting services. [215]. With heavy congestion in many metropolitan areas of Indonesia, ride-sourcing services include car-based ride-sourcing (CBRS) and motorcycle-based ride-sourcing (MBRS). MBRS is the extension of another type of Indigenous paratransit system in Indonesia, namely the *ojeg* or motorcycle taxi, compared with which MBRS provides better reliability before and during the journey [216].

3.2 Flowchart

The methods for this study are briefly explained step by step with a set of plans in the following flowchart, as shown in Figure 3.2.

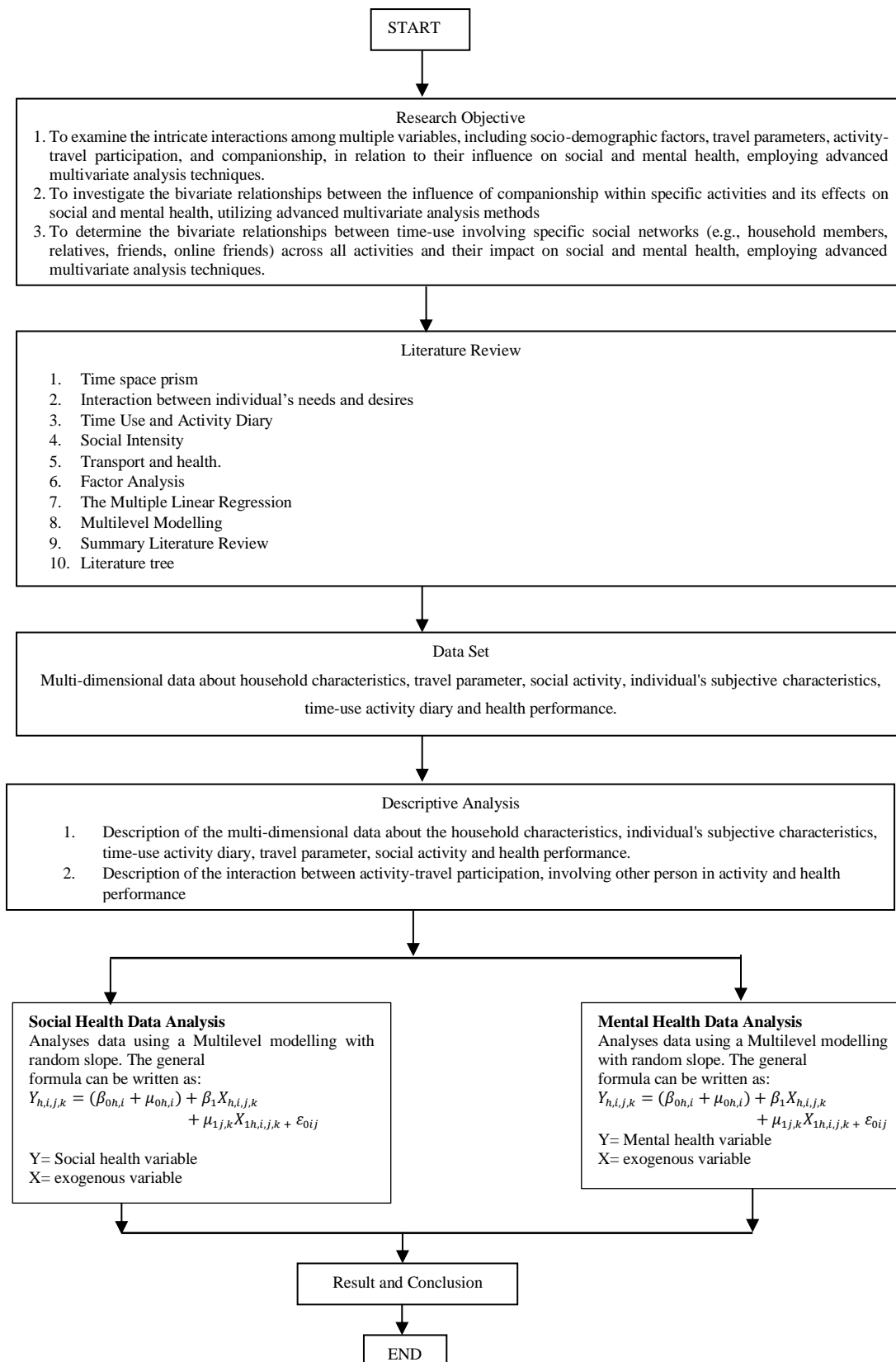


Figure 3.2: Project Flowchart

3.3 Data Collection

3.3.1 Population and sample

The population of this research comprises all citizens aged seven years and older who work and live in the Malang Greater Area. The sample size is a critical consideration; having too many samples can result in wasted resources and energy, while too few samples increase the probability of error. Therefore, determining an optimal sample size is essential to balance accuracy and efficiency in the research process. To determine how many samples should be used, the [217] at (1964) formula is used presented in formula 3.1

$$n = \frac{N}{1 + N(E)^2}$$

With:

n = The number of samples (confidence level 95%) 3.1

N = The number of populations

E = The degree of error

3.3.2 Data Sources

This research investigated how people's transportation and health conditions are affected by the involvement of other persons, considering geographical constraints, travel, and activity patterns. The study utilises data from the Malang Greater Area (MGA) 2019 dataset, collected over five consecutive weekdays. The study acknowledges several limitations. Firstly, it does not address the regulations and policies regarding private vehicle and motorized transport usage within the Malang City Area. Secondly, data collection was restricted to weekdays (Monday through Friday), limiting the scope of the findings. Thirdly, the age range for dependent children was confined to 7–14 years. Lastly, the study focuses solely on the mental and social health indices. The dataset contains numerical and multidimensional information in four different parts: (1) Household and individual characteristics questions, (2) time-use and activity diary questions, (3) attitudes, norms, anticipated emotions, perceived behavioural control, past experiences and desires, (4) detailed physical and social

activities (involving other persons in certain activities) and (5) Health-related quality of life questions.

This report focuses on preventing bias in self-reported survey data by paying close attention to survey design and administration. Questions are formulated in clear, neutral language, avoiding wording that could lead or influence participants. Confidentiality is protected to reduce social desirability bias since respondents often answer more honestly when their identities remain private. Diverse response options are included to avoid overly simplistic or binary choices, thus capturing broader perspectives. Before full-scale deployment, a pilot survey is conducted with a small group to identify misunderstandings or potential biases, and any necessary adjustments are made. Finally, findings are strengthened and validated by combining survey data with additional methods, such as interviews or observations, which allows for cross-checking and verification of self-reported responses

3.3.3 Survey Method

The survey was inspired by and an extension of the work of Dharmowijoyo 2015, 2016 [25], [218], which collected activity diaries and personal, household and health-related quality-of-life information in the Bandung Metropolitan Area. Similar to this 2013 MGA dataset, the data collection process also included all household members within the household. Before its implementation, the survey underwent comprehensive deliberation among survey planners, managers, and field coordinators in Indonesia. Subsequently, the survey was adapted to Bahasa Indonesia for practical purposes. Conducted in August 2019, the survey considered both local and national holidays in Indonesia, which could potentially impact individuals' activity and travel behaviours, leading to deviations from their routine patterns.

Surveyors personally approached each potential respondent, acquainting them with the survey's objectives. Special attention was given to individuals who had not responded to previous communication attempts, owing to the low enrolment rate. Hence, the presence of native or regional authorities in the survey area was deemed

essential to facilitate communication between parties. Surveyors endeavoured to establish a personal rapport with respondents to mitigate errors in their answers. Finally, questionnaires were distributed to consenting participants, who were required to sign an obligation letter committing to complete the survey without withdrawal before its conclusion.

3.1.1.1 Households and Individuals Characteristics Question

Data were collected in the Malang Greater Area on weekdays (Monday to Friday) from August to October 2019, involving 420 participants from 92 households. The questions regarding household characteristics gather comprehensive information about household members and perceived accessibility. The household data include the number of members, each individual's role, age, occupation types, income, highest education levels completed, and access to motorised travel modes. People's travel characteristics provide information on the number of trips and trip chains, as well as the percentage of travel time using various modes of transport. The modes of transport identified are private vehicles (including both motorcycles and cars), public transport, non-motorised transport and ride-sourcing modes. As discussed above, ride-sourcing is divided into MBRS and CBRS. Accommodation details cover the type of accommodation and ownership status. Perceived accessibility data capture detailed information on transportation facilities' availability and proximity. The variables used in the research are listed in the following Table 3.1.

Table 3.1: The variables used in the study are listed in the following

Variable	Indicators
Socio-demographic	Males
	Females
	Workers
	Non-workers
	Students
	Age Below 22 years
	Age 23 - 45 years
	Age 46 - 55 years
	Senior citizens (> 55 years old)
Household characteristics	Part of low-income households (IDR 3 million (\$193.30) and under)
	Part of middle-income household (IDR 3-15 million (\$193.30-966.51))

Variable	Indicators
	Part of high-income households (above IDR 15 million (\$966.51))
	Number of household members
	Number of dependent children per household
	Number of private vehicles per household
Percentages of travel Parameters	Non-motorised mode travel time
	Private vehicle travel time
	Public transport travel time
	MBRS travel time
	CBRS travel time
	Total daily travel time
Time use activity diary	Others-Mandatory In-Home
	Others-Mandatory Out-of-Home
	Others-Maintenance In-Home
	Others-Maintenance Out-of-Home
	Others-Leisure In-Home
	Others-Leisure Out-of-Home
	Others-Online In-home
	Others-Online Out-of-home
	Others-sport
	Others-Travel
Perceived travel time to certain public amenities using private vehicles and public transport	Perceived number of public transportation lines passing respondents' residential location
	Perceived travel time to city Centre using private vehicle and public transport (minute)
	Perceived travel time to shopping Centre using private vehicle and public transport (minute)
	Perceived travel time to supermarket using private vehicle and public transport (minute)
	Perceived travel time to city park area using private vehicle and public transport (minute)
	Perceived travel time to bus stop using private vehicle and public transport (minute)
	Perceived travel time to hospital using private vehicle and public transport (minute)
	Perceived travel time to health clinic using private vehicle and public transport (minute)
	Perceived travel time to governmental offices using private vehicle and public transport (minute)
	Perceived travel time to bank or post office using private vehicle and public transport (minute)
	Perceived travel time to kindergarten using private vehicle and public transport (minute)
	Perceived travel time to play group using private vehicle and public transport (minute)
	Perceived travel time to primary school using private vehicle and public transport (minute)
	Perceived travel time to junior high school / senior high school using private vehicle and public transport (minute)
	Perceived travel time to station using private vehicle and public transport (minute)
	Perceived travel time to market using private vehicle and public transport (minute)
Percentage of time used to involve a specific social network	With household members
	Relatives
	Friends
	Online friends

3.1.1.2 Activity Diary Survey

The time-use and activity diary questions captured individuals' activity specifics and location data. The diary survey was segmented into 96 time slots within a day, each lasting 15 minutes. Consequently, the diary did not record activities or travel shorter than 15 minutes. This approach minimises bias in estimating time spent on activities. The time slots in the diary make it easier for surveyors and respondents to operationalise and document activities. The time slot is divided based on previous research. [21], [25], [31].

Twenty-five activity classifications are classified into 14 types, as shown in Table 3.2. There were 25 activity classifications, including online activities (e.g., online shopping, online gaming, browsing, and online leisure such as watching YouTube), which could be conducted in or outside the home. The 28 activity classifications were then grouped as mandatory, leisure and maintenance activities, following the categorisations by [80] and [25]. Leisure was divided into relaxing and socialising activities. In contrast, out-of-home maintenance was reclassified into grocery shopping and other out-of-home maintenance (e.g., going to the bank/post office/health centre). Sport was separated from leisure and maintenance activities.

Table 3.2: Activity classification in the survey

Activities used in the research	Activity classifications in the survey
In-home (IH) mandatory	Sleeping, personal activities, eating at home
Out-of-home (OH) mandatory	Working, schooling and dropping/picking up child/children and other household members
In-home (IH) leisure	Watching TV/listening to radio/music without internet connections, reading newspapers/magazines/comics, relaxing or daydreaming at home and out-of-home
Out-of-home (OH) leisure	OH leisure also includes going to the cinema, park, playground, recreation areas, sightseeing, and shopping.
In-home (IH) socialising	Talking/texting with household members/relatives/colleagues/friends, either using phone/internet connections or not, visiting/receiving friends/relatives, meeting with friends/relatives, including religious gatherings and volunteering/political activities at in-home
Out-of-home OH socialising	Talking/texting with household members/relatives/colleagues/friends, either using phone/internet connections or not, visiting/receiving friends/relatives, meeting with friends/relatives, including religious gatherings and volunteering/political activities at out-of-home
In-home (IH) maintenance	Household activities and in-home babysitting

Activities used in the research	Activity classifications in the survey
Grocery shopping	Going to the grocery store
Out-of-home (OH) other maintenance	Going to bank/post office/health centre, out-of-home babysitting
Sport activities	Doing sport activities
In-home (IH) online activities	Social media activities, playing games online, watching movies from internet platforms, browsing, reading online news and any related online activities related to leisure in-home
Out-of-home (OH) online activities	Social media activities, playing games online, watching movies from internet platforms, browsing, reading online news and any related online activities related to leisure out-of-home
Travel time	All travel time with various modes

3.1.1.3 Psychological variables related questions Psychological

Psychological theory offers a framework for understanding how both an individual's subjective characteristics and those of others influence individual behaviour. In this study, positive and negative anticipated emotions are categorised into two dimensions: activation–deactivation (active–passive) and pleasant–unpleasant. These dimensions include pleasant–unpleasant (satisfied–dissatisfied, glad–sad), pleasant deactivation–unpleasant activation (nervous–calm, stressed–relaxed), and pleasant activation–unpleasant deactivation (enthusiastic–bored), as suggested by Dharmowijoyo. [25].

3.1.1.4 Involving another person in certain activities

Respondents were asked to record their activities and travel within 15-minute intervals for five consecutive weekdays for time-use and activity-travel participation information. Thus, it is also recorded whether other people are involved in each time slice of each activity. The total sum of the involvements of other people within a specific activity is defined as the percentage of time used involving other persons within each activity.[20], [203]. Companionship within different activities is then disaggregated into different types of social networks, namely other household members, relatives, close friends, and online friends. Therefore, we obtain the

involvement of different types of social networks within different activities. The total involvement of a specific type of social network within all activities is also estimated.

3.1.1.5 Health-related quality of life questions

The questionnaire included health-related quality of life (QoL) inquiries and their potential determinants. Health-related QoL was constructed using the SF-36 (Short-Form 36), a prevalent generic health survey measure. This question set has been implemented in over 11 countries. [34]. The survey also contained detailed questions about daily physicals (as seen in Table 3.2). The health variables used in this study are inspired by Suzukamo, 2011 [18], derived from Short Form-36 (SF-36) questions. Health is derived according to whether there are physical, role, and social functioning limitations due to physical or emotional problems, bodily pain, general health, vitality and mental health. Suzukamo et al (2011) defined eight parameters in SF-36 into three different components of health (presented in Figure 3.3), namely physical, social and mental health, rather than the two health components posited by [219]–[221]. Physical functioning (PF), limitations on role functioning according to physical health (RP), general health (GH) and bodily pain (BP) are the observed variables of physical health. In contrast, RP, social functioning (SF) and limitations on role functioning due to emotional problems (RE) define social health. Moreover, mental health is explained by BP, SF, GH, vitality (VT) and mental health (MH). Each of the questions capturing the subsection is recorded in the form of a Likert scale 1 through 5, negative to positive, respectively. To generate social and mental health as the dependent variables for this study, components of each variable are summarised into one final score using Factor Analysis.

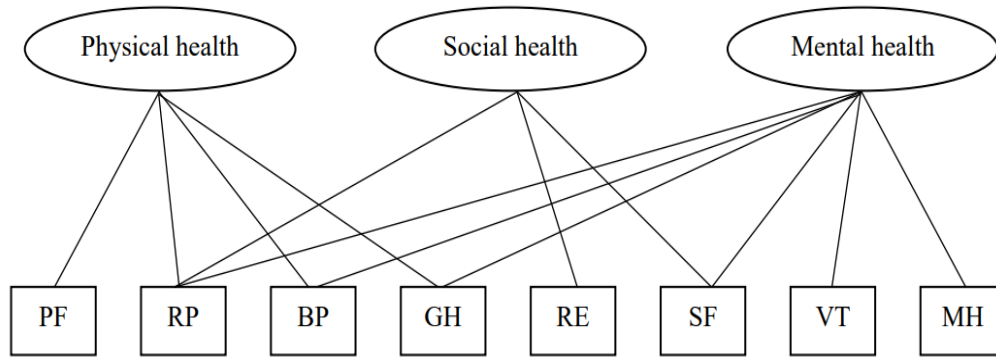


Figure 3.3: Health-Related Quality of Life (Source: Zhang, 2013) [34]

Table 3.3: Health-related Questions (source: Zhang, 2013 [31])

Category	Description	Possible answer
Limitations on role functioning according to physical health (RP)	During the last four weeks, how much did you get the following problems at work or other daily activities as a result of your health condition? 1 Cutting your working time 2 Do not reach expected achievement 3 Limitations in work or other specific activities 4 Difficulties in work activities or other activities	A = all the time B = almost all the quad time C = sometime D = rare E = never
Vitality (VT)	1 Do you feel alive? 2 Do you feel a lot of energy? 3 Do you feel outcast? 4 Do you feel tired?	
limitations on role functioning due to emotional problems (RE)	During the last four weeks, how much did you get the following problems at work or other daily activities, as a result of your emotional state? 1 Cutting your working time 2 Do not reach expected achievement 3 Do a sloppy job or activity more than usual	
General Health (GH)	Please choose right or wrong! 1 I am easier to get sick than anybody 2 I am the healthiest person. 3 I think my condition is getting worse now. 4 I am in very good condition	A= absolutely right B= right C= I don't know D= wrong E= absolutely wrong
Physical Functioning (PF)	The following questions relate to your daily activities. Does your current health condition limit you some activities? 1. Strenuous physical activities (running, lifting heavy loads, and other strenuous sports	A = Yes, I limit my activities so much B = Yes, limit my activities not so much C = No, it does not limit my activities

Category	Description	Possible answer
	activities) 2. Moderate activities (bowling, golf, moving table/s, etc) 3. Lifting or taking groceries 4. Stepping stairs 5. Stepping one stair 6. Kneeling, spinning, etc 7. Walking more than 1 km 8. Walking some metres 9. Walking 100 metres 10. Bathing and clothing	
Bodily Pain (BP)	1. How much did emotional health problems have during the last four weeks? 2. During the last four weeks, how much did your emotional health problems interfere with your working activities?	A = not at all B = bit C = bother me not too much D = bother me
Social Functioning (SF)	During the last four weeks, how much did your emotional health problems interfere with your social activities with family, friends, neighbours, etc?	
Mental Health (MH)	during the last four weeks, how much did your condition the following questions bother you? 1. Do you feel nervous? 2. Do you feel very down? 3. Do you feel peace? 4. Are you depressed? 5. Do you feel happy?	

3.2 Procedures of Analysis

The dataset was processed using three software tools. Initially, Microsoft Excel 2016 was used for the primary data deployment. Subsequently, the data was transferred to IBM SPSS Statistics version 26.0.0.0 for preparation, exploration, and dimensionality reduction via factor analysis. Finally, the data from SPSS was transferred to R Studio version 4.4.00 for the computation of linear regression. Further detailed procedures outlining how the data was processed are elucidated in subsequent sections.

3.1.4 Data Input

Survey responses were converted into numerical values with consistent measurement directions for data analysis purposes. Initially, the data was imported from Microsoft Excel into four separate SPSS documents: (1) Socio-demographic, geographical/Built

Environment conditions, and travel parameters; (2) Activity-travel participation time-use; (3) Social and communication activities within the family; (4) Lifestyle; and (5) Health questions. However, numerical values were essential for the evaluation of each variable. Therefore, all responses were transformed accordingly. For instance, participants' travel experiences, initially recorded using letters corresponding to specific criteria, were converted into numerical values based on their alphabetical order (e.g., A=01, Z=26). This transformation enabled simultaneous engagement in multiple activities within the travel journal. Furthermore, participants were asked to provide information about their chosen mode of transportation for their daily commute and with whom they spend their activity diary.

3.1.5 Data Analysis

Additional data preparation was undertaken to facilitate the current research for specific factors. Initially, categorical factors such as age, occupation, and income were split into dummy variables. This involved employing a dummy coding technique to eliminate any extraneous mathematical relationships within the data, resulting in a binary array commonly known as binary variables. For instance, to capture respondents' occupation information, three additional variables were generated: (1) workers, (2) non-workers, and (3) students. Lecture, for instance, would be assigned a value of one in the occupation parameter for workers and a value of zero in the occupation parameter for non-workers and students. For a comprehensive assessment of socio-demographics and its impact on both social and mental health, the values derived from various questions were amalgamated into a single variable score using factor analysis in SPSS.

Principal Component Analysis with Orthogonal Varimax Rotation and Kaiser Normalization, considering Eigenvalues greater than 1 for both variables, was conducted to streamline the factor structure. Initially, the values about social and mental health were condensed based on responses to health-related questions, delineated in Table 3.1, into eight subscales represented in the category column. Subsequently, upon formulation of the eight aspect scores, as depicted in Figure 3.1, these subscales were combined to compute a singular factor score for social and mental health. Notably, within this dataset, a singular question was designated for the social functioning

subscale. In alignment with previous studies by Zhang (2013) [34] Two questions were posed to evaluate the social functioning subscale. This discrepancy solely affects the variable score for mental health. Additionally, consolidating five daily travel satisfaction questions into one-factor scores resulted in reduced factor scores.

Following this, we utilised Table 3.1 to recode the quantitative values of activity-travel participation into journey time and 25 additional activity characteristics. Subsequently, we computed the activity-travel duration by multiplying the number of columns (each representing 96-time slices per day) by 15 minutes, resulting in a total of 1440 minutes, representing the duration of activities and travel each day. Consequently, determining the duration of each activity allowed for the calculation of the proportion of time spent travelling daily. The subsequent steps involved consolidating variables with a single value for each respondent into one SPSS file. This was followed by merging the activity-travel participation time-use SPSS file, which contained 87 values for 15 consecutive days for each activity criterion and trip time variable. It is imperative to ensure that a single data frame represents every respondent in the initial file and that they are uniformly sorted in the respondents' column before importing into the activity-travel participation file, which comprises 87 data frames per respondent. Once the aggregated data was consolidated into a solitary file in SPSS, it was imported into R Studio. Hierarchical (MLM) models were devised to scrutinise the intricate interplay between health, activity diary, and activity-travel involvement. The framework of the created model is delineated in Figure 3.4.

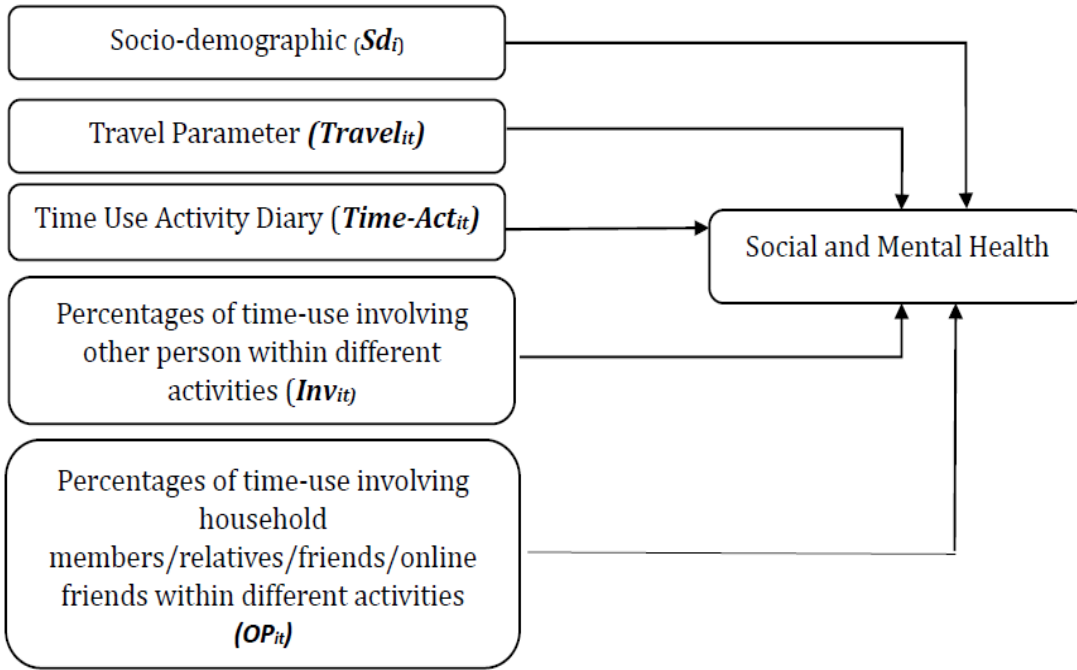


Figure 3.4: Proposed Model Structure

Given that the dataset comprises activity diaries for all household members across five consecutive weekdays, the model can incorporate nesting effects related to daily activity variations and activity-travel patterns of individuals and the variability in other household members' activity-travel patterns. Multilevel modelling with random intercepts can mitigate error terms and elucidate the impact of social and mental health by considering both individuals' daily variability and other household members' activity-travel patterns.

Research in social science emphasises the value of integrating a random intercept model with a random slope model to construct a comprehensive, multilevel, mixed-effects model [222]. The multilevel mixed-effect model can incorporate cross-level interactions involving upper- and lower-level observations. In social sciences like transport studies, there is a focus on interdependencies between observations (e.g., individuals and their residential locations or social networks), challenging the assumption of independence and considering the hierarchical nesting of observations.[91], [191]. Normally, upper-level observations will serve as random intercepts, whereas lower-level observations will detail the model as random slopes [222]. Including a mixed-effect model will reduce the absolute t-ratio of the cross-level

interaction term by 31% or more [222]. Therefore, the lower-level observations of detailed information on the involvement in various social networks are expected to be incorporated into the model as random slopes. The general model can be written as below (as also suggested by Schwanen et al. 2008 [91], Heisig and Schaeffer, 2019 [222], Leyland & Groenewegen, 2000 [223])

$$Y_{h,i,j,k} = (\beta_{0h,i} + \mu_{0h,i}) + \beta_1 X_{h,i,j,k} + \mu_{1j,k} X_{1h,i,j,k} + \varepsilon_{0ij} \dots \dots \dots 3.2$$

From Eq. (3.2), $Y_{h,i,j,k}$ is the dependent variable, where h denotes upper-level observations (e.g., household and geographical locations), i indexes individual-level observations, and j and k are lower-level observations (e.g., daily repeated observations of individuals and observations of different types of social networks within various activities and travels). $\beta_{0h,i}$ represents the intercept or constant, whereas $\mu_{0h,i}$ represents the random intercepts of the upper-level model. β_i is the coefficient of the observed variables $X_{h,i,j,k}$, which can be different in the lower-level observations (e.g., j and k). Another term in this equation is $\mu_{1j,k}$, which is the random slope in the lower-level observations. $\mu_{1j,k}$ is different for different lower-level observations (e.g., social network companionship within activity-travel patterns). μ_{0j} indicates a departure from the overall intercept β_0 , then $\mu_{1j,k}$ indicates the extent of a departure from the overall slope β_1 in a random slope model. Lastly, ε_{ij} is a random variable depicting the distribution of the residuals, which indicates some unexplained errors by the regression line. The NLME package is able to apply multilevel mixed-effect regression analysis with multiple random intercepts and multiple random slopes [224]. Additionally, the coefficient parameters in the NLME were estimated by maximum likelihood estimation, as clearly shown in Eq. (3.3) [225][224]. The multilevel modelling tries to find coefficients Σ_b shared between observations within a nested group. The parameter Σ_b , or the nesting effect, is then used to estimate the coefficients jointly β . This means that the regression parameter is estimated with the inclusion of variations of nested observations.

$$L^*(\Sigma_b, \beta; y) = \int (P(y|\beta, b, i) (P(b|\Sigma_b)) db \tag{3.3}$$

To more clearly explain the model in Fig. 3.4 using mathematical forms, Equations (3.4)–(3.5) are written as follows

$$\begin{aligned}
SH_{h,i,j,k} = & (\beta_{0h,i} + \mu_{0h,i}) + \beta_1 Sd_{h,i,j,k} + \\
& \mu_{1j,k} Sd_{1h,i,j,k} + \beta_2 Travel_{h,i,j,k} + \mu_{2j,k} Travel_{2h,i,j,k} + \beta_3 Time - \\
& Act_{h,i,j,k} + \mu_{3j,k} Time - Act_{3h,i,j,k} + \beta_4 Inv_{h,i,j,k} + \\
& \mu_{4j,k} Inv_{4h,i,j,k} + \beta_5 OP_{h,i,j,k} + \mu_{5j,k} OP_{5h,i,j,k} + \varepsilon_{0ij}
\end{aligned}$$

$$\begin{aligned}
MH_{h,i,j,k} = & (\beta_{0h,i} + \mu_{0h,i}) + \beta_6 Sd_{h,i,j,k} + \mu_{6j,k} Sd_{6h,i,j,k} + \beta_7 Travel_{h,i,j,k} \\
& + \mu_{7j,k} Travel_{7h,i,j,k} + \beta_8 Time - Act_{h,i,j,k} \\
& + \mu_{8j,k} Time - Act_{8h,i,j,k} + \beta_9 Inv_{h,i,j,k} \\
& + \mu_{9j,k} Inv_{4h,i,j,k} + \beta_{10} OP_{h,i,j,k} + \mu_{10j,k} OP_{10h,i,j,k} + \varepsilon_{0ij}
\end{aligned}$$

CHAPTER 4

RESULT AND DISCUSSION

4.1 Data Description

The data were obtained through a comprehensive household survey conducted between August and October 2019, initially involving 420 individuals from 92 households. To ensure the relevance and reliability of the data, an age-based inclusion criterion was applied, whereby respondents aged seven years or younger were excluded. Following this screening process and subsequent validation for completeness, internal consistency, and logical coherence, the final analytical sample consisted of 377 respondents, including 68 dependent children. The dataset encompasses detailed information on socio-demographic attributes, travel behaviours, time-use patterns, activity-travel participation, and the involvement of various social network types throughout daily activities and travel episodes.

4.1.1 Socio-Demography

The respondents' profile and health factor scores over the observed period are presented in Table 4.1. The respondent pool consisted of a nearly balanced gender composition, with most respondents being workers in their productive age. A significant proportion of the households are classified as low-income, earning below IDR 3 million per month. Lastly, the health factor scores, estimated values derived from social and mental self-reported health factors in the factor analysis, show negative values. This indicates a larger number of respondents with poor health conditions. The survey was inspired by and an extension of the work [25] and [74], which collected activity diaries and personal, household and health-related quality-of-life information

in the Bandung Metropolitan Area. Similar to this 2013 BMA dataset, the data collection process also included all household members within the household.

Table 4.1: Profile of participants as samples used in this study (377 individuals)

Variables	Percentage of mean
<i>Socio-demographic</i>	
Males	51.20%
Females	48.80%
Workers	66.60%
Non-workers	6.10%
Students	27.30%
Age Below 22 years	27.60%
Age 23 - 45 years	51.50%
Age 46 - 55 years	13.80%
Senior citizens (> 55 years old)	7.20%
<i>Household characteristics</i>	
Part of low-income households (IDR 3 million (\$193.30) and under)	77.70%
Part of middle-income household (IDR 3-15 million (\$193.30-966.51))	15.90%
Part of high-income households (above IDR 15 million (\$966.51))	6.40%
Number of household members	4.57
Number of dependent children per household	0.73
Number of private vehicles per household	2.40
<i>Health Indicators</i>	
Self-Reported Social Health	0.00(-2.19; 1.75) ^a
Self-Reported Mental Health	0.00 (-6.22;1.76) ^a

^aThese numbers show the standard deviation and range of the reported scale of respondents' self-assessed health conditions. Since the factor score is nominal, the range is given in brackets to show the nature of the figures

4.1.2 Travel Parameter

Every day, people have needs and desires, and to fulfil them, they engage in travel. Travel is the activity of moving from one place to another. The 2019 Malang Dataset survey indicates that the number of trips, trip chains, and travel times vary significantly each day, as presented in Table 4.2. The percentages of travel parameters are detailed in Table 4.3 and illustrated in Figure 4.1, which clearly shows that nearly 50% of daily travel is conducted using motorised modes of transportation. This highlights the predominance of motorised vehicles in daily commuting and other travel activities.

Table 4.2: Trips engagements and travel time spent

Characteristic (Percentages or means)	Days				
	Monday	Tuesday	Wednesday	Thursday	Friday
Number of trips	2.178	2.178	2.207	2.151	2.316
Number of trips chain	1.090	1.090	1.082	1.061	1.135
Total Travel time spent (Minute)	88.89	88.77	86.14	86.94	87.41

Table 4.3: Percentages of travel parameter.

Day	Non-Motorised	Motorised	Public Transport	MBRS	CBRS
Monday	20%	40%	24%	4%	12%
Tuesday	18%	41%	25%	4%	12%
Wednesday	18%	40%	23%	5%	12%
Thursday	19%	41%	23%	4%	12%
Friday	20%	41%	20%	4%	15%
Average Monday-Friday	22.72%	40.21%	20.99%	4.17%	11.91%

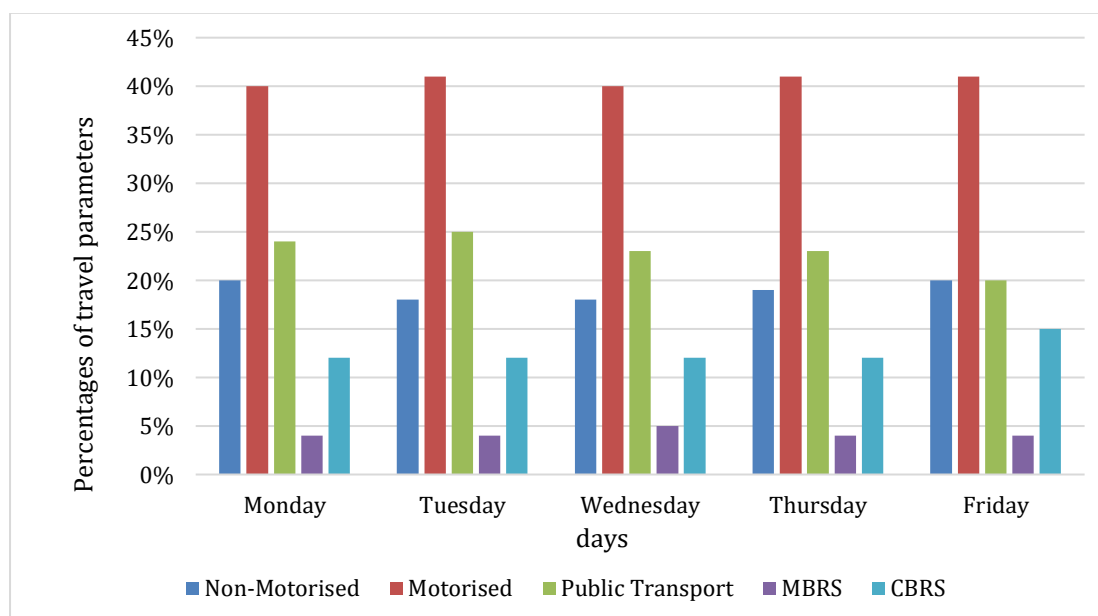


Figure 4.1: Percentages of travel parameters

Perceived travel time to public amenities is an individual's subjective assessment of how long it takes to travel to public amenities, which may differ from the actual travel time due to factors like personal experience, mode of transportation, and traffic conditions [226], [227]. Most people in the Malang City area use private vehicles and public transport for their daily travel needs instead of walking or bicycling. The Summarized data on perceived travel time to public amenities is presented in Table 4.4. [228], [229]. Factor analysis, a statistical technique used to reduce a large dataset into a smaller set of summary variables, is applicable when both observed and latent variables are assumed to be measured at the interval level. [230], [231]. In this research, Exploratory Factor Analysis (EFA) was employed to identify the characteristics of perceived time. An orthogonal varimax rotation was applied to the data to maximise the variance of the squared loadings of factors in the columns on all variables in the rows of the factor matrix. Each factor had either small or large loadings of any variable, as Randolph and Myers. [232], suggested, indicating a significant relationship between variables and components. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is an index used to assess the appropriateness of factor analysis. The KMO index ranges from 0.00 to 1.00 and can be computed for the total correlation matrix and each measured variable. Generally, KMO values from 0.5 to 1.0 indicate that factor analysis is appropriate and acceptable. [175], [233]. Values below 0.50 are unacceptable, suggesting that the correlation matrix is unsuitable for factor analysis. [231]. In this study, the KMO measure was used to ensure the adequacy of the sampling for factor analysis, ensuring the validity of the results and their applicability to understanding travel behaviour and time-use patterns in Malang. Tables 4.5 and 4.6 presented the perceived travel time using private vehicles and public transport, respectively.

Table 4.4: Perceived travel time to certain public amenities

Perceived accessibility and distance to nearest public facilities	Mean
Perceived number of public transportation lines passing respondents' residential location	2.64
Perceived travel time to city Centre using private vehicle and public transport (minute)	17.20 and 21.22
Perceived travel time to shopping Centre using private vehicle and public transport (minute)	9.62 and 12.89
Perceived travel time to supermarket using private vehicle and public transport (minute)	5.52 and 6.74

Perceived accessibility and distance to nearest public facilities	Mean
Perceived travel time to city park area using private vehicle and public transport (minute)	11.09 and 13.00
Perceived travel time to bus stop using private vehicle and public transport (minute)	8.24 and 11.30
Perceived travel time to hospital using private vehicle and public transport (minute)	9.84 and 13.21
Perceived travel time to health clinic using private vehicle and public transport (minute)	8.31 and 11.48
Perceived travel time to governmental offices using private vehicle and public transport (minute)	13.04 and 15.89
Perceived travel time to bank or post office using private vehicle and public transport (minute)	7.58 and 10.04
Perceived travel time to kindergarten using private vehicle and public transport (minute)	4.72 and 5.70
Perceived travel time to play group using private vehicle and public transport (minute)	4.67 and 6.04
Perceived travel time to primary school using private vehicle and public transport (minute)	6.44 and 7.66
Perceived travel time to junior high school / senior high school using private vehicle and public transport (minute)	9.59 and 11.31
Perceived travel time to station using private vehicle and public transport (minute)	15.91 and 19.70
Perceived travel time to market using private vehicle and public transport (minute)	7.15 and 9.74

Table 4.5: Perceived travel time using private vehicle

Variable (Minute)	Component		
	Residing in an area near the city centre, parks, government office and secondary schools but farther from various public amenities	Residing in an area near various public amenities but farther from government offices and parks	Residing near grocery stores and primary schools but farther from the city centre and secondary schools
Private Vehicle to City Centre			0.760
Private Vehicle to Secondary Schools			0.828
Private Vehicle to City Park		0.927	
Private Vehicle to Government Office		0.920	
Private Vehicle to Bank or POS	0.573		
Private Vehicle to Primary Schools	0.599		
Private Vehicle to Hospital	0.818		
Private Vehicle to Station	0.808		
Private Vehicle to Supermarket	0.673		
Private Vehicle to Market	0.633		
Private Vehicle to Shopping Centre	0.909		
Private Vehicle to health centres	0.950		
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization			
a. Rotation converged in 5 iterations.			

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.587	
Bartlett's Test of Sphericity	Approx. Chi-Square	17805.178
	df	66
	Sig.	0.000
Loadings lower than 0.5 were suppressed (Hair, 2018)		

Table 4.6: Perceived travel time using public Transport

Variable (Minute)	Component		
	Residing in an area near the city center, parks, government office and secondary schools but farther from various public amenities	Residing in an area near various public amenities but farther from government offices and parks	Residing near grocery stores and primary schools but farther from the city center and secondary schools
Public Transport to City Park			0.907
Public Transport to Government Office			0.897
Public Transport to City Centre		0.733	
Public Transport to Secondary Schools		0.879	
Public Transport to Bus Stop		0.564	
Public Transport to Playground	0.594		
Public Transport to Primary Schools	0.558		
Public Transport to Hospital	0.879		
Public Transport to Station	0.779		
Public Transport to Supermarket	0.638		
Public Transport to Market	0.582		
Public Transport to Shopping Centre	0.945		
Public Transport to health centres	0.960		
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization			
a. Rotation converged in 5 iterations.			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.660		
Bartlett's Test of Sphericity	Approx. Chi-Square	23620.756	
	df	91	
	Sig.	0.000	
Loadings lower than 0.5 were suppressed (Hair, 2018)			

Presumably, most people using private vehicles to access public amenities reside between the Central Business District (CBD) and office areas. That indicates poor public transport service in these regions. Additionally, people living in compact urban areas, while facing many traffic management problems, tend to have better social health. It is likely because residents in these areas often use public transport rather than private vehicles to avoid inadequate parking services.[15], [25]. In compact city areas, public services such as malls and offices are easily accessible by public transport or

walking/cycling. [31]. This increased use of public transport and walking contributes to better social interactions and overall social health. However, these areas may also be associated with lower mental health due to the stresses of traffic and congestion.

4.1.3 Time-Use Activity Travel Participation

The interplay between time-use activities and travel participation in Malang City, Indonesia, significantly impacts local transportation. Residents allocate time to various daily activities such as work, education, leisure, and household chores, necessitating different forms of travel [16]. Commuting to work or school constitutes a large portion of daily travel, influencing personal schedules and the city's transportation patterns. Leisure activities involving longer, more flexible trips contribute to traffic variability and peak congestion, especially in popular areas like Alun-Alun Malang and Jalan Ijen. Technology and remote work advancements have transformed traditional travel patterns and reduced daily commutes while increasing local travel for errands [234]. The city's transportation infrastructure accommodates these needs, including public options like *angkot* and bike-sharing programs. Understanding the dynamics of time use and travel participation in Malang is crucial for urban planners and policymakers to develop strategies that alleviate congestion, promote sustainable transportation, and enhance urban efficiency[31], [228]. Table 3 in the document categorised activities related to travel participation into various groups, showing the average time spent and the percentage of daily use for each. This categorised matches research on time-use patterns and travel behaviour, offering insights into how people divide their time among different activities, both necessary and optional. In-home (IH) mandatory activities, such as sleeping, personal care, and eating at home, take up the most time, averaging 559.51 minutes, or 38.89% of the day. This aligns with research indicating that much of the day is spent on essential activities at home. Out-of-home (OH) mandatory activities, including working, schooling, and tasks like dropping off or picking up family members, come next with 329.44 minutes, or 22.89% of the day. These activities are vital for socioeconomic participation and are frequently studied in the context of urban mobility and commuting patterns [126], [160], [235].

Leisure activities are split between in-home and out-of-home settings. In-home leisure, such as watching TV, listening to music, and reading, averages 146.01 minutes (10.14%). Out-of-home leisure, including visits to cinemas, parks, and recreational sites, averages 52.39 minutes (3.64%). These numbers support findings from studies exploring how leisure activities contribute to well-being and quality of life [45], [236], [237]. Social activities are also categorised similarly; in-home socialising, involving interactions with household members and virtual communications, averages 52.69 minutes (3.66%), while out-of-home socialising averages 18.94 minutes (1.32%). It reflects the importance of social interactions in home and public settings, as highlighted in social capital research [7], [163], [238].

Maintenance activities necessary for household upkeep are highlighted as well. In-home maintenance, such as household chores and babysitting, takes up 47.41 minutes (3.29%). Grocery shopping, a critical out-of-home maintenance activity, takes 14.63 minutes (1.02%), while other out-of-home maintenance tasks, including visits to banks, post offices, and health centres, average 22.57 minutes (1.57%). These activities are crucial for managing daily life and have been widely studied in the context of gender roles and time-use studies. [36], [123], [239]. Sports activities are minimally represented, with only 0.93 minutes (0.07%), indicating the limited time allocated to physical exercise in daily routines.

Online activities are becoming increasingly significant, with in-home online leisure activities—such as social media usage, online gaming, and streaming—averaging 77.75 minutes (5.4%). Out-of-home online activities account for 29.80 minutes (2.07%). The rise of online activities highlights the growing influence of digital technology on daily life and leisure, as documented in recent studies [16], [50], [240], [241]. Lastly, travel time, covering all modes of travel, averages 87.55 minutes, representing 6.08% of daily time used. This aligns with research on travel behaviour, emphasising the role of travel in structuring daily schedules and its impact on well-being [141], [242]–[244]. These classifications offer a detailed understanding of how time is allocated across various activities, reflecting daily life's mandatory and discretionary aspects. The insights from this research can guide policies and interventions to optimise time-use patterns,

enhancing individual well-being and societal efficiency. Table 4.7 presents 25 categories of activity classification in the research.

Table 4.7: Activities used in the research.

Activities used in the research	Activity classifications in the survey	Mean (minutes)	Percentages of each activity time-use on a day (%)
In-home mandatory (IH)	Sleeping, personal activities, eating at home	559.51	38.89
Out-of-home mandatory (OH)	Working, schooling and dropping/picking up child/children and other household members	329.44	22.89
In-home (IH) leisure	Watching TV/listening to radio/music without internet connections, reading newspapers/magazines/comics, relaxing or daydreaming at home and out-of-home	146.01	10.14
Out-of-home leisure (OH)	OH leisure also includes going to cinema/park/playground, going to recreations and sightseeing shopping	52.39	3.64
In-home socialising (IH)	Talking/texting with household members/relatives/colleagues/friends, either using phone/internet connections or not, visiting/receiving friends/relatives, meeting with friends/relatives, including religious gatherings and volunteering/political activities at in-home	52.69	3.66
Out-of-home socialising OH	Talking/texting with household members/relatives/colleagues/friends, either using phone/internet connections or not, visiting/receiving friends/relatives, meeting with friends/relatives, including religious gatherings and volunteering/political activities at out-of-home	18.94	1.32
In-home maintenance (IH)	Household activities and in-home babysitting	47.41	3.29
Grocery shopping	Going to the grocery store	14.63	1.02
Out-of-home other maintenance (OH)	Going to bank/post office/health centre, out-of-home babysitting	22.57	1.57
Sport activities	Doing sport activities	0.93	0.07
In-home (IH) online activities	Social media activities, playing games online, watching movies from internet platforms, browsing, reading online news and any related online activities related to leisure in-home	77.75	5.4
Out-of-home (OH) online activities	Social media activities, playing games online, watching movies from internet platforms, browsing, reading online news and any related online activities related to leisure out-of-home	29.80	2.07
Travel time	All travel time with various modes	87.55	6.08

4.1.4 The Percentages involved other persons (household members, Relatives, Friends, and Online Friends) in specific Activities.

In travel behaviour, transport planning, and urban planning, understanding how individuals engage in activities with others, such as through companionship, is crucial for promoting social and mental health. [26], [35], [160]. Studies show that social interactions during travel can positively impact mental health by reducing stress and feelings of loneliness. [7], [50], [192]. For instance, walking or cycling with others can enhance feelings of community and belonging, contributing to overall well-being. [135], [192], [245]. Transport planners and urban designers can promote and support such interactions by designing pedestrian-friendly spaces, bike lanes, and public transport systems that facilitate social encounters. [246]–[250]. Creating environments that encourage walking and cycling supports physical health and fosters social connections. Moreover, integrating safe, reliable, and accessible public transport systems can further enhance opportunities for social interaction during travel. [56], [101], [251]. By considering the impact of companionship on travel behaviour, planners can develop urban environments that support social connections. This approach leads to healthier and more resilient communities by addressing travel's physical and mental health aspects. Prioritising designs and encouraging social interactions can create more vibrant and inclusive urban spaces.

Table 4.8 The percentages involving social networks. The table provides a detailed breakdown of various activities undertaken on different days of the week, segmented by the type of people involved, including household members, relatives, friends, and online friends. It highlights how different social interactions influence activity travel participation, travel behaviour, and transport planning. For instance, household members tend to focus more on in-home mandatory and maintenance tasks, with significant portions of their day dedicated to in-home leisure activities. This indicates a relatively lower need for travel, affecting travel demand and transport planning within residential areas. On the other hand, relatives exhibit a balanced distribution between in-home and out-of-home activities, suggesting moderate travel participation. This balanced behaviour can inform transport planning to accommodate both in-home and out-of-home needs efficiently.

Friends show the highest total activity times, particularly in leisure and out-of-home activities, indicating a more social and active lifestyle with higher travel participation. This group's behaviour reflects a significant demand for transportation services, especially during leisure hours, necessitating efficient transport planning to cater to social and recreational travel needs. Online friends, as expected, dedicate a significant portion of their time to online activities, both in-home and out-of-home, with notable engagement in online leisure and sports. This trend suggests a shift towards digital interaction, potentially reducing physical travel demand but increasing the need for robust digital infrastructure and services.

Overall, the table reveals how different social interactions and types of relationships influence travel behaviour and activity travel participation, providing valuable insights for transport planning. Understanding these patterns helps in designing targeted transportation policies and infrastructure that cater to the diverse needs of different groups, ensuring efficient and effective transport systems that support both physical and digital mobility.

Table 4.8: The percentages involving social network

Day	Involved others person	Mandatory		Maintenance		Leisure		In-home-Online	Out-of-home Online	Sport	Online Shopping	Travel Time	SUM
		In-Home Mandatory Activity	Out-of-home Mandatory	In-home	Out-of-home	In-home	Out-of-home						
Monday	Household	0.382	0.072	2.531	0.984	4.403	1.245	0.807	0.000	0.000	0.000	0.303	10.728
	Relatives	0.113	0.111	1.266	0.252	3.993	1.294	1.322	0.818	0.000	0.000	1.262	10.431
	Friends	0.059	1.659	0.243	0.441	4.854	6.091	1.925	5.249	0.095	0.000	2.981	23.597
	Online Friends	0.158	0.168	0.166	0.028	3.643	1.016	2.359	3.254	0.000	0.000	0.291	11.084
Tuesday	Household	0.940	0.342	1.904	0.747	2.524	1.045	0.670	0.000	0.000	0.000	0.951	9.124
	Relatives	0.100	0.247	0.955	0.127	5.386	0.829	0.699	0.909	0.000	0.000	1.958	11.209
	Friends	0.157	1.448	0.124	0.452	5.965	6.435	3.309	6.490	0.305	0.000	2.208	26.893
	Online Friends	0.010	0.157	0.133	0.099	3.118	0.900	1.521	2.757	0.000	0.000	1.790	10.485
Wednesday	Household	0.866	0.154	3.604	0.332	8.934	2.589	0.603	0.531	0.093	0.000	0.995	18.700
	Relatives	0.059	0.077	1.807	0.100	2.894	1.230	0.095	0.000	0.000	0.000	0.177	6.439
	Friends	0.037	2.084	1.379	0.417	4.015	6.092	1.523	5.981	0.371	0.318	0.995	23.212
	Online Friends	0.069	0.046	0.345	0.038	2.566	0.838	1.975	0.796	0.000	0.000	0.265	6.937
Thursday	Household	0.784	0.142	3.650	0.387	2.170	1.068	0.398	0.000	0.000	0.000	0.690	9.288
	Relatives	0.064	0.139	0.120	0.093	1.977	0.721	0.111	0.376	0.000	0.000	0.239	3.838
	Friends	0.157	2.131	0.424	0.266	4.711	5.692	5.455	7.935	0.424	0.252	4.125	31.572
	Online Friends	0.017	0.111	0.000	0.000	8.193	2.976	1.074	1.680	0.000	0.000	0.265	14.316
Friday	Household	1.018	0.157	3.038	1.035	3.810	1.901	0.908	0.266	0.000	0.160	0.731	13.025
	Relatives	0.029	0.110	0.077	0.222	4.439	0.507	0.713	0.479	0.000	0.000	0.089	6.665
	Friends	0.086	1.471	1.154	0.193	5.187	5.190	2.325	6.764	0.597	0.199	1.499	24.665
	Online Friends	0.070	0.142	0.262	0.038	5.018	1.452	1.637	1.017	0.000	0.000	0.246	9.882

4.1.5 The Percentages involved other persons in all activities.

In the multifaceted domain of urban planning and travel behaviour analysis, understanding the involvement of individuals in activities with others is crucial, particularly in the context of Malang City Area, Indonesia. This city, known for its dense urban environment and significant traffic congestion, predominantly relies on private vehicles, while public transport services are underutilised. [252]–[255]. Social interactions during travel influence decision-making processes, infrastructure needs, and urban experiences. For instance, commuters' preferences for travelling with companions versus solo travellers inform transportation planners about amenities like carpool lanes or bike-sharing programs. [92], [256], [257]. Considering the social aspects of mobility, such as the percentage of people engaging in shared transportation or community events, guides the development of inclusive and accessible urban spaces. [16], [31]. In Malang, enhancing pedestrian-friendly spaces and developing efficient public transport networks can reduce reliance on private vehicles and improve social interactions. By integrating the social dimensions of travel behaviour into urban planning frameworks, policymakers can foster cohesive communities, enhance social well-being, and create sustainable cities that cater to diverse needs and interactions. [27], [35], [244], [256], [258]. This approach supports residents' social and mental health, creating more vibrant and inclusive urban environments.

Figure 4.2 presents a detailed analysis of the percentage of time individuals allocate to interactions with various social networks during their weekday activities. The social networks considered include household members, relatives, friends, and online friends, with their respective percentages being 12.37%, 7.86%, 26.13%, and 10.56%. Interactions within the household account for 12.37% of an individual's time on weekdays. This significant proportion reflects the centrality of immediate family or cohabitants in daily life, emphasising the role of the household as a primary social unit. Engagements with relatives outside the immediate household make up 7.86% of daily activities, indicating a moderate but notable level of connection with extended family members during the week. Interactions with friends constitute the largest share of time

use at 26.13%, underscoring the pivotal role of friendships in individuals' social lives, especially in the workplace. This high percentage suggests that socialising with friends (in school or at work) is a major component of daily activities, influencing both social and travel behaviours. Meanwhile, time spent with online friends accounts for 10.56% of daily activities, highlighting the increasing importance of digital communication and virtual social networks in contemporary life. The percentage of time used to involve specific social networks within all activities on weekdays is presented in Figure 4.2

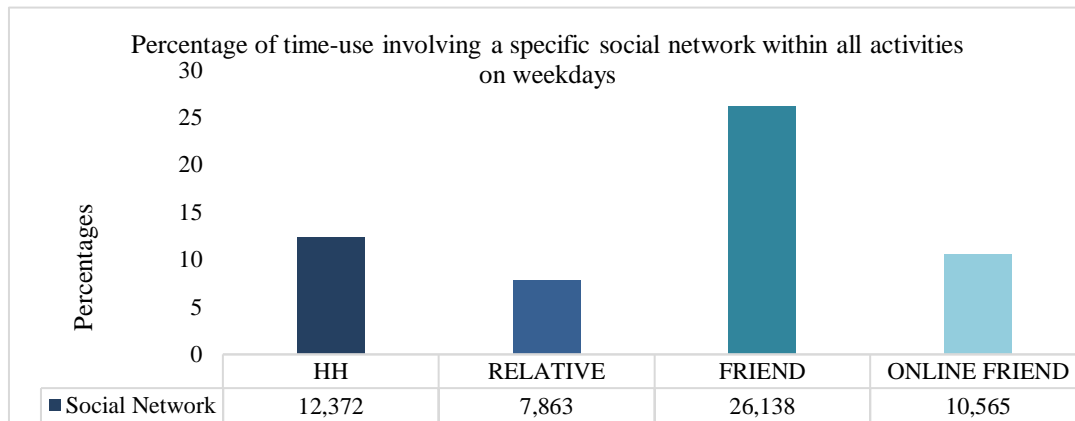


Figure 4.2 : Percentages of time use with social networks.

These insights significantly affect travel behaviour, transport planning, and urban planning. The substantial amount of time dedicated to friends suggests frequent social visits, which can shape travel patterns. Understanding these patterns is crucial for designing transport systems that effectively accommodate social travel needs. Transport planners should consider integrating more social spaces and enhancing internet connectivity in public transport to support physical and digital social interactions. For urban planners, the emphasis on friendships and online interactions points to more communal spaces such as parks, cafes, and recreational areas where people can meet friends. Additionally, given the significant role of online friendships, urban planning should prioritise robust digital infrastructure to facilitate seamless virtual interactions. By comprehensively understanding these dynamics, urban environments can be designed to be more liveable, socially inclusive, and responsive to the diverse social needs of the population [26], [75], [208], [227], [243].

4.2 Data Descriptive Analysis

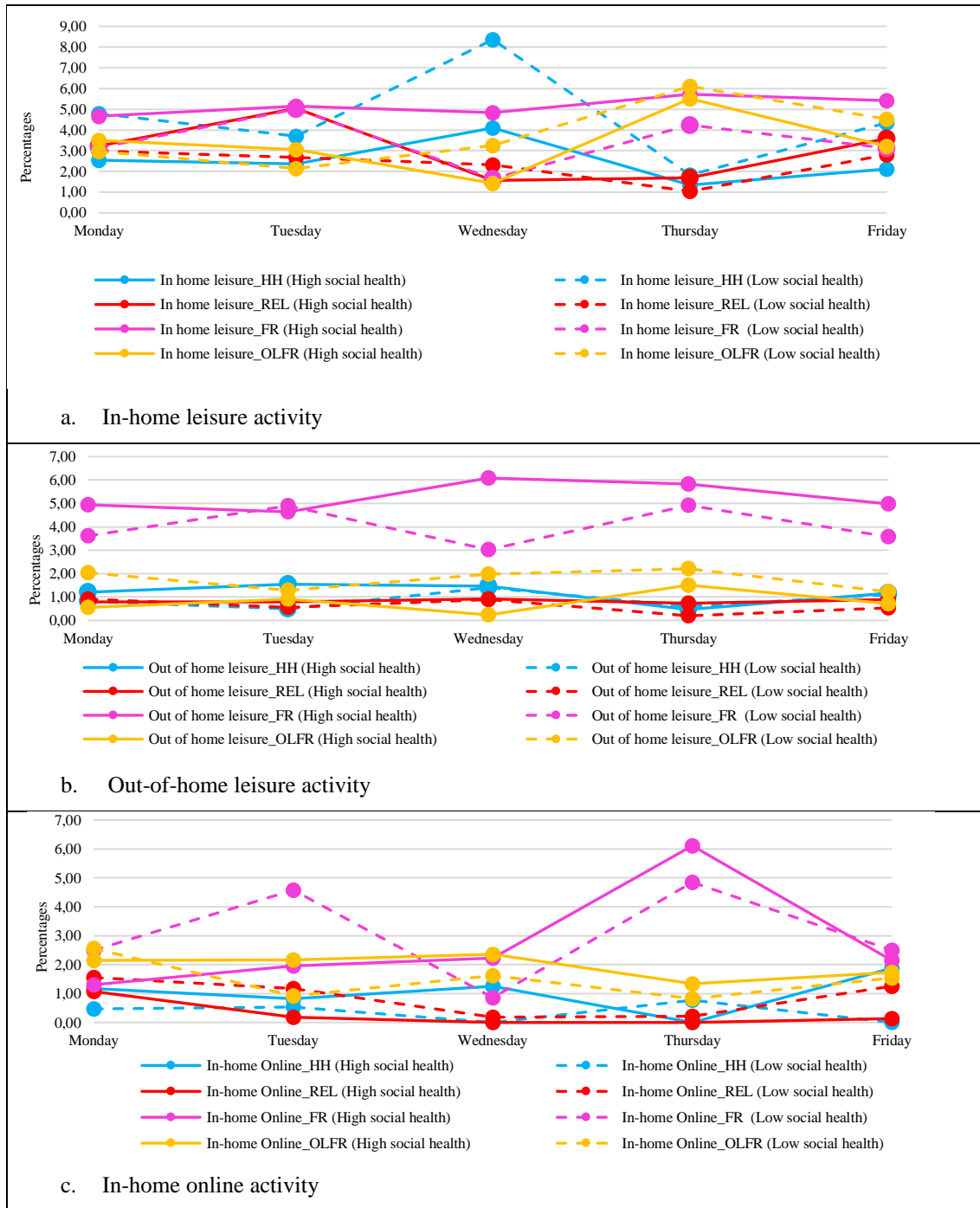
A descriptive analysis is prepared to show a bivariate analysis between socio-demographics and the effects of involvement in different social networks on social and mental health. Figure 4.3 shows how different socio-demographic variables correspond with different social and mental health conditions. It seems that financial security may make males, people from high-income households and those who are older than 45 years old have better mental health, as also argued by [259] and [21]. On the other hand, having more flexible time may result in females, those from low-income households and young adults having better social health. Flexible time might enable people to engage with others and tend to have more socialising time.



Figure 4.3: Social and mental health index by socio-demographics

Figures 4.4 and 4.5 show the effects of companionship within different social networks on high or low social or mental health. In both Figures 4.4 and 4.5, high social and mental health are indicated by a positive factor score (>0), whereas low social and mental health have a negative factor score (<0). In Figure 4, the results show that companionship with friends during in-home leisure, out-of-home leisure and out-of-home online activities corresponds with high social health. On the other hand, online activities at home and the involvement of online friends correspond with better social health as concerns mental health, similar to the results for social health, companionship with colleagues/friends during in-home leisure, out-of-home leisure and out-of-home

online activities as well as companionships with online friends during online activities tends to correspond with high mental health. The involvement of relatives within in-home and out-of-home leisure tends to lead to better mental health. Joint activities with other household members within out-of-home leisure and in-home online activities seem to correspond with better social and mental health.



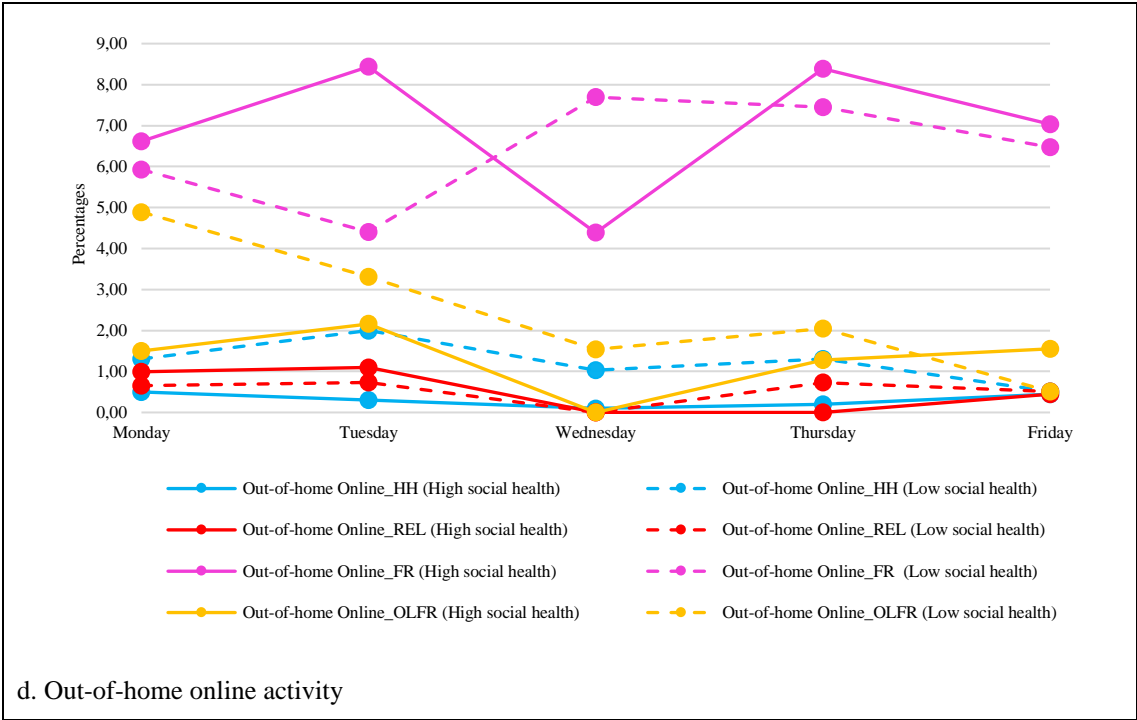
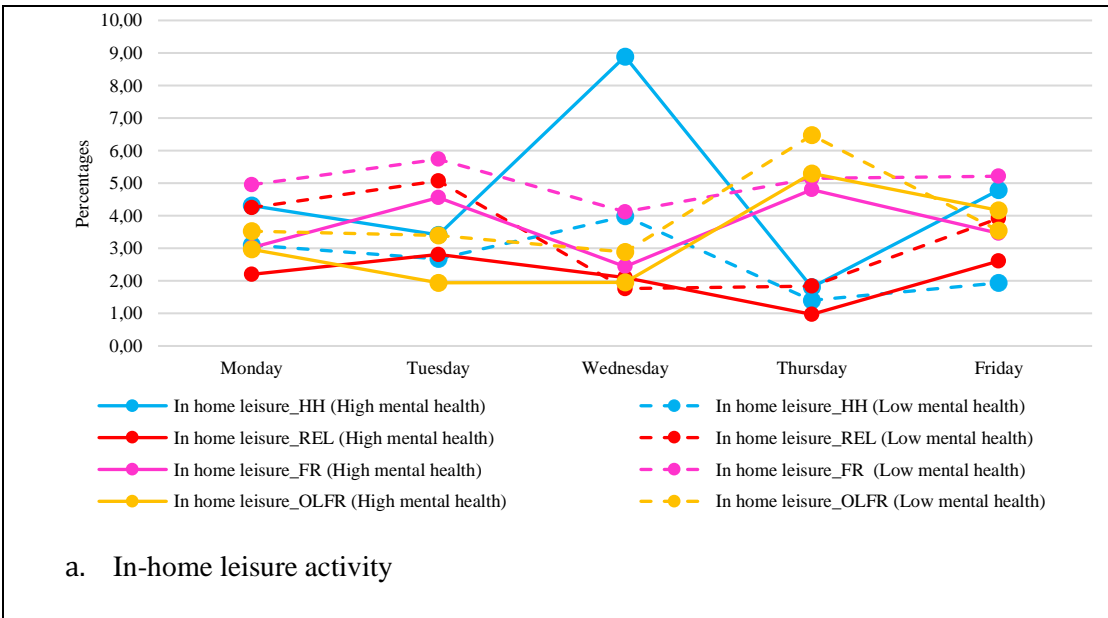


Figure 4.4: Percentages of involved others person for leisure activity and online activity based on people's social health.



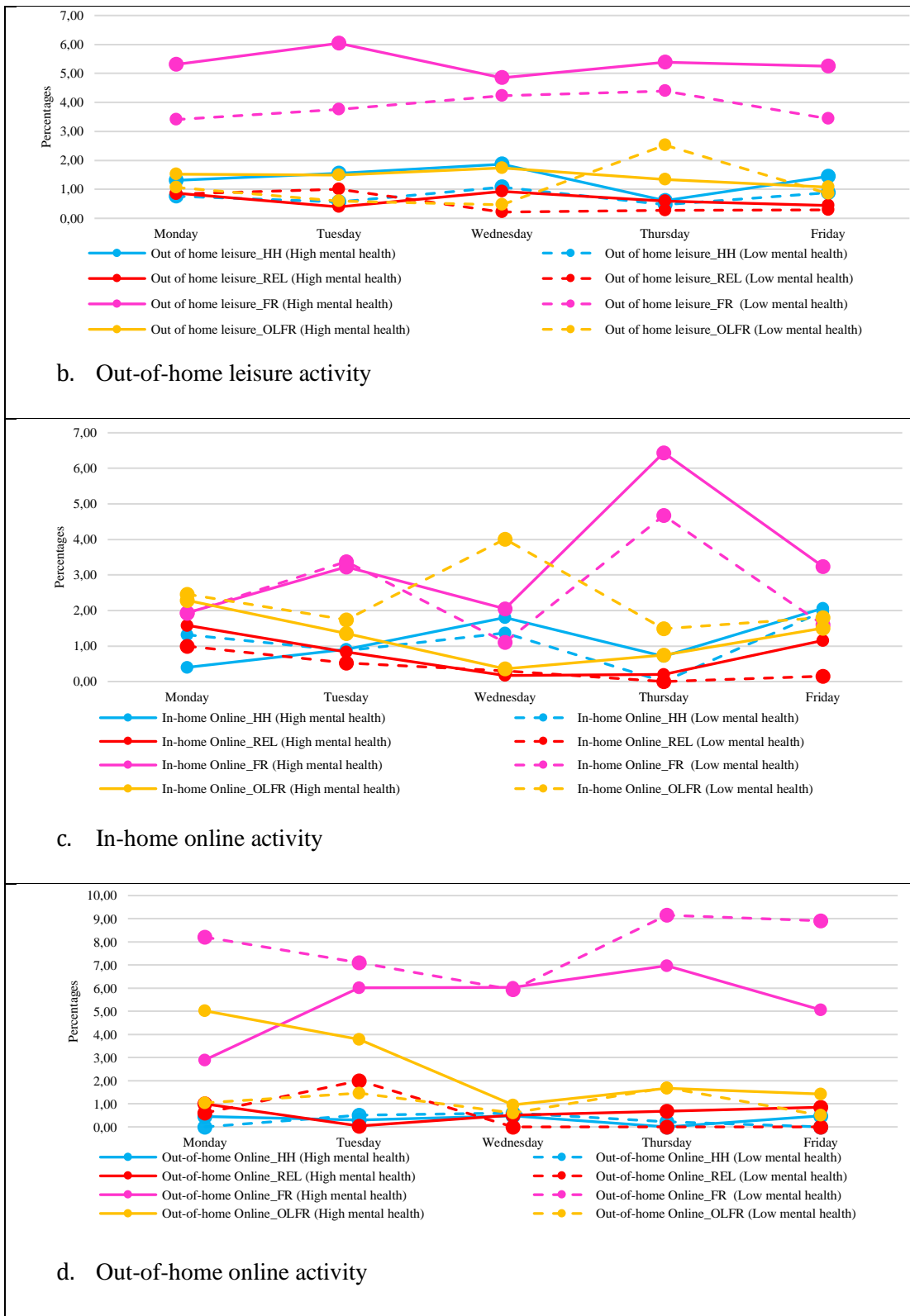


Figure 4.5: Percentages of involved others person for leisure activity and online activity based on people’s mental health.

Note Figure 4&5: HH = Households, REL= Relatives, FR= Friends, and OLFR= Online Friends.

4.3 Model Estimation Result

4.3.1 Random Slope Model

Table 4.9 shows the interactions among the observed variables, including socio-demographics, travel characteristics, activity time duration, and companionship within various social networks and different activities, as they affect social and mental health. The variances of different households are estimated here, rather than the variances of different individuals. This is because the effects of different individuals show insignificant impacts, which means that different households have significantly more different social and mental health results than different individuals. Different household nesting effects explain more about the heterogeneity of social and mental health than joint activities with other household members, relatives, close friends, and online friends. As expected, social and mental health is found to be significant for someone who engages in joint activities with other household members (0.035 for social health and 0.045 for mental health), with close friends (0.074 and 0.079) and with online friends (0.124 and 0.125). Those who jointly undertake activities with relatives show significant results on mental health (0.068) but insignificant results on social health.

The social and mental health covariances between the variances of different households and variances of joint activities with various social networks are negative. This indicates that the social and mental health results of different households show less variation when each household member is observed performing joint activities with various social networks. However, the social and mental health covariances between variances of involvement of other persons (do not specifically define the social network types when performing an activity or travel) and variances of involvement of a specific type of social networks (e.g., variance of the involvements household members or close friends only) show positive results. It means that defining the specific with whom people spend their daily activities and travels explains higher (or better) variances of social and mental health than not defining the social network type specifically.

Table 4.9: Model estimation result for mental and social health conditions (using standardised coefficients)

Variables	Social Health		Mental Health	
	Value	t-value	Value	t-value
(Intercept)	0.126	0.465	1.569	4.976
Socio-demographic				
Males	0.041	1.678	-	-
Females	Reference			
Young adults	-	-	-0.110	-2.083
At age 23-45	-	-	-	-
At age 46-55	-	-	-	-
Senior citizens (at age >55 years old)	Reference			
Low Income	-	-	-	-
Middle Income	-	-	-0.074	-2.181
High Income	Reference			
Workers	-	-	-	-
Students	0.108	2.199	0.154	3.310
Non-workers	Reference			
Number of dependent children within a household	-	-	0.404	3.074
Number of household members	-	-	-0.579	-4.124
Number of trips	-	-	-	-
Number of trip chains	-	-	-	-
Number of private vehicles	-	-	-0.537	-4.181
Percentage of travel parameters				
Non-motorised modes' travel time	0.072	2.287	-	-
Private vehicles' travel time	-	-	0.051	1.647
Public transport's travel time	-	-	-	-
CBRS travel time	0.041	1.846	0.042	2.034
MBRS travel time	-	-	-	-
Total daily travel time	-	-	-	-
Time-use Activity Diary				
In-home mandatory	-	-	0.056	2.229
Out-of-home mandatory	-	-	0.074	2.217
In-home leisure	-	-	0.070	2.503
Out-of-home leisure	-	-	0.062	2.670
In-home socialising	-	-	-	-
Out-of-home socialising and recreation	0.127	5.767	0.135	6.535
In-home maintenance	0.081	3.029	0.053	2.072
Grocery shopping	-0.059	-2.274	-	-
Out-of-home other maintenance	-0.059	-2.572	-	-
Sport	-0.057	-2.738	-0.061	-3.125
In-home online	-0.140	-5.522	-	-
Out-of-home online	-	-	-	-
Percentages of time use involving other people within a specific activity				

Variables	Social Health		Mental Health	
	Value	t-value	Value	t-value
Others-Mandatory In-Home	-	-	-	-
Others-Mandatory Out-of-Home	-0.093	-1.794	-0.142	-2.937
Others-Maintenance In-Home	-	-	-	-
Others-Maintenance Out-of-Home	0.112	2.753	0.117	3.015
Others-Leisure In-Home	-	-	-	-
Others-Leisure Out-of-Home	0.102	1.886	-	-
Others-Online In-home	-	-	-	-
Others-Online Out-of-home	-	-	-	-
Others-sport	-	-	-	-
Others-Travel	-	-	-	-
Percentages of time use involving other people within all activities (Monday-Friday)				
Percentages of time use involving other household members within a specific activity				
Others-Mandatory In-Home	-	-	-	-
Others-Mandatory Out-of-Home	-	-	-	-
Others-Maintenance In-Home	-	-	0.109	2.161
Others-Maintenance Out-of-Home	-0.078	-2.244	-0.087	-2.641
Others-Leisure In-Home	-	-	-	-
Others-Leisure Out-of-Home	-0.045	-1.673	-	-
Others-Online In-home	-0.076	-2.830	-0.074	-2.885
Others-Online Out-of-home	-	-	-	-
Others-sport	-	-	-	-
Others-Travel	0.065	2.117	0.049	1.693
Percentages of time use involving relatives within a specific activity				
Others-Mandatory In-Home	-	-	-	-
Others-Mandatory Out-of-Home	0.050	2.146	0.114	2.352
Others-Maintenance In-Home	-	-	-	-
Others-Maintenance Out-of-Home	-	-	-	-
Others-Leisure In-Home	-	-	-	-
Others-Leisure Out-of-Home	-	-	-	-
Others-Online In-home	0.041	1.811	-	-
Others-Online Out-of-home	-	-	-	-
Others-Travel	0.046	1.723	-	-
Percentages of time use involving friends in a specific activity				
Others-Mandatory In-Home	-	-	-	-
Others-Mandatory Out-of-Home	-	-	0.114	2.352
Others-Maintenance In-Home	-	-	-	-
Others-Maintenance Out-of-Home	-	-	-	-
Others-Leisure In-Home	-	-	-	-
Others-Leisure Out-of-Home	-	-	-	-
Others-Online In-home	-	-	-	-
Others-Online Out-of-home	-	-	-	-
Others-sport	-	-	-	-
Others-Travel	0.088	1.913	-	-

Variables	Social Health		Mental Health	
	Value	t-value	Value	t-value
Percentages of time use involving online friends within a specific activity				
Others-Mandatory In-Home	-	-	-	-
Others-Mandatory Out-of-Home	-	-	0.042	1.897
Others-Maintenance In-Home	-	-	-	-
Others-Maintenance Out-of-Home	-	-	-	-
Others-Leisure In-Home	-	-	-	-
Others-Leisure Out-of-Home	-	-	-	-
Others-Online In-home	-	-	-	-
Others-Online Out-of-home	-	-	-	-
Others-Travel	-	-	-	-
Percentages of time use involving other people within all activities (Monday-Friday)				
Percentages of time use involving other people within all activities				
Joint activities with household members	-0.142	-2.718	-	-
Joint activities with relatives	-	-	-	-
Joint activities with friends	-	-	0.052	1.898
Joint activities with online friends	-	-	-	-
Mean	0		0	
Std	1		1	
ε	0.680		0.629	
μ_0 (Variances between different households or household-specific error terms)	0.713		1.077	
μ_1 (Variances of the involvements of other household members within various activities)	0.035		0.045	
μ_2 (Variances of the involvements of relatives within various activities)	-		0.068	
μ_3 (Variances of the involvements of close friends within various activities)	0.074		0.079	
μ_4 (Variances of the involvements of online friends within various activities)	0.124		0.125	
Covariances between variances of different households and variances of the involvements of other household members within various activities	-0.420		-0.436	
Covariances between variances of different households and variances of the involvements of relatives within various activities	-		-0.518	
Covariances between variances of different households and variances of the involvements of close friends within various activities	-0.475		-0.128	
Covariances between variances of different households and variances of the involvements of other household members within various activities	-0.391		-0.385	
Covariances between variances of the involvements of other household members and variances of the involvements of relatives	-		0.994	
Covariances between variances of the involvements of other household members and variances of the involvements of close friends	0.972		0.677	

Variables	Social Health		Mental Health	
	Value	t-value	Value	t-value
Covariances between variances of the involvements of other household members and variances of the involvements of online friends	0.355		0.990	
Covariances between variances of the involvements of relatives and variances of the involvements of close friends	-		0.647	
Covariances between variances of the involvements of relatives and variances of the involvements of online friends	-		0.981	
Covariances between variances of the involvements of close friends and variances of the involvements of online friends	0.552		0.593	
AIC	4532.992		4380.514	
BIC	5059.452		4934.682	
Likelihood	-2171.500		-2090.26	

4.3.2 The effects of socio-demographics, travel, activity types and durations and companionship within different activities

Regarding socio-demographic variables, the relationship between gender and activity travel participation significantly influences transportation mode choice. Males have a social health index of 0.041 points higher than females, particularly those living in suburban and metropolitan areas who spend more time picking up and dropping off children due to limited access to private and public transportation services, reducing time for recreation and leisure [260]. However, there is no significant correlation between gender and mental health. Another study indicates that women, compared to men, are more likely to have shorter commute distances, chain trips, more non-work-related trips, travel during off-peak hours, and choose flexible transportation modes due to safety concerns [261]. Memory biases related to negative experiences in public transport may also deter women from using these services [262]–[264]. Daily travel and activity participation fulfils essential needs and desires, categorised into mandatory and discretionary activities [41], [45].

Financial conditions also correlate with mental and social health. [265]. Middle-income households have negative mental health indices, -0.074, and no correlation with the social health index, contrasting with some studies suggesting low-income households have better social health but no correlation with mental health. [25], [72], [163], [265]. Due to limited resources, individuals from low- and middle-income

households often rely on public transport, carpooling, or non-motorized modes, increasing social interaction during travel compared to high-income individuals who typically use private vehicles. Vehicle ownership, financial income, and license access significantly influence travel behaviour. High-income individuals often travel more and prefer living farther from workplaces, unlike low- and middle-income individuals who stay closer to reduce travel costs. Financial conditions determine activity type, companionship, duration, transportation mode, and location, impacting mental and social health variably. [266].

Similar to the results in the US [267] and Australia, [268] but different from the results in the UK, [269] gender shows insignificant results on mental health. However, similar to the results in the UK, [269] older people show better mental health conditions than young adults, as also shown by studies in Australia, [268] for older people who spend more time on work-related physical activities. Older people may be able to maximise their positive emotions during their life [259], [270], whereas young adults may have unemployment problems in the developing country context, particularly Indonesia. For males aged 23-45 and 46-55, there is a correlation with better social and mental health indices, whereas young adults (below 22 years old) have a lower mental health index of -0.110 compared to senior citizens (over 55 years old). It suggests that senior citizens suffering from mood disorders often report psychosomatic symptoms such as persistent aches, pains, cramps, or digestive problems that do not improve with treatment. These issues can lead to impairments in physical, mental, and social functioning, causing senior citizens to spend more time alone or with household members and have less social contact. Generally, senior citizens engage in out-of-home activities primarily when the activities are inherently social, such as attending religious services or parties. In contrast, younger people (below 22 years old) tend to engage in both in-home and out-of-home activities with others, regardless of the social nature of the activities [32], [271]. This reduced mobility among senior citizens can negatively impact their ability to participate in social relations and activities essential for fulfilling their daily needs and desires. Senior citizens take fewer trips, and the characteristics of these trips differ from those of younger individuals, leading to less time spent in out-of-home activities due to physical limitations. Interestingly, senior citizens generally exhibit better mental health compared to males aged below 22 years old (young age),

likely because they are retired and free from work-related activities and commuting, which can exacerbate mental health issues.

Having more dependent children positively correlates with mental health, whereas more household members show the opposite effect. A larger household size might correspond with caring for older people. Numerous studies have shown that providing care to older people is associated with more psychological distress [259], [272], [273] and limited time for social engagements with other social networks [274]. Different from the mental health results, gender and age significantly and insignificantly correlate with social health, respectively. Students might have more time and opportunities to engage with their social networks [23], which may be the reason why they have better social and mental health than workers and non-workers.

Additionally, owning more private vehicles is linked to lower mental health indices, -0.537. Households with children show the highest differential in total trip frequency compared to single/unmarried or married households without children and tend to report higher social health [36], [185]. This increased frequency is related to the presence of children, which boosts the rate of work/school, personal business, entertainment, and visiting trips, adult-oriented activities that promote higher activity rates. After marriage, individuals tend to focus more on their family, shifting travel behaviour from single to family patterns [275], [276]. It often includes dropping off children at school or daycare. Before marriage, people typically socialise more with friends, but their social lives change significantly after marriage.

Concerning the effects of travel mode, car-based ride-sourcing (CBRS) positively correlates with social and mental health. CBRS users tend to be travellers from high-income groups, as shown by results in developing [277] and developed countries [278]–[280]. In line with this result, the high-income group also has significantly better mental health than the middle-income group. In Indonesia, transportation is dominated by heavily subsidised motorised road transport, particularly motorcycles, compared to non-motorized modes and transport [185], [281]. The poor condition of public transport and transport networks, especially in suburban and greater areas, leads Indonesians to commonly use motorised modes for longer commuting trips [57]. The growing population has also led to an increase in the number of motorised vehicles. Since 1995, the number of cars and motorcycles has significantly increased in

Indonesia (World Bank, 2019), contributing to environmental issues such as pollution and traffic congestion, as well as road fatalities and stress during congestion [237].

Regarding the effects of activity type and duration, longer out-of-home socialising corresponds with positive social health. On the other hand, more time allocated for grocery shopping and other out-of-home maintenance might cause people to have less out-of-home socialising time, which negatively correlates with social health. Out-of-home socialising also has the highest positive effects on mental health. Moreover, mandatory and leisure activities performed either at home or out of the home also have positive effects with a lower magnitude than out-of-home socialising. Interestingly, sport negatively correlates with social and mental health, as also shown in Australia [268]. Solitary sports might reduce people's time to engage with their social networks.

Transit use is linked to increased levels of physical activity due to the requirement to walk or bike at the start and end of each journey; however, the effects vary by individual. [239]. Long-duration commuting, such as increasing the number of trips and trip chains, as well as traffic congestion, frequently leads to increased stress and decreased commuting satisfaction, ultimately affecting mental and social health indices negatively. [20], [85], [86], [141], [157], [158], [282]–[284]. Longer trips are associated with lower happiness and more stress; however, travelling with someone else can improve joy and meaning when compared to travelling alone. [26]. Contrarily, the study revealed no significant link between the number of journeys or the difficulty of the journey and mental health.

Spending more time with other people while working and studying negatively correlates with social and mental health. This is presumably because more time spent engaging with other people during working and studying time corresponds with longer working and studying times. However, this study confirms that visits during working or studying time by relatives or more engagements with relatives during working and studying time positively affect social and mental health. Working with close friends during working time also positively affects mental health. Spending time with others (or any social network) during out-of-home maintenance positively correlates with social and mental health. However, spending time with other household members

during out-of-home maintenance negatively affects social and mental health. It is presumably because people who spend time with other household members during out-of-home maintenance tend to have no opportunities to spend time with relatives or friends during their out-of-home time budget. Moreover, spending time with other household members during in-home online activities negatively correlates with social and mental health. However, the involvement of relatives during in-home online activities results in positive social health results. Travelling time with other household members, relatives, or close friends correlates positively with social health. Travelling with other household members also positively correlates with mental health.

Young people sometimes find travel stressful owing to financial constraints, inexperience, and a lack of control in travel decisions, mainly when using public transportation or travelling for school or work. [285] Meanwhile, middle-income people must choose between car ownership and public transportation, considering aspects like cost, convenience, and environmental impact, all of which can impact mental health. [286], [287] Furthermore, bigger families confront challenging travel issues, particularly with youngsters or older relatives. These can be stressful due to scheduling conflicts and addressing varied mobility needs. Reliance on cars can contribute to congestion and pollution, exacerbating these challenges. [25], [288] Improving mental health can be accomplished by creating cities with accessible, eco-friendly, and community-oriented places and efficient public transportation systems, emphasising the importance of including mental health in urban and transportation planning.

Out-of-home mandatory activities may not have a direct impact on health outcomes. This is primarily because people devote a significant chunk of their day, roughly one-third, to job or school responsibilities. These obligations limit opportunities for social involvement due to the physical limitation of being in numerous locations simultaneously, known as the coupling constraint. [25]. Meanwhile, interactions within certain social groups, such as family, friends, and internet connections, can substantially impact social and mental health. [26] Emphasised that journeys with family, particularly with children or friends, are more gratifying and enjoyable than solitary travel. The research findings show that geographical factors, distance, and accessibility all impact social engagement and well-being. These elements

are essential in influencing people's quality of life, with potential positive and negative consequences. Accordingly, [289] contends that the quality of social engagements considerably impacts individual subjective well-being. As a result, including another person in one's activities can improve one's quality of life, as the presence of another person often fosters increased social contact.

4.3.3 Engaging other people in activity-travel behaviour may contribute for Transport policy

By actively involving household members, relatives, friends, and online connections in discussions and decisions related to travel behaviour and activity participation, significant improvements can be realized across various urban and social life aspects [26], [141], [161], [163], [204]. This inclusive approach enriches the dataset for transportation planners and ensures that the resulting policies and solutions effectively cater to a broader range of community needs. Such involvement helps make public transportation systems more user-friendly and efficient, boosting usage rates and enhancing public satisfaction with urban transit options.

Additionally, this method of collaborative travel planning can lead to more environmentally sustainable practices. Encouraging groups to coordinate their travel reduces individual vehicle use, directly contributing to lower urban emissions and less traffic congestion [290]–[292]. This benefits the environment and improves the overall quality of urban living, making cities healthier places to reside. Socially, communal travel has profound benefits. It fosters a sense of community and belonging, as individuals sharing travel experiences will likely feel more connected [163], [293], [294]. It can be essential for populations that might otherwise feel isolated, such as senior citizens or those without personal transportation. Regular social interactions during travel can significantly enhance an individual's mental health, reducing the stress and anxiety of navigating complex city environments alone [26], [30], [295].

Economically, shared travel arrangements can lead to considerable cost savings, distributing expenses such as fuel and parking fees among multiple parties. More importantly, cities can develop more equitable transportation systems by democratizing

the transportation planning process and involving a broader cross-section of the population [32], [136], [271], [296]. These systems address the needs of the typical commuter and consider those of less visible groups, including the disabled and economically disadvantaged, ensuring everyone has reliable access to mobility. In sum, the collective involvement of a diverse group in travel planning and behaviour studies improves transportation and urban planning, enriches social interactions, and supports mental health, creating a more inclusive, healthy, and sustainable urban environment.

Activity travel participation involving other individuals, such as family members, friends, or colleagues, plays a significant role in shaping travel behaviour and has important implications for transportation policy and urban land use planning. When people coordinate their travel with others, their choices regarding mode of transport, travel time, and destination tend to shift based on collective needs and preferences. This behaviour encourages the development of transportation policies that support shared mobility options, flexible transit services, and infrastructure designed to accommodate group travel, such as family-friendly transit routes or carpooling incentives. From an urban planning perspective, the prevalence of socially coordinated travel highlights the need for mixed-use developments that integrate residential, commercial, and recreational functions within accessible distances. It also may promote the creation of community-focused public spaces and support the accessibility of urban areas for vulnerable populations like children and the elderly. Therefore, incorporating the social dimensions of travel into planning processes helps create more inclusive, efficient, and sustainable urban environments.

CHAPTER 5

CONCLUSION

Since the effects of other people or different types of social networks have been studied, particularly in developed countries, this study has shown that various social networks might correspond with varying results in developing countries. Beyond the effects of spatial situations or spatial constraints that many researchers have investigated, this study reveals that engaging with others is unnecessary to gain positive health results. Within different types of activities and different contexts, such as in developing countries, which have higher percentages of low-income households, too much time spent in engagements with other household members can worsen social and mental health. The magnitude of the effects of other household members' involvement in worsening social health seems to be greater than the effects of relatives in improving social health. These results might contradict the results from developed countries using life satisfaction (as argued by [14]) and travel experiences (as argued by [297]). As dependent variables, travelling might be indicated as an effort to spend more time out of home. This study revealed that, unlike other activities, travelling with different types of social networks (with other household members, relatives and close friends) shows positive results on social health. Travelling time with other household members also shows positive results on mental health.

Using advanced multivariate analysis, this study successfully investigated the combined effects of socio-demographic factors, travel characteristics, activity-travel participation, and companionship on social and mental health. In a developing country context like Indonesia, better social health outcomes are often associated with more frequent interactions beyond the household and increased time spent on travel and out-of-home activities. In developing country contexts such as Indonesia, better social health might be indicated by having more engagements with other people beyond household members and spending more time on travelling or out-of-home activities. However, more disposable income, more time for socialising and leisure activities and more engagements with close and online friends all seem to be able to gain favourable mental health conditions. Even though in-home online activities might be seen as a

solitary activity that reduces out-of-home socialising [15], [16], [160], involvement with relatives is found to turn the results into positive social health. As concerns the positive impacts of car-based ride-sourcing (CBRS) on social and mental health, this mode seems to increase the mobility of people from high-income households, as also argued by research in both developed [278], [279], [298] and developing countries [299]. The presence of household members, especially older people with disability, and having too many members in the household can impact social and mental health due to the demands on time and resources. Limited financial means can restrict parents' ability to outsource their obligations, reducing their opportunities for social interactions, which are crucial for well-being. However, the joy and fulfilment derived from family life can also offer significant emotional support. [32], [289].

Furthermore, through bivariate analysis, the study also identified how involvement in activity travel with different types of social networks, such as household members, relatives, friends, and online friends, influences social and mental health outcomes. From a policy perspective, understanding how individuals construct their daily activity travel patterns offers opportunities for targeted interventions. Policymakers can enhance social and mental health by shaping transportation policies that encourage specific travel modes, promote effective time use, and support inclusive land use planning.

The study has several limitations. Firstly, this research did not address the regulations and policies on private vehicles and motorised mode use in the Malang City Area. Secondly, there is a limitation for only taking samples on weekdays (Monday until Friday). Thirdly, for dependent children, we took between 7 - 14 years old. Fourthly, we only focus on the mental and social health index. From this limitation, future research may adopt a comprehensive approach to examine the effects of Malang City's transport policies on private vehicle and motorised transport use, focusing on outcomes like traffic congestion, air quality, and public health. Then, by extending data collection to include weekends, the study could capture varied travel behaviours linked to leisure and social activities, enriching the understanding of their health impacts. Moreover, broadening the participant age range would reveal age-specific responses to urban mobility, especially among children. Integrating a more comprehensive array of health metrics, including physical and environmental factors, could provide a holistic

perspective on how transport choices intersect with the urban environment and collective well-being.

Transport policies that encourage shared mobility such as carpooling, ride-sharing, and the development of community-focused public transit systems play a crucial role in enhancing both social and mental health. By prioritizing initiatives that bring people together during their daily commutes, these policies not only help reduce traffic congestion and environmental impact but also create valuable opportunities for social interaction. Regular engagement with fellow travellers can diminish feelings of isolation, foster community bonds, and alleviate the stress often associated with solitary travel. Moreover, transport policies that incentivize shared rides or community-based travel solutions contribute to a more resilient urban fabric, where improved mental health and enhanced social connectedness become integral to public health strategies.

In addition, including various social network types may raise another endogeneity problem that can be tackled in future research. Another endogeneity problem that can be solved in a future study is investigating the intercorrelated effects among joint activities with different social network types. Joint activities with household members in maintenance and leisure activities negatively affect social or mental health. However, performing joint activities can reduce or limit joint activities with other social networks, which may contribute to better social and mental health. Therefore, the intercorrelated effects of joint activities with various social network types seem worth investigating.

5.1 Summary of Novel

1. Influence of Travel on Social and Mental Health

- a. Traveling with different social networks (household members, relatives, and close friends) positively influences social and mental well-being.
- b. Allocating more time spent for out-of-home activities is linked to better social health.
- c. Car-based ride-sourcing (CBRS) enhances mobility and contributes to improved social and mental health, particularly for high-income individuals.

- d. Transportation policies should acknowledge that travel behaviour plays a crucial role in fostering social interactions and mental well-being.

2. Challenges in Mobility and Well-being

- a. Limited financial resources restrict travel opportunities, negatively affecting social interactions and mental health.
- b. Dependency on household members for transportation, especially in large households or those with elderly or disabled members, can limit mobility and social engagement.
- c. The inability to outsource caregiving responsibilities due to financial constraints reduces opportunities for social interactions, crucial for well-being.

3. Policy Recommendations for Sustainable Transport Planning

- a. Encouraging Shared Mobility: Promoting carpooling, ride-sharing, and community-based public transit can reduce congestion, enhance social interactions, and improve mental well-being.
- b. Expanding Affordable Public Transport: Ensuring accessible and affordable transit options can help low-income individuals engage in social activities outside their homes.
- c. Improving Non-Motorized Transport Infrastructure: Developing pedestrian-friendly environments and cycling infrastructure can encourage more out-of-home activities, positively impacting social health.
- d. Regulating Ride-Sourcing Services: Integrating CBRS into urban transport policies can maximize its social benefits while ensuring equitable access for all income groups.
- e. Designing Transport Policies for Inclusivity: Addressing mobility barriers for vulnerable groups (e.g., elderly, disabled individuals, and low-income households) can enhance their ability to travel and engage in social activities.

4. Future Research Directions in Transport Policy

- a. Assessing the effects of Malang City's transport policies on traffic congestion, air quality, and public health.
- b. Expanding data collection to weekends to understand travel behaviour related to leisure and social activities.
- c. Examining how transport policies can improve urban mobility while balancing social, environmental, and economic impacts.
- d. Investigating the intercorrelated effects of different travel behaviours on social and mental well-being across diverse social networks.

5. The contribution of this research to the environment

This study investigated the impact of social connections on travel engagement, promoting the advancement of more efficient, inclusive, and multimodal transportation systems that mitigate greenhouse gas emissions and urban air pollution. Additionally, it facilitates the amalgamation of land use and transportation planning, which may promote compact urban environments and pedestrian-friendly communities that minimise travel distances and improve access to public transit. From these insights, urban planners and policymakers can implement strategies that enhance mobility and well-being while adhering to global environmental goals, such as carbon neutrality, energy efficiency, and sustainable urban development, by the Sustainable Development Goals (SDGs).

REFERENCES

- [1] K. Ellegård, *Time geography in the global context: an anthology*. 2018. [Online]. Available: <http://liu.diva-portal.org/smash/get/diva2:1251648/FULLTEXT01.pdf><http://liu.diva-portal.org/smash/get/diva2:1251648/PREVIEW01.jpg><http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-151613>
- [2] C. Liu, Y. O. Susilo, and D. B. E. Dharmowijoyo, "Investigating intra-household interactions between individuals' time and space constraints," *J.*

Transp. Geogr., vol. 73, pp. 108–119, 2018, doi:
<https://doi.org/10.1016/j.jtrangeo.2018.10.015>.

- [3] T. Gärling, D. Ettema, and M. Friman, *Handbook of sustainable travel*. 2014. doi: 10.1007/978-94-007-7034-8.
- [4] M. Abou-Zeid and M. Ben-Akiva, “The effect of social comparisons on commute well-being,” *Transp. Res. Part A Policy Pract.*, vol. 45, no. 4, pp. 345–361, 2011, doi: 10.1016/j.tra.2011.01.011.
- [5] R. M. Pendyala, T. Yamamoto, and R. Kitamura, “On the formulation of time-space prisms to model constraints on personal activity-travel engagement,” *Transportation (Amst.)*, vol. 29, no. 1, pp. 73–94, 2002, doi: 10.1023/A:1012905110686.
- [6] F. N. Nkeki and M. O. Asikhia, “Geographically weighted logistic regression approach to explore the spatial variability in travel behaviour and built environment interactions: Accounting simultaneously for demographic and socioeconomic characteristics,” *Appl. Geogr.*, vol. 108, no. May, pp. 47–63, 2019, doi: 10.1016/j.apgeog.2019.05.008.
- [7] D. Wang and S. He, *Mobility, sociability and well-being of urban living*. 2015. doi: 10.1007/978-3-662-48184-4.
- [8] N. Vasudevan, N. Gore, R. Zope, S. Arkatkar, and G. Joshi, “Determining mode shift elasticity based on household income and travel cost,” *Res. Transp. Econ.*, no. November, p. 100771, 2019, doi: 10.1016/j.retrec.2019.100771.
- [9] J. A. Carrasco and E. J. Miller, “The social dimension in action: A multilevel, personal networks model of social activity frequency between individuals,” *Transp. Res. Part A Policy Pract.*, vol. 43, no. 1, pp. 90–104, 2009, doi: 10.1016/j.tra.2008.06.006.
- [10] J. A. Carrasco, B. Hogan, B. Wellman, and E. J. Miller, “Agency in social activity interactions: The role of social networks in time and space,” *Tijdschr.*

- voor *Econ. en Soc. Geogr.*, vol. 99, no. 5, pp. 562–583, 2008, doi: 10.1111/j.1467-9663.2008.00492.x.
- [11] R. Van den Berg and P. W. De Langen, “Environmental sustainability in container transport: the attitudes of shippers and forwarders,” *Int. J. Logist. Res. Appl.*, vol. 20, no. 2, pp. 146–162, 2017, doi: 10.1080/13675567.2016.1164838.
- [12] A. Delbosc and P. Mokhtarian, “Face to Facebook: The relationship between social media and social travel,” *Transp. Policy*, vol. 68, no. January 2017, pp. 20–27, 2018, doi: 10.1016/j.tranpol.2018.04.005.
- [13] J. A. Carrasco and B. Cid-Aguayo, “Network Capital, Social Networks, and Travel: An Empirical Illustration from Concepción, Chile,” *Environ. Plan. A Econ. Sp.*, vol. 44, no. 5, pp. 1066–1084, May 2012, doi: 10.1068/a43222.
- [14] T. Schwanen and D. Wang, “Well-Being, Context, and Everyday Activities in Space and Time,” *Ann. Assoc. Am. Geogr.*, vol. 104, no. 4, pp. 833–851, 2014, doi: 10.1080/00045608.2014.912549.
- [15] D. B. E. Dharmowijoyo, Y. O. Susilo, and T. B. Joewono, “Residential locations and health effects on multitasking behaviours and day experiences,” *Sustain.*, vol. 13, no. 20, pp. 1–21, 2021, doi: 10.3390/su132011347.
- [16] L. E. Tanjung *et al.*, “The impact of activity travel participation on the individual’s mental and social health,” *AIP Conf. Proc.*, vol. 2711, no. November 2022, 2023, doi: 10.1063/5.0136982.
- [17] K. W. Axhausen, “Social networks, mobility biographies, and travel: Survey challenges,” *Environ. Plan. B Plan. Des.*, vol. 35, no. 6, pp. 981–996, 2008, doi: 10.1068/b3316t.
- [18] Y. Suzukamo, S. Fukuhara, J. Green, M. Kosinski, B. Gandek, and J. E. Ware, “Validation testing of a three-component model of Short Form-36 scores,” *J. Clin. Epidemiol.*, vol. 64, no. 3, pp. 301–308, 2011, doi:

10.1016/j.jclinepi.2010.04.017.

- [19] B. van Wee and D. Ettema, “Travel behaviour and health: A conceptual model and research agenda,” *J. Transp. Heal.*, vol. 3, no. 3, pp. 240–248, 2016, doi: 10.1016/j.jth.2016.07.003.
- [20] D. B. E. Dharmowijoyo and T. B. Joewono, “Mobility and Health: The Interaction of Activity-Travel Patterns, Overall Well-Being, Transport-Related Social Exclusion on Health Parameters,” *Energy Effic. Mobil. Syst.*, pp. 53–83, 2020, doi: 10.1007/978-981-15-0102-9_4.
- [21] D. B. E. Dharmowijoyo, Y. O. Susilo, and I. Syabri, “Time use and spatial influence on transport-related social exclusion, and mental and social health,” *Travel Behav. Soc.*, vol. 21, no. April, pp. 24–36, 2020, doi: 10.1016/j.tbs.2020.05.006.
- [22] J. . Scanlan, A. . Bundy, and L. Matthews, “Investigating the Relationship between Meaningful time use and Health in 18- to 25-year-old Unemployed People in New South Wales, Australia.,” vol. 20, no. 21 January 2010, pp. 232–247, 2010, doi: 10.1002/casp.1035.
- [23] D. Ettema, T. Gärling, L. E. Olsson, and M. Friman, “Out-of-home activities, daily travel, and subjective well-being,” *Transp. Res. Part A Policy Pract.*, vol. 44, no. 9, pp. 723–732, 2010, doi: 10.1016/j.tra.2010.07.005.
- [24] J. H. Lee and K. G. Goulias, “Companionship and time investment in social fields at different life cycle stages: Implications for activity and travel modeling and simulation,” *Res. Transp. Econ.*, vol. 68, no. November 2016, pp. 18–28, 2018, doi: 10.1016/j.retrec.2017.01.003.
- [25] D. B. E. Dharmowijoyo, Y. O. Susilo, A. Karlström, and L. S. Adiredja, “Collecting a multi-dimensional three-weeks household time-use and activity diary in the Bandung Metropolitan Area, Indonesia,” *Transp. Res. Part A Policy Pract.*, vol. 80, pp. 231–246, 2015, doi: 10.1016/j.tra.2015.08.001.

- [26] J. Zhu and Y. Fan, “Daily travel behavior and emotional well-being: Effects of trip mode, duration, purpose, and companionship,” *Transp. Res. Part A Policy Pract.*, vol. 118, no. February 2017, pp. 360–373, 2018, doi: 10.1016/j.tra.2018.09.019.
- [27] M. Kroesen and J. De Vos, “Does active travel make people healthier, or are healthy people more inclined to travel actively?,” *J. Transp. Heal.*, vol. 16, no. October 2019, p. 100844, 2020, doi: 10.1016/j.jth.2020.100844.
- [28] Z. Xing and L. Huang, “The relationship between age and subjective well-being: Evidence from five capital cities in mainland china,” *Soc. Indic. Res.*, vol. 117, no. 3, pp. 743–756, 2014, doi: 10.1007/s11205-013-0396-6.
- [29] Public Health England, “Working Together to Promote Active Travel A briefing for local authorities Working Together to Promote Active Travel: A briefing for local authorities 2 About Public Health England,” pp. 1–33, 2016, [Online]. Available: www.gov.uk/phe%5Cnwww.gov.uk/phe
- [30] L. E. Tanjung, F. Yurnalis, P. Hartieni, D. B. E. Dharmowijoyo, A. Wicaksono, and D. San Santoso, “Does involving another person in day-to-day activity-travel participation affect social and mental health?,” *J. Transp. Heal.*, vol. 37, no. May, p. 101836, 2024, doi: 10.1016/j.jth.2024.101836.
- [31] A. Wicaksono, D. B. E. Dharmowijoyo, L. E. Tanjung, and Y. O. Susilo, “The reciprocal effects of physical activities and ride-sourcing on health,” *Int. J. Sustain. Transp.*, vol. 17, no. 6, pp. 1–19, 2023, doi: 10.1080/15568318.2023.2180787.
- [32] J. Kim, S. Rasouli, and H. J. P. Timmermans, “Social networks, social influence and activity-travel behaviour: a review of models and empirical evidence,” *Transp. Rev.*, vol. 38, no. 4, pp. 499–523, 2018, doi: 10.1080/01441647.2017.1351500.
- [33] J. Syahputri, D. B. E. Dharmowijoyo, T. Basuki Joewono, and M. Rizki, “Effect of travel satisfaction and heterogeneity of activity-travel patterns of

other persons in the household on social and mental health: The case of Bandung Metropolitan area,” *Case Stud. Transp. Policy*, vol. 10, no. 4, pp. 2111–2124, 2022, doi: 10.1016/j.cstp.2022.09.005.

- [34] J. Zhang, “Urban Forms and Health. Promotion: An Evaluation Based On Urban Forms And Health Health-Related Qol Indicators,” *Proceeding 13th World Conf. Transp. Res.*, pp. 1–20, 2013.
- [35] J. De Vos, T. Schwanen, V. van Acker, and F. Witlox, “Travel and Subjective Well-Being: A Focus on Findings, Methods and Future Research Needs,” *Transp. Rev.*, vol. 33, no. 4, pp. 421–442, 2013, doi: 10.1080/01441647.2013.815665.
- [36] Y. O. Susilo and C. Liu, “Examining the relationships between individual’s time use and activity participations with their health indicators,” *Eur. Transp. Res. Rev.*, vol. 9, no. 2, p. 26, 2017, doi: 10.1007/s12544-017-0243-y.
- [37] L. Liu, A. Porr, and H. J. Miller, “Realizable accessibility: evaluating the reliability of public transit accessibility using high-resolution real-time data,” *J. Geogr. Syst.*, vol. 25, no. 3, pp. 429–451, 2023, doi: 10.1007/s10109-022-00382-w.
- [38] C. Cavoli, N. Christie, J. Mindell, and H. Titheridge, “Linking transport, health and sustainability: Better data sets for better policy-making,” *J. Transp. Heal.*, vol. 2, no. 2, pp. 111–119, 2013, doi: 10.1016/j.jth.2014.08.001.
- [39] P. Rode *et al.*, “Accessibility in Cities: Transport and Urban Form BT - Disrupting Mobility: Impacts of Sharing Economy and Innovative Transportation on Cities,” G. Meyer and S. Shaheen, Eds. Cham: Springer International Publishing, 2017, pp. 239–273. doi: 10.1007/978-3-319-51602-8_15.
- [40] A. Justen, F. J. Martínez, and C. E. Cortés, “The use of space-time constraints for the selection of discretionary activity locations,” *J. Transp. Geogr.*, vol. 33, pp. 146–152, 2013, doi: 10.1016/j.jtrangeo.2013.10.009.

- [41] H. J. Miller, “Modelling accessibility using space-time prism concepts within geographical information systems,” *Int. J. Geogr. Inf. Syst.*, vol. 5, no. 3, pp. 287–301, 1991, doi: 10.1080/02693799108927856.
- [42] H. J. Miller, “Time Geography and Space-Time Prism,” *Int. Encycl. Geogr.*, pp. 1–19, 2017, doi: 10.1002/9781118786352.wbieg0431.
- [43] K. Lucas, J. Bates, J. Moore, and J. A. Carrasco, “Modelling the relationship between travel behaviours and social disadvantage,” *Transp. Res. Part A Policy Pract.*, vol. 85, pp. 157–173, 2016, doi: 10.1016/j.tra.2016.01.008.
- [44] T. Neutens, F. Witlox, N. Van De Weghe, and P. De Maeyer, “Human interaction spaces under uncertainty,” *Transp. Res. Rec.*, no. 2021, pp. 28–35, 2007, doi: 10.3141/2021-04.
- [45] T. Neutens, T. Schwanen, and F. Witlox, “The prism of everyday life: Towards a new research agenda for time geography,” *Transp. Rev.*, vol. 31, no. 1, pp. 25–47, 2011, doi: 10.1080/01441647.2010.484153.
- [46] T. Neutens, F. Witlox, N. Van De Weghe, and P. H. De Maeyer, “Space-time opportunities for multiple agents: A constraint-based approach,” *Int. J. Geogr. Inf. Sci.*, vol. 21, no. 10, pp. 1061–1076, 2007, doi: 10.1080/13658810601169873.
- [47] I. Cullen and V. Godson, “Urban networks: The structure of activity patterns,” *Prog. Plann.*, vol. 4, no. PART 1, pp. 1–96, 1975, doi: 10.1016/0305-9006(75)90006-9.
- [48] Y. Kanda, D. Akagi, and A. Taniguchi, “Can Promoting Use of Public Transportation Improve People’s Health? - Relationship Analysis Among Health, Lifestyle and Transportation Habit Considering Gender Difference,” *J. Transp. Heal.*, vol. 9, no. 2018, p. S58, 2018, doi: 10.1016/j.jth.2018.05.046.
- [49] R. Lovelace and J. Parkin, “Estimating the Determinants of Cycling: From Area to Road Network Levels,” *J. Transp. Heal.*, vol. 9, pp. S4–S5, 2018, doi:

10.1016/j.jth.2018.05.054.

- [50] Y. O. Susilo, C. Liu, and M. Börjesson, “The changes of activity-travel participation across gender, life-cycle, and generations in Sweden over 30 years,” *Transportation (Amst.)*, vol. 46, no. 3, pp. 793–818, 2019, doi: 10.1007/s11116-018-9868-5.
- [51] R. Zuckerman, “the Role of Public Transportation in Access To Care for,” 2016.
- [52] L. A. Merlin, “Accessibility, travel behavior, and urban form change,” *ProQuest Diss. Theses*, p. 174, 2014, [Online]. Available: <http://search.proquest.com.ezaccess.library.uitm.edu.my/docview/1548706931?accountid=42518>
- [53] E. Rind, N. Shortt, R. Mitchell, E. E. Richardson, and J. Pearce, “Are income-related differences in active travel associated with physical environmental characteristics? A multi-level ecological approach,” *Int. J. Behav. Nutr. Phys. Act.*, vol. 12, no. 1, pp. 1–10, 2015, doi: 10.1186/s12966-015-0217-1.
- [54] M. R. O. Beiler, G. Miller, and M. Brown, “Transportation and recreational infrastructure development: Transport and land use measures for public health comparisons,” *J. Urban Plan. Dev.*, vol. 144, no. 4, pp. 1–19, 2018, doi: 10.1061/(ASCE)UP.1943-5444.0000468.
- [55] K. Fransen, S. Farber, G. Deruyter, and P. De Maeyer, “A spatio-temporal accessibility measure for modelling activity participation in discretionary activities,” *Travel Behav. Soc.*, vol. 10, no. September 2017, pp. 10–20, 2018, doi: 10.1016/j.tbs.2017.09.002.
- [56] J. Schofield and R. Mitra, “Connecting Cycling to Transit : A Typology of Toronto Region Commuter Rail Passengers Toward Zero Road Death Vision Assessment the Role Auto-Dependency , Public Health , and Active Transportation Modes Case Study : How St . Louis , Missouri Is Mobilizing ,” *J. Transp. Heal.*, vol. 9, pp. S47–S48, 2018, doi: 10.1016/j.jth.2018.05.032.

- [57] A. Dharmowijoyo, D. B. E., Susilo, Y. O., & Karlström, “On complexity and variability of individuals’ discretionary activities,” *Transportation (Amst.)*, vol. 45, no. 1, pp. 177–204, 2018, doi: 10.1007/s11116-016-9731-5.
- [58] M. I. Ramli and D. E. Dharmowijoyo, “Activity-Travel Behaviour, and Daily and Global Well-Being,” *MATEC Web Conf.*, vol. 203, pp. 1–11, 2018, doi: 10.1051/mateconf/201820305004.
- [59] J. S. Mindell, “Transport and health around the world,” *J. Transp. Heal.*, vol. 4, pp. 1–3, 2017, doi: 10.1016/j.jth.2017.04.001.
- [60] Y. O. Susilo and R. Kitamura, “Analysis of day-to-day variability in an individual’s action space: Exploration of 6-week mobidrive travel diary data,” *Transp. Res. Rec.*, no. 1902, pp. 124–133, 2005, doi: 10.3141/1902-15.
- [61] L. Ramírez *et al.*, *Handbook of Leisure, Physical Activity, Sports, Recreation and Quality of Life*. 2018. doi: 10.1007/978-3-319-75529-8.
- [62] F. Takeda, H. Noguchi, T. Monma, and N. Tamiya, “How possibly do leisure and social activities impact mental health of middle-Aged adults in Japan?: An evidence from a national longitudinal survey,” *PLoS One*, vol. 10, no. 10, pp. 1–10, 2015, doi: 10.1371/journal.pone.0139777.
- [63] M. Langlois, R. A. Wasfi, N. A. Ross, and A. M. El-Geneidy, “Can transit-oriented developments help achieve the recommended weekly level of physical activity?,” *J. Transp. Heal.*, vol. 3, no. 2, pp. 181–190, 2016, doi: 10.1016/j.jth.2016.02.006.
- [64] J. Garrard, “Active transport: Adults : An overview of recent evidence ,” no. December, pp. 1–21, 2009, [Online]. Available: http://www.chpcp.org/resources/Active_Transport_Adults_FINAL.pdf
- [65] I. Avila-Palencia *et al.*, “The effects of transport mode use on self-perceived health, mental health, and social contact measures: A cross-sectional and longitudinal study,” *Environ. Int.*, vol. 120, no. June, pp. 199–206, 2018, doi:

10.1016/j.envint.2018.08.002.

- [66] J. Bridgman, “The Health Impact of Rural Transport Deprivation and Social Exclusion in the Older Population: A Systematic Literature Review,” *J. Transp. Heal.*, vol. 9, no. 2018, pp. S11–S12, 2018, doi: 10.1016/j.jth.2018.05.063.
- [67] L. Dahlberg and K. J. McKee, “Social exclusion and well-being among older adults in rural and urban areas,” *Arch. Gerontol. Geriatr.*, vol. 79, no. August, pp. 176–184, 2018, doi: 10.1016/j.archger.2018.08.007.
- [68] J. Pateman and J. Vincent, “Tackling Social Exclusion,” *Public Libr. Soc. Justice*, no. MAY, pp. 91–116, 2018, doi: 10.4324/9781315602905-5.
- [69] L. Cheng, X. Bi, X. Chen, and L. Li, “Travel Behavior of the Urban Low-income in China: Case Study of Huzhou City,” *Procedia - Soc. Behav. Sci.*, vol. 96, no. Cictp, pp. 231–242, 2013, doi: 10.1016/j.sbspro.2013.08.030.
- [70] P. Van den Berg, T. Arentze, and H. Timmermans, “A latent class accelerated hazard model of social activity duration,” *Transp. Res. Part A Policy Pract.*, vol. 46, no. 1, pp. 12–21, 2012, doi: 10.1016/j.tra.2011.09.015.
- [71] N. Atchessi, V. Ridde, S. Abimbola, and M. V. Zunzunegui, “Factors associated with the healthcare-seeking behaviour of older people in Nigeria,” *Arch. Gerontol. Geriatr.*, vol. 79, no. September 2016, pp. 1–7, 2018, doi: 10.1016/j.archger.2018.07.015.
- [72] K. Rowlingson, “Does income inequality cause health and social problems?,” *Joseph Rowntree Found.*, no. September, p. 51, 2011, [Online]. Available: <http://www.jrf.org.uk/sites/files/jrf/inequality-income-social-problems-full.pdf>
- [73] T. Hägerstrand, “WHAT ABOUT PEOPLE IN REGIONAL SCIENCE ? by Torsten H / igerstrand *,” *Pap. Reg. Sci.*, vol. 66, pp. 1–6, 1970, doi: 10.1111/j.1435-5597.1970.tb01464.x.

- [74] D. B. E. Dharmowijoyo, Y. O. Susilo, and A. Karlström, “Relationships among discretionary activity duration, its travel time spent and activity space indices in the Jakarta Metropolitan Area, Indonesia,” *J. Transp. Geogr.*, vol. 54, pp. 148–160, 2016, doi: 10.1016/j.jtrangeo.2016.05.012.
- [75] K. Mouratidis, D. Ettema, and P. Næss, “Urban form, travel behavior, and travel satisfaction,” *Transp. Res. Part A Policy Pract.*, vol. 129, no. October 2018, pp. 306–320, 2019, doi: 10.1016/j.tra.2019.09.002.
- [76] L. D. Frank, N. Iroz-Elardo, K. E. MacLeod, and A. Hong, “Pathways from built environment to health: A conceptual framework linking behavior and exposure-based impacts,” *J. Transp. Heal.*, vol. 12, no. November 2018, pp. 319–335, 2019, doi: 10.1016/j.jth.2018.11.008.
- [77] T. Neutens, M. Delafontaine, D. M. Scott, and P. De Maeyer, “An analysis of day-to-day variations in individual space-time accessibility,” *J. Transp. Geogr.*, vol. 23, pp. 81–91, 2012, doi: 10.1016/j.jtrangeo.2012.04.001.
- [78] T. Schwanen and P. L. Mokhtarian, “Attitudes toward travel and land use and choice of residential neighborhood type: Evidence from the San Francisco Bay Area,” *Hous. Policy Debate*, vol. 18, no. 1, pp. 171–207, 2007, doi: 10.1080/10511482.2007.9521598.
- [79] D. B. E. Dharmowijoyo, *7. The complexity and variability of individuals’ activity-travel patterns in Indonesia*. 2016. [Online]. Available: <https://www.diva-portal.org/smash/get/diva2:876744/FULLTEXT01.pdf>
- [80] I. Meloni, L. Guala, and A. Loddo, “Time allocation to discretionary in-home, out-of-home activities and to trips,” *Transportation (Amst.)*, vol. 31, no. 1, pp. 69–96, 2004, doi: 10.1023/B:PORT.00000007228.44861.ae.
- [81] D. Kahneman, A. B. Krueger, D. A. Schkade, N. Schwarz, and A. A. Stone, “A survey method for characterizing daily life experience: The day reconstruction method,” *Science (80-.)*, vol. 306, no. 5702, pp. 1776–1780, 2004, doi: 10.1126/science.1103572.

- [82] L. Liu, “Understanding the impact of built environment on travel behaviour with activity-based modelling : Evidence from Beijing,” no. September, 2017.
- [83] T. Feuillet *et al.*, “Built environment in local relation with walking: Why here and not there?,” *J. Transp. Heal.*, vol. 3, no. 4, pp. 500–512, 2016, doi: 10.1016/j.jth.2015.12.004.
- [84] N. M. Wells and G. A. Donofrio, *Urban Planning, the Natural Environment, and Public Health*, Second Edi., vol. 6. Elsevier, 2019. doi: 10.1016/b978-0-12-409548-9.11831-7.
- [85] M. Sweet, “Traffic Congestion’s Economic Impacts: Evidence from US Metropolitan Regions,” *Urban Stud.*, vol. 51, no. 10, pp. 2088–2110, 2014, doi: 10.1177/0042098013505883.
- [86] C. D. Higgins, M. N. Sweet, and P. S. Kanaroglou, “All minutes are not equal: travel time and the effects of congestion on commute satisfaction in Canadian cities,” *Transportation (Amst.)*, vol. 45, no. 5, pp. 1249–1268, 2018, doi: 10.1007/s11116-017-9766-2.
- [87] M. Dijst, “Two-earner families and their action spaces : A case study of two dutch communities Author (s): Martin Dijst Source : GeoJournal , Vol . 48 , No . 3 , Actors , activities , and the geographical scene . Studies Published by : Springer Stable URL : http:/,” vol. 48, no. 3, pp. 195–206, 2016.
- [88] M. Sheller and J. Urry, “The new mobilities paradigm,” *Environ. Plan. A*, vol. 38, no. 2, pp. 207–226, 2006, doi: 10.1068/a37268.
- [89] Y. Zahavi and A. Talvitie, “Regularities in Travel Time and Money Expenditures.,” *Transp. Res. Rec.*, no. 750, pp. 13–19, 1980.
- [90] C. Marchetti, “Anthropological invariants in travel behavior,” *Technol. Forecast. Soc. Change*, vol. 47, no. 1, pp. 75–88, 1994, doi: 10.1016/0040-1625(94)90041-8.

- [91] T. Schwanen, M. P. Kwan, and F. Ren, “How fixed is fixed? Gendered rigidity of space-time constraints and geographies of everyday activities,” *Geoforum*, vol. 39, no. 6, pp. 2109–2121, Nov. 2008, doi: 10.1016/j.geoforum.2008.09.002.
- [92] G. Akar, K. J. Clifton, and S. T. Doherty, “Discretionary activity location choice: In-home or out-of-home?,” *Transportation (Amst.)*, vol. 38, no. 1, pp. 101–122, 2011, doi: 10.1007/s11116-010-9293-x.
- [93] H. Kang and D. M. Scott, “Exploring day-to-day variability in time use for household members,” *Transp. Res. Part A Policy Pract.*, vol. 44, no. 8, pp. 609–619, 2010, doi: 10.1016/j.tra.2010.04.002.
- [94] Q. Liang, J. Weng, W. Zhou, S. B. Santamaria, J. Ma, and J. Rong, “Individual Travel Behavior Modeling of Public Transport Passenger Based on Graph Construction,” *J. Adv. Transp.*, vol. 2018, 2018, doi: 10.1155/2018/3859830.
- [95] K. Lucas, I. Phillips, C. Mulley, and L. Ma, “Is transport poverty socially or environmentally driven? Comparing the travel behaviours of two low-income populations living in central and peripheral locations in the same city,” *Transp. Res. Part A Policy Pract.*, vol. 116, no. August, pp. 622–634, 2018, doi: 10.1016/j.tra.2018.07.007.
- [96] M. Li, M. Zou, and H. Li, *Urban Travel Behavior Study Based on Data Fusion Model*. Elsevier Inc., 2019. doi: 10.1016/b978-0-12-817026-7.00005-9.
- [97] V. Van Acker, C. Mulley, and L. Ho, “Impact of childhood experiences on public transport travel behaviour,” *Transp. Res. Part A Policy Pract.*, vol. 130, no. October, pp. 783–798, 2019, doi: 10.1016/j.tra.2019.10.008.
- [98] T. H. Newsome, W. A. Walcott, and P. D. Smith, “Urban activity spaces: Illustrations and application of a conceptual model for integrating the time and space dimensions,” *Transportation (Amst.)*, vol. 25, no. 2–4, pp. 357–377, 1998, doi: 10.1023/A:1005082827030.

- [99] S. Darcy and P. F. Burke, “On the road again: The barriers and benefits of automobility for people with disability,” *Transp. Res. Part A Policy Pract.*, vol. 107, no. October 2017, pp. 229–245, 2018, doi: 10.1016/j.tra.2017.11.002.
- [100] B. B. Brown, C. M. Werner, C. P. Tribby, H. J. Miller, and K. R. Smith, “Transit use, physical activity, and body mass index changes: Objective measures associated with complete street light-rail construction,” *Am. J. Public Health*, vol. 105, no. 7, pp. 1468–1474, 2015, doi: 10.2105/AJPH.2015.302561.
- [101] K. Mouratidis, “Built environment and leisure satisfaction: The role of commute time, social interaction, and active travel,” *J. Transp. Geogr.*, vol. 80, no. August, p. 102491, 2019, doi: 10.1016/j.jtrangeo.2019.102491.
- [102] Y. Liu, Y. Zhang, S. T. Jin, and Y. Liu, “Spatial pattern of leisure activities among residents in Beijing, China: Exploring the impacts of urban environment,” *Sustain. Cities Soc.*, vol. 52, no. August 2019, p. 101806, 2020, doi: 10.1016/j.scs.2019.101806.
- [103] J. P. Gliebe and F. S. Koppelman, “Modeling household activity-travel interactions as parallel constrained choices,” *Transportation (Amst.)*, vol. 32, no. 5, pp. 449–471, 2005, doi: 10.1007/s11116-005-5328-0.
- [104] N. Schreuer, P. Plaut, L. Golan, and D. Sachs, “The relations between walkable neighbourhoods and active participation in daily activities of people with disabilities,” *J. Transp. Heal.*, vol. 15, no. May, pp. 1–10, 2019, doi: 10.1016/j.jth.2019.100630.
- [105] T. He, C. Huang, M. Li, Y. Zhou, and S. Li, “Social Participation of the Elderly in China: The Roles of Conventional Media, Digital Access and Social Media Engagement,” *Telemat. Informatics*, vol. 48, no. January, p. 101347, 2020, doi: 10.1016/j.tele.2020.101347.
- [106] F. Skarin, L. E. Olsson, M. Friman, and E. Wästlund, “Importance of motives, self-efficacy, social support and satisfaction with travel for behavior change

- during travel intervention programs,” *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 62, pp. 451–458, 2019, doi: 10.1016/j.trf.2019.02.002.
- [107] Y. Ding and H. Lu, “Activity participation as a mediating variable to analyze the effect of land use on travel behavior: A structural equation modeling approach,” *J. Transp. Geogr.*, vol. 52, pp. 23–28, 2016, doi: 10.1016/j.jtrangeo.2016.02.009.
- [108] P. G. Garcés and T. Ruiz, “Variations on the Activity-travel Scheduling Process After Participation in Travel Behavior Change Programs,” *Procedia - Soc. Behav. Sci.*, vol. 160, no. Cit, pp. 150–159, 2014, doi: 10.1016/j.sbspro.2014.12.126.
- [109] A. Simma and K. W. Axhausen, “Structures of commitment in mode use: A comparison of Switzerland, Germany and Great Britain,” *Transp. Policy*, vol. 8, no. 4, pp. 279–288, 2001, doi: 10.1016/S0967-070X(01)00023-3.
- [110] R. Rafiq and M. G. McNally, “Modeling the Structural Relationships of Activity-Travel Participation of Working Women,” *Transp. Res. Rec.*, vol. 2672, no. 47, pp. 81–91, 2018, doi: 10.1177/0361198118784135.
- [111] N. J. Newton, J. Pladevall-Guyer, R. Gonzalez, and J. Smith, “Activity Engagement and Activity-Related Experiences: The Role of Personality,” *Journals Gerontol. - Ser. B Psychol. Sci. Soc. Sci.*, vol. 73, no. 8, pp. 1480–1490, 2018, doi: 10.1093/geronb/gbw098.
- [112] P. A. Amoah, “Social participation, health literacy, and health and well-being: A cross-sectional study in Ghana,” *SSM - Popul. Heal.*, vol. 4, no. November 2017, pp. 263–270, 2018, doi: 10.1016/j.ssmph.2018.02.005.
- [113] M. Henderson, S. Y. Cheung, E. Sharland, and J. Scourfield, “The effect of social work use on the mental health outcomes of parents and the life satisfaction of children in Britain,” *Child. Youth Serv. Rev.*, vol. 58, pp. 71–81, 2015, doi: 10.1016/j.childyouth.2015.09.007.

- [114] Y. Lee and W. J. Jean Yeung, “Gender matters: Productive social engagement and the subsequent cognitive changes among older adults,” *Soc. Sci. Med.*, vol. 229, no. August 2018, pp. 87–95, 2019, doi: 10.1016/j.socscimed.2018.08.024.
- [115] D. M. Carpenter *et al.*, “The Relationship Between Social Support, Social Constraint, and Psychological Adjustment for Patients with Rare Autoimmune Disease,” *Curr. Rheumatol. Rev.*, vol. 12, no. 3, pp. 232–238, 2016, doi: 10.2174/1573397112666160719163145.
- [116] M. T. Hyypä and J. Mäki, “Social participation and health in a community rich in stock of social capital,” *Health Educ. Res.*, vol. 18, no. 6, pp. 770–779, 2003, doi: 10.1093/her/cyf044.
- [117] J. Hwang, S. Park, and S. Kim, “Effects of participation in social activities on cognitive function among middle-aged and older adults in Korea,” *Int. J. Environ. Res. Public Health*, vol. 15, no. 10, 2018, doi: 10.3390/ijerph15102315.
- [118] M. F. Steger and T. B. Kashdan, “Depression and Everyday Social Activity, Belonging, and Well-Being,” *J. Couns. Psychol.*, vol. 56, no. 2, pp. 289–300, 2009, doi: 10.1037/a0015416.
- [119] F. J. Carod-Artal, “Social determinants of mental health,” *Glob. Ment. Heal. Prev. Promot.*, pp. 33–46, 2017, doi: 10.1007/978-3-319-59123-0_4.
- [120] D. Umberson and J. Karas Montez, “Social Relationships and Health: A Flashpoint for Health Policy,” *J. Health Soc. Behav.*, vol. 51, no. 1_suppl, pp. S54–S66, 2010, doi: 10.1177/0022146510383501.
- [121] C. J. Greaves and L. Farbus, “Effects of creative and social activity on the health and well-being of socially isolated older people: Outcomes from a multi-method observational study,” *J. R. Soc. Promot. Health*, vol. 126, no. 3, pp. 134–142, 2006, doi: 10.1177/1466424006064303.
- [122] T. Lin, D. Wang, and M. Zhou, “Residential relocation and changes in travel

- behavior: what is the role of social context change?," *Transp. Res. Part A Policy Pract.*, vol. 111, no. March, pp. 360–374, 2018, doi: 10.1016/j.tra.2018.03.015.
- [123] D. Wang and T. Lin, "Built environments, social environments, and activity-travel behavior: A case study of Hong Kong," *J. Transp. Geogr.*, vol. 31, pp. 286–295, 2013, doi: 10.1016/j.jtrangeo.2013.04.012.
- [124] L. F. Berkman, T. Glass, I. Brissette, and T. E. Seeman, "Social Science & Medicine From social integration to health : Durkheim in the new," vol. 51, no. 1, 2000, doi: 10.1016/S0277-Get.
- [125] M. E. Kelly *et al.*, "The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: A systematic review," *Syst. Rev.*, vol. 6, no. 1, 2017, doi: 10.1186/s13643-017-0632-2.
- [126] M. A. Niedzielski and R. Kucharski, "Impact of commuting, time budgets, and activity durations on modal disparity in accessibility to supermarkets," *Transp. Res. Part D Transp. Environ.*, vol. 75, no. August, pp. 106–120, 2019, doi: 10.1016/j.trd.2019.08.021.
- [127] P. van den Berg, T. Arentze, and H. Timmermans, "A path analysis of social networks, telecommunication and social activity-travel patterns," *Transp. Res. Part C Emerg. Technol.*, vol. 26, pp. 256–268, 2013, doi: 10.1016/j.trc.2012.10.002.
- [128] S. Y. He, Y. H. Y. Cheung, and S. Tao, "Travel mobility and social participation among older people in a transit metropolis: A socio-spatial-temporal perspective," *Transp. Res. Part A Policy Pract.*, vol. 118, no. December 2017, pp. 608–626, 2018, doi: 10.1016/j.tra.2018.09.006.
- [129] W. L. Zijlema *et al.*, "Active commuting through natural environments is associated with better mental health: Results from the PHENOTYPE project," *Environ. Int.*, vol. 121, no. October, pp. 721–727, 2018, doi:

10.1016/j.envint.2018.10.002.

- [130] H. K. Park, S. Y. Chun, Y. Choi, S. Y. Lee, S. J. Kim, and E. C. Park, “Effects of social activity on health-related quality of life according to age and gender: An observational study,” *Health Qual. Life Outcomes*, vol. 13, no. 1, pp. 1–9, 2015, doi: 10.1186/s12955-015-0331-4.
- [131] E. M. Vogelsang, “Older adult social participation and its relationship with health: Rural-urban differences,” *Heal. Place*, vol. 42, no. October, pp. 111–119, 2016, doi: 10.1016/j.healthplace.2016.09.010.
- [132] K. B. Adams, S. Leibbrandt, and H. Moon, “A critical review of the literature on social and leisure activity and wellbeing in later life,” *Ageing Soc.*, vol. 31, no. 4, pp. 683–712, 2011, doi: 10.1017/S0144686X10001091.
- [133] M. Hendryx, C. A. Green, and N. A. Perrin, “Social support, activities, and recovery from serious mental illness: STARS study findings,” *J. Behav. Heal. Serv. Res.*, vol. 36, no. 3, pp. 320–329, 2009, doi: 10.1007/s11414-008-9151-1.
- [134] R. M. Gyasi, D. R. Phillips, and K. Abass, “Social support networks and psychological wellbeing in community-dwelling older Ghanaian cohorts,” *Int. Psychogeriatrics*, vol. 31, no. 7, pp. 1047–1057, 2019, doi: 10.1017/S1041610218001539.
- [135] A. Milner, L. Krnjacki, P. Butterworth, and A. D. LaMontagne, “The role of social support in protecting mental health when employed and unemployed: A longitudinal fixed-effects analysis using 12 annual waves of the HILDA cohort,” *Soc. Sci. Med.*, vol. 153, pp. 20–26, 2016, doi: 10.1016/j.socscimed.2016.01.050.
- [136] K. Tomioka, N. Kurumatani, and H. Hosoi, “Positive and negative influences of social participation on physical and mental health among community-dwelling elderly aged 65-70 years: a cross-sectional study in Japan,” *BMC Geriatr.*, vol. 17, no. 1, pp. 1–13, 2017, doi: 10.1186/s12877-017-0502-8.

- [137] R. F. Hunter *et al.*, “Environmental, health, wellbeing, social and equity effects of urban green space interventions: A meta-narrative evidence synthesis,” *Environ. Int.*, vol. 130, no. December 2018, p. 104923, 2019, doi: 10.1016/j.envint.2019.104923.
- [138] A. Papagiannakis, I. Baraklianos, and A. Spyridonidou, “Urban travel behaviour and household income in times of economic crisis: Challenges and perspectives for sustainable mobility,” *Transp. Policy*, vol. 65, no. February 2016, pp. 51–60, 2018, doi: 10.1016/j.tranpol.2016.12.006.
- [139] N. S. Baron, “Adjusting the Volume: Technology and Multitasking in Discourse Control,” *Handb. Mob. Commun. Stud.*, no. 1979, pp. 177–194, 2013, doi: 10.7551/mitpress/9780262113120.003.0014.
- [140] S. Rasouli and H. Timmermans, “Judgments of travel experiences, activity envelopes, trip features and multi-tasking: A panel effects regression model specification,” *Transp. Res. Part A Policy Pract.*, vol. 63, pp. 67–75, 2014, doi: 10.1016/j.tra.2014.02.012.
- [141] J. De Vos, “Satisfaction-induced travel behaviour,” *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 63, pp. 12–21, 2019, doi: 10.1016/j.trf.2019.03.001.
- [142] Y. C. Chiu *et al.*, “The mediating effects of leisure engagement on relationships between caregiving stress and subjective wellbeing among family caregivers of persons with cognitive impairment: A cross-sectional study,” *Geriatr. Nurs. (Minneap)*, vol. 000, pp. 1–8, 2019, doi: 10.1016/j.gerinurse.2019.08.017.
- [143] F. Lederbogen *et al.*, “City living and urban upbringing affect neural social stress processing in humans,” *Nature*, vol. 474, no. 7352, pp. 498–501, 2011, doi: 10.1038/nature10190.
- [144] O. Gruebner, M. A. Rapp, M. Adli, U. Kluge, S. Galea, and A. Heinz, “Cities and mental health,” *Dtsch. Arztebl. Int.*, vol. 114, no. 8, pp. 121–127, 2017, doi: 10.3238/arztebl.2017.0121.

- [145] J. De Vos and F. Witlox, “Do people live in urban neighbourhoods because they do not like to travel? Analysing an alternative residential self-selection hypothesis,” *Travel Behav. Soc.*, vol. 4, pp. 29–39, 2016, doi: 10.1016/j.tbs.2015.12.002.
- [146] P. Daniel Harris, BA, Lynn McNicoll, MD, Gary Epstein-Lubow, MD, and Kali S. Thomas, Woalder, M. S. Lener, and Woalder, “乳鼠心肌提取 HHS Public Access,” *Physiol. Behav.*, vol. 176, no. 1, pp. 139–148, 2017, doi: 10.1016/j.physbeh.2017.03.040.
- [147] World Health Organization, “WHO Remains Firmly Committed to The Principles Set Out In The Preamble to The Constitution,” *World Health Organization*, 1946.
<https://www.who.int/about/governance/constitution#:~:text=Health is a state of,absence of disease or infirmity>.
- [148] J. Zhang, *Life-Oriented Behavioral Research for Urban Policy*. 2017. doi: 10.1007/978-4-431-56472-0.
- [149] P. J. Chang, L. Wray, and Y. Lin, “Social relationships, leisure activity, and health in older adults,” *Heal. Psychol.*, vol. 33, no. 6, pp. 516–523, 2014, doi: 10.1037/hea0000051.
- [150] J. J. de Hartog, H. Boogaard, H. Nijland, and G. Hoek, “Do the health benefits of cycling outweigh the risks?,” *Environ. Health Perspect.*, vol. 118, no. 8, pp. 1109–1116, 2010, doi: 10.1289/ehp.0901747.
- [151] A. De Nazelle *et al.*, “Improving health through policies that promote active travel: A review of evidence to support integrated health impact assessment,” *Environ. Int.*, vol. 37, no. 4, pp. 766–777, 2011, doi: 10.1016/j.envint.2011.02.003.
- [152] A. C. Lindsay, M. L. Greaney, S. F. Wallington, T. Mesa, and C. F. Salas, “A review of early influences on physical activity and sedentary behaviors of preschool-age children in high-income countries,” *J. Spec. Pediatr. Nurs.*, vol.

- 22, no. 3, 2017, doi: 10.1111/jspn.12182.
- [153] A. Samimi, A. (Kouros) Mohammadian, and S. Madanizadeh, “Effects of transportation and built environment on general health and obesity,” *Transp. Res. Part D Transp. Environ.*, vol. 14, no. 1, pp. 67–71, 2009, doi: 10.1016/j.trd.2008.10.002.
- [154] D. C. Parra *et al.*, “Household motor vehicle use and weight status among Colombian adults: Are we driving our way towards obesity?,” *Prev. Med. (Baltim.)*, vol. 49, no. 2–3, pp. 179–183, 2009, doi: 10.1016/j.ypmed.2009.07.010.
- [155] A. C. Bell, K. Ge, and B. M. Popkin, “The road to obesity or the path to prevention: Motorized transportation and obesity in China,” *Obes. Res.*, vol. 10, no. 4, pp. 277–283, 2002, doi: 10.1038/oby.2002.38.
- [156] E. Berglund, P. Lytsy, and R. Westerling, “Active traveling and its associations with self-rated health, BMI and physical activity: A comparative study in the adult Swedish population,” *Int. J. Environ. Res. Public Health*, vol. 13, no. 5, 2016, doi: 10.3390/ijerph13050455.
- [157] W. J. Requia, C. D. Higgins, M. D. Adams, M. Mohamed, and P. Koutrakis, “The health impacts of weekday traffic: A health risk assessment of PM2.5 emissions during congested periods,” *Environ. Int.*, vol. 111, no. October 2017, pp. 164–176, 2018, doi: 10.1016/j.envint.2017.11.025.
- [158] R. E. Wener and G. W. Evans, “Comparing stress of car and train commuters,” *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 14, no. 2, pp. 111–116, 2011, doi: 10.1016/j.trf.2010.11.008.
- [159] M. Fisher and F. Baum, “The social determinants of mental health: Implications for research and health promotion,” *Aust. N. Z. J. Psychiatry*, vol. 44, no. 12, pp. 1057–1063, 2010, doi: 10.3109/00048674.2010.509311.
- [160] J. Hong, K. Sila-Nowicka, and D. P. McArthur, “Is the popularity of social

networking services beneficial for public health? Focusing on active travel and BMI,” *J. Transp. Heal.*, vol. 11, no. September, pp. 183–192, 2018, doi: 10.1016/j.jth.2018.09.003.

- [161] I. M. Sukmayasa, “Satisfaction with travel scale before and after implementing new improvement: study case Karlstadsbuss,” pp. 1–64, 2014.
- [162] P. Næss, “Residential location, transport rationales and daily-life travel behaviour: The case of hangzhou metropolitan area, China,” *Prog. Plann.*, vol. 79, no. 1, pp. 1–50, 2013, doi: 10.1016/j.progress.2012.05.001.
- [163] W. Du, J. Zhou, J. Liu, X. Yang, H. Wang, and M. He, “Social-Demographic Correlates of the Mental Health Conditions among the Chinese Elderly,” pp. 1–13.
- [164] X. Cheng, R. Long, H. Chen, and J. Yang, “Does social interaction have an impact on residents’ sustainable lifestyle decisions? A multi-agent stimulation based on regret and game theory,” *Appl. Energy*, vol. 251, no. January, p. 113366, 2019, doi: 10.1016/j.apenergy.2019.113366.
- [165] K. Tomioka, N. Kurumatani, and K. Saeki, “The differential effects of type and frequency of social participation on IADL declines of older people,” *PLoS One*, vol. 13, no. 11, pp. 1–17, 2018, doi: 10.1371/journal.pone.0207426.
- [166] M. Garcia-Sierra, “Travel behaviour and environmental-transport policy: Theory and empirical studies,” no. September 2014, p. 218, 2014.
- [167] G. Ren, T. Zhang, L. Xu, and Y. Yang, “Transportation demands of low-mobility individuals: Case study in Wenling, China,” *J. Urban Plan. Dev.*, vol. 144, no. 4, pp. 1–12, 2018, doi: 10.1061/(ASCE)UP.1943-5444.0000487.
- [168] S. Chang and H. J. Gibson, “The relationships between four concepts (involvement, commitment, loyalty, and habit) and consistency in behavior across leisure and tourism,” *Tour. Manag. Perspect.*, vol. 13, pp. 41–50, 2015, doi: 10.1016/j.tmp.2014.11.003.

- [169] V. Van Acker and F. Witlox, “Why land use patterns affect travel behaviour (or not) Toward a «state-of-the-art conceptual framework and an appropriate modelling technique,” *Belgeo*, no. 1, pp. 5–26, 2009, doi: 10.4000/belgeo.8777.
- [170] Y. Chen, X. Li, and S. Zhang, “Structured Latent Factor Analysis for Large-scale Data: Identifiability, Estimability, and Their Implications,” *J. Am. Stat. Assoc.*, vol. 115, no. 532, pp. 1756–1770, 2020, doi: 10.1080/01621459.2019.1635485.
- [171] S. Abraham, B. A. Mir, H. Suhara, F. A. Mohamed, and M. Sato, “Structural equation modeling and confirmatory factor analysis of social media use and education,” *Int. J. Educ. Technol. High. Educ.*, vol. 16, no. 1, 2019, doi: 10.1186/s41239-019-0157-y.
- [172] M. Tavakol and A. Wetzel, “Factor Analysis: a means for theory and instrument development in support of construct validity,” *Int. J. Med. Educ.*, vol. 11, pp. 245–247, 2020, doi: 10.5116/ijme.5f96.0f4a.
- [173] R. Maskey, J. Fei, and H. O. Nguyen, “Use of exploratory factor analysis in maritime research,” *Asian J. Shipp. Logist.*, vol. 34, no. 2, pp. 91–111, 2018, doi: 10.1016/j.ajsl.2018.06.006.
- [174] T. Theodoridis and J. Kraemer, *Factor Analysis, Classic Edition (2nd ed)*, 2nd ed. New York, NY, US: Taylor & Francis, 2014. doi: <https://doi.org/10.4324/9781315735740>.
- [175] J. F. Hair, W. C. Black, B. J. Babin, R. E. Anderson, W. C. Black, and R. E. Anderson, *Multivariate Data Analysis*. 2018. doi: 10.1002/9781119409137.ch4.
- [176] B. G. Tabachnick and L. S. Fidell, *Using multivariate statistics*, 5th ed. Boston SE - xxviii, 980 pages : illustrations ; 25 cm: Pearson/Allyn & Bacon Boston, 2007. doi: LK - <https://worldcat.org/title/62766132>.
- [177] H. J. Kim, “Common factor analysis versus principal component analysis:

- Choice for symptom cluster research,” *Asian Nurs. Res. (Korean. Soc. Nurs. Sci.)*, vol. 2, no. 1, pp. 17–24, 2008, doi: 10.1016/S1976-1317(08)60025-0.
- [178] J. Yang, Y. Ma, M. Mao, P. Zhang, and H. Gao, “Application of regression model combined with computer technology in the construction of early warning model of sepsis infection in children,” *J. Infect. Public Health*, vol. 13, no. 2, pp. 253–259, 2020, doi: 10.1016/j.jiph.2019.11.012.
- [179] Y. Yang, L. Sun, and C. Guo, “Aero-material consumption prediction based on linear regression model,” *Procedia Comput. Sci.*, vol. 131, pp. 825–831, 2018, doi: 10.1016/j.procs.2018.04.271.
- [180] J. D. Jobson, “Multiple Linear Regression BT - Applied Multivariate Data Analysis: Regression and Experimental Design,” J. D. Jobson, Ed. New York, NY: Springer New York, 1991, pp. 219–398. doi: 10.1007/978-1-4612-0955-3_4.
- [181] G. K. Uyanık and N. Güler, “A Study on Multiple Linear Regression Analysis,” *Procedia - Soc. Behav. Sci.*, vol. 106, pp. 234–240, 2013, doi: 10.1016/j.sbspro.2013.12.027.
- [182] C. M. Mastrangelo, *Multilevel Statistical Models, 4th edition*, vol. 43, no. 4. 2011. doi: 10.1080/00224065.2011.11917872.
- [183] A. P. King and R. J. Eckersley, “Inferential Statistics II: Parametric Hypothesis Testing,” *Stat. Biomed. Eng. Sci.*, pp. 91–117, 2019, doi: 10.1016/b978-0-08-102939-8.00014-1.
- [184] J. F. Hair, R. Anderson, B. Babin, and W. Black, “Multivariate Data Analysis.pdf.” p. 758, 2010.
- [185] Y. O. Susilo and M. Dijst, “Behavioural decisions of travel-time ratios for work, maintenance and leisure activities in the Netherlands,” *Transp. Plan. Technol.*, vol. 33, no. 1, pp. 19–34, 2010, doi: 10.1080/03081060903429280.

- [186] S. Schönfelder and K. W. Axhausen, “On the Variability of Human Activity Spaces,” *Real Virtual Worlds Spat. Plan.*, pp. 237–262, 2004, doi: 10.1007/978-3-662-10398-2_17.
- [187] I. van de Craats, P. van den Berg, A. Kemperman, and E. O. D. Waygood, *Children’s school travel and wellbeing in the Netherlands*. Elsevier Inc., 2020. doi: 10.1016/b978-0-12-814694-1.00017-8.
- [188] K. M. Habib and J. A. Carrasco, “Investigating the role of social networks in start time and duration of activities: Trivariate simultaneous econometric model,” *Transp. Res. Rec.*, no. 2230, pp. 1–8, 2011, doi: 10.3141/2230-01.
- [189] G. Currie and J. Stanley, “Investigating Links between Social Capital and Public Transport,” vol. 28, no. 4, pp. 529–547, 2008, doi: 10.1080/01441640701817197.
- [190] R. Inklaar, H. de Jong, J. Bolt, and J. van Zanden, “The Industry Sources of Productivity Growth and Convergence,” in *The Oxford Handbook of Productivity Analysis*, E. Grifell-Tatjé, C. A. K. Lovell, and R. C. Sickles, Eds. Oxford University Press, 2018, pp. 724–752. doi: 10.1093/oxfordhb/9780190226718.013.22.
- [191] M. Friman, T. Gärling, D. Ettema, and L. E. Olsson, “How does travel affect emotional well-being and life satisfaction?,” *Transp. Res. Part A Policy Pract.*, vol. 106, no. June 2016, pp. 170–180, 2017, doi: 10.1016/j.tra.2017.09.024.
- [192] S. Nordbakke and T. Schwanen, “Transport, unmet activity needs and wellbeing in later life: exploring the links,” *Transportation (Amst.)*, vol. 42, no. 6, pp. 1129–1151, 2015, doi: 10.1007/s11116-014-9558-x.
- [193] J. Zhang and H. Timmermans, “Scobit-based panel analysis of multitasking behavior of public transport users,” *Transp. Res. Rec.*, no. 2157, pp. 46–53, 2010, doi: 10.3141/2157-06.
- [194] M. Friman, L. E. Olsson, M. Ståhl, D. Ettema, and T. Gärling, “Travel and

residual emotional well-being,” *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 49, pp. 159–176, 2017, doi: 10.1016/j.trf.2017.06.015.

- [195] M. Kariuki, D. Dharmowijoyo, L. E. Tanjung, and S. F. Shalihati, “The Integration of Time-Space Prism and Psychological Mechanism on The Use of Public Transport,” *Asian J. Technol. Manag.*, vol. 13, no. 1, pp. 35–46, 2020, doi: 10.12695/ajtm.2020.13.1.3.
- [196] A. Budiarto *et al.*, “Effects of Changes in Discretionary Trips and Online Activities on Social and Mental Health during Two Different Phases of the COVID-19 Pandemic in Malaysia,” *Sustain.*, vol. 14, no. 21, pp. 1–24, 2022, doi: 10.3390/su142113776.
- [197] M. J. Nieuwenhuijsen and H. Khreis, *Transport and health; an introduction*. INC, 2020. doi: 10.1016/b978-0-12-819136-1.00001-2.
- [198] S. Greaves *et al.*, “Working from Home, Active Travel, Health and Wellbeing: Consequences of a Pandemic,” *SSRN Electron. J.*, vol. 25, p. 101431, 2022, doi: 10.2139/ssrn.4034725.
- [199] H. J. Miller, “A Measurement Theory for Time Geography,” *Geogr. Anal.*, vol. 37, no. 1, pp. 17–45, Jan. 2005, doi: <https://doi.org/10.1111/j.1538-4632.2005.00575.x>.
- [200] M. Z. Irawan, P. F. Belgiawan, T. B. Joewono, F. F. Bastariato, M. Rizki, and A. Ilahi, “Exploring activity-travel behavior changes during the beginning of COVID-19 pandemic in Indonesia Exploring activity - travel behavior changes during the beginning of COVID - 19 pandemic in Indonesia,” *Transportation (Amst.)*, no. April, 2022, doi: 10.1007/s11116-021-10185-5.
- [201] World Health Organization, “What does ‘Health’ mean to you?,” 1948. [https://www.emro.who.int/about-who/rc60/what-does-health-mean-to-you.html#:~:text=In 1948%2C the World Health,WHO Constitution 1948\)](https://www.emro.who.int/about-who/rc60/what-does-health-mean-to-you.html#:~:text=In 1948%2C the World Health,WHO Constitution 1948))
- [202] D. B. E. Dharmowijoyo, E. Cherchi, N. Ahmad Termida, and D. A. A.

- Samsura, “On the role of subjective well-being in mediating the relationship between spatiotemporal and health variables,” *J. Transp. Heal.*, vol. 32, p. 101679, 2023, doi: <https://doi.org/10.1016/j.jth.2023.101679>.
- [203] L. E. Tanjung *et al.*, “Does involving another person in day-to-day activity-travel participation affect social and mental health ?,” *J. Transp. Heal.*, vol. 37, no. May, p. 101836, 2024, doi: 10.1016/j.jth.2024.101836.
- [204] W. Wang, L. Yi, M. Y. Wu, P. L. Pearce, and S. (Sam) Huang, “Examining Chinese adult children’s motivations for traveling with their parents,” *Tour. Manag.*, vol. 69, no. June, pp. 422–433, 2018, doi: 10.1016/j.tourman.2018.06.024.
- [205] H. J. Miller, “What about people in geographic information science,” *Representing Geogr. Inf. Syst.*, pp. 215–242, 2005.
- [206] M. Manoj and A. Verma, “Analysis and Modelling of Activity-travel Behaviour of Non- workers from a City of Developing Country, India,” *Procedia - Soc. Behav. Sci.*, vol. 104, pp. 621–629, 2013, doi: 10.1016/j.sbspro.2013.11.156.
- [207] Y. O. Susilo and K. W. Axhausen, “Repetitions in individual daily activity–travel–location patterns: a study using the Herfindahl–Hirschman Index,” *Transportation (Amst)*., vol. 41, no. 5, pp. 995–1011, 2014, doi: 10.1007/s11116-014-9519-4.
- [208] C. Raux, T. Y. Ma, and E. Cornelis, “Variability in daily activity-travel patterns: the case of a one-week travel diary,” *Eur. Transp. Res. Rev.*, vol. 8, no. 4, 2016, doi: 10.1007/s12544-016-0213-9.
- [209] Malang District Statistics Central Bureau, “Malang district data in numbers year 2020,” p. 191, 2020, [Online]. Available: <https://malangkab.bps.go.id/publication/2020/04/27/ea488f90917e5d821b211f40/kabupaten-malang-dalam-angka-2020.html>

- [210] R. Situmorang, Antariksa, Surjono, and A. D. Wicaksono, “The feasibility of malang city as college town,” *Int. J. Sci. Technol. Res.*, vol. 8, no. 12, pp. 2835–2839, 2019.
- [211] BPS, “Kota Malang dalam Angka 2020. Malang: Badan Pusat Statistik Kota Malang.,” *Badan Pus. Stat.*, pp. 1–390, 2020.
- [212] Y. O. Susilo, “paratransit,” in *A Dictionary of Transport Analysis*, Cheltenham, UK: Edward Elgar Publishing Limited, 2010.
- [213] GOJEK. Rilis Laporan Kejog, “Rilis Laporan Kejog , Gojek Umumkan Pencapaiannya Selama 2019,” pp. 2018–2020, 2019, [Online]. Available: <https://selular.id/2019/01/rilis-laporan-kejog-gojek-umumkan-pencapaiannya-selama-2018/>
- [214] Statista, “Internet Usage In Indonesia,” *Internet Soc.*, p. 146, 2020, [Online]. Available: <https://statista.com/study/22622/internet-usage-in-indonesia-statista-dossier/>
- [215] A. Tirachini and M. del Río, “Ride-hailing in Santiago de Chile: Users’ characterisation and effects on travel behaviour,” *Transp. Policy*, vol. 82, no. January 2020, pp. 46–57, 2019, doi: 10.1016/j.tranpol.2019.07.008.
- [216] M. Rizki, T. B. Joewono, D. B. E. Dharmowijoyo, and D. Prasetyanto, “The Effects of On- and Before- Journey Advantages Using Ride-Sourcing in Indonesia,” *Sustainability*, vol. 13, no. 19, p. 11117, Oct. 2021, doi: 10.3390/su131911117.
- [217] T. Yamane, *Statistics, An Introductory Analysis, 2nd Ed.*,. 1967. doi: 10.1177/001316446402400434.
- [218] D. B. E. Dharmowijoyo, Y. O. Susilo, and A. Karlström, “Day-to-day variability in travellers’ activity-travel patterns in the Jakarta metropolitan area,” *Transportation (Amst.)*, vol. 43, no. 4, pp. 601–621, 2016, doi: 10.1007/s11116-015-9591-4.

- [219] S. D. Keller *et al.*, “Use of structural equation modeling to test the construct validity of the SF-36 Health Survey in ten countries: Results from the IQOLA Project,” *J. Clin. Epidemiol.*, vol. 51, no. 11, pp. 1179–1188, 1998, doi: 10.1016/S0895-4356(98)00110-3.
- [220] J. E. Ware, “SF-36 Health Survey update,” *Spine (Phila. Pa. 1976)*., vol. 25, no. 24, pp. 3130–3139, 2000, doi: 10.1097/00007632-200012150-00008.
- [221] J. E. Ware, “Conceptualization and measurement of health-related quality of life: Comments on an evolving field,” *Arch. Phys. Med. Rehabil.*, vol. 84, no. 4 SUPPL. 2, pp. 43–51, 2003, doi: 10.1053/apmr.2003.50246.
- [222] J. P. Heisig and M. Schaeffer, “Why you should always include a random slope for the lower-level variable involved in a cross-level interaction,” *Eur. Sociol. Rev.*, vol. 35, no. 2, pp. 258–279, 2019, doi: 10.1093/esr/jcy053.
- [223] A. H. Leyland and P. P. Groenewegen, *Multilevel Modelling for Public Health and Health Services Research*. 2020. doi: 10.1007/978-3-030-34801-4.
- [224] J. Pinheiro, D. Bates, S. DebRoy, D. Sarkar, and R Core Team, “‘nlme’ Title Linear and Nonlinear Mixed Effects Models,” *R Packag. version 3.1-164*, [https://CRAN.R-project.org/package=nlme.](https://CRAN.R-project.org/package=nlme), 2022.
- [225] J. I. Levy, J. J. Buonocore, K. von Stackelberg, and K. Von Stackelberg, “Evaluation of the public health impacts of traffic congestion: A health risk assessment,” *Environ. Heal. A Glob. Access Sci. Source*, vol. 9, no. 65, pp. 1–12, 2010, doi: 10.1186/1476-069X-9-65.
- [226] S. Sadeghi, R. Daziano, S.-Y. Yoon, and A. K. Anderson, “Crowding and Perceived Travel Time in Public Transit: Virtual Reality Compared With Stated Choice Surveys,” *Transp. Res. Rec.*, vol. 2677, no. 5, pp. 296–307, Oct. 2022, doi: 10.1177/03611981221130346.
- [227] L. E. Olsson, T. Gärling, D. Ettema, M. Friman, and S. Fujii, “Happiness and Satisfaction with Work Commute,” *Soc. Indic. Res.*, vol. 111, no. 1, pp. 255–

263, 2013, doi: 10.1007/s11205-012-0003-2.

- [228] R. Susanto, Z. Fanani, and M. Soleh., “Study of Sustainable Development of Public Transport System in Malang, Indonesia.,” *Int. J. Adv. Res.*, vol. 5, no. 2, pp. 2355–2363, 2017, doi: 10.21474/ijar01/3418.
- [229] N. D. Priandani and H. Tolle, “Evaluation of Malang City public transportation route search mobile application implementation,” *Int. J. Adv. Soft Comput. its Appl.*, vol. 9, no. 2, pp. 107–117, 2017.
- [230] J. R. J. Fontaine, “Equivalence,” vol. 1, pp. 803–813, 2005.
- [231] M. W. Watkins, “Exploratory Factor Analysis: A Guide to Best Practice,” *J. Black Psychol.*, vol. 44, no. 3, pp. 219–246, 2018, doi: 10.1177/0095798418771807.
- [232] K. A. Randolph and L. L. Myers, “Basic Statistics in Multivariate Analysis,” *Basic Stat. Multivar. Anal.*, 2013, doi: 10.1093/acprof:oso/9780199764044.001.0001.
- [233] P. Samuels, “Advice on Exploratory Factor Analysis,” *Cent. Acad. Success, Birmingham City Univ.*, no. June, p. 2, 2016, doi: 10.13140/RG.2.1.5013.9766.
- [234] H. Tessa, “A STRATEGY FOR RESILIENCE PUBLIC TRANSPORTATION DEVELOPMENT IN MALANG CITY,” *Russ. J. Agric. Socio-Economic Sci.*, vol. 10, no. October, pp. 52–59, 2020.
- [235] S. McCarthy and M. A. Habib, “Investigation of Well-Being, Travel Behaviour, Built Environment and Lifestyle Preferences,” *J. Transp. Heal.*, vol. 9, no. 2018, pp. S28–S29, 2018, doi: 10.1016/j.jth.2018.05.087.
- [236] M. C. de Haas, C. E. Scheepers, L. W. J. Harms, and M. Kroesen, “Travel pattern transitions: Applying latent transition analysis within the mobility biographies framework,” *Transp. Res. Part A Policy Pract.*, vol. 107, no. December 2017, pp. 140–151, 2018, doi: 10.1016/j.tra.2017.11.007.

- [237] J. Choi, J. Coughlin, and L. D'Ambrosio, "Travel time and subjective well-being," *Transp. Res. Rec.*, no. 2357, pp. 100–108, 2013, doi: 10.3141/2357-12.
- [238] P. Cranswick and M. McGowan, "The impact of social and cultural activities on the health and wellbeing of homeless people," no. October, pp. 1–69, 2005.
- [239] I. N. Sener, R. J. Lee, and Z. Elgart, "Potential health implications and health cost reductions of transit-induced physical activity," *J. Transp. Heal.*, vol. 3, no. 2, pp. 133–140, 2016, doi: 10.1016/j.jth.2016.02.002.
- [240] M. Rizki, T. B. Joewono, D. B. E. E. Dharmowijoyo, and P. F. Belgiawan, "Does multitasking improve the travel experience of public transport users? Investigating the activities during commuter travels in the Bandung Metropolitan Area, Indonesia," *Public Transp.*, vol. 13, no. 2, pp. 429–454, 2021, doi: 10.1007/s12469-021-00263-3.
- [241] R. Sulistyorini, N. S. Abdi, D. B. E. Dharmowijoyo, and L. EviantiTanjung, "Effects of Change of Discretionary Trips & Activities, During COVID-19 Pandemic Towards Social & Mental Health BT - Proceedings of the International Conference on Emerging Smart Cities (ICESC2022)," 2024, pp. 429–448.
- [242] J. De Vos and F. Witlox, "Travel satisfaction revisited. On the pivotal role of travel satisfaction in conceptualising a travel behaviour process," *Transp. Res. Part A Policy Pract.*, vol. 106, no. October, pp. 364–373, 2017, doi: 10.1016/j.tra.2017.10.009.
- [243] K. Chatterjee *et al.*, "Commuting and wellbeing: a critical overview of the literature with implications for policy and future research," *Transp. Rev.*, vol. 40, no. 1, pp. 5–34, 2020, doi: 10.1080/01441647.2019.1649317.
- [244] H. Hook, J. De Vos, V. Van Acker, and F. Witlox, "On undirected trips, satisfaction, and well-being: Evidence from Flanders (Belgium)," *Transp. Res. Part D Transp. Environ.*, vol. 99, no. August, p. 103018, 2021, doi: 10.1016/j.trd.2021.103018.

- [245] V. Brown, A. Barr, J. Scheurer, A. Magnus, B. Zapata-Diomed, and R. Bentley, “Better transport accessibility, better health: A health economic impact assessment study for Melbourne, Australia,” *Int. J. Behav. Nutr. Phys. Act.*, vol. 16, no. 1, pp. 1–10, 2019, doi: 10.1186/s12966-019-0853-y.
- [246] K. Pérez, M. Olabarria, D. Rojas-Rueda, E. Santamariña-Rubio, C. Borrell, and M. Nieuwenhuijsen, “The health and economic benefits of active transport policies in Barcelona,” *J. Transp. Heal.*, vol. 4, pp. 316–324, 2017, doi: 10.1016/j.jth.2017.01.001.
- [247] L. K. Lades, A. Kelly, and L. Kelleher, “Why is active travel more satisfying than motorized travel? Evidence from Dublin,” *Transp. Res. Part A Policy Pract.*, vol. 136, no. April, pp. 318–333, 2020, doi: 10.1016/j.tra.2020.04.007.
- [248] R. Rybeck, “Funding Transportation for Prosperity Sustainability & Equity,” *J. Transp. Heal.*, vol. 9, no. 2018, p. S2, 2018, doi: 10.1016/j.jth.2018.05.050.
- [249] L. M. Wen, N. Orr, J. Bindon, and C. Rissel, “Promoting active transport in a workplace setting: Evaluation of a pilot study in Australia,” *Health Promot. Int.*, vol. 20, no. 2, pp. 123–133, 2005, doi: 10.1093/heapro/dah602.
- [250] L. Sagaris, “Active Transport and Health: Is Employment Essential to Community Change in Developing Countries?,” *J. Transp. Heal.*, vol. 9, no. 2018, pp. S36–S37, 2018, doi: 10.1016/j.jth.2018.05.098.
- [251] J. Lee, S. Y. He, and D. W. Sohn, “Potential of converting short car trips to active trips: The role of the built environment in tour-based travel,” *J. Transp. Heal.*, vol. 7, no. October, pp. 134–148, 2017, doi: 10.1016/j.jth.2017.08.008.
- [252] N. D. Priandani, H. Tolle, and D. R. Yuniarto, “Design and implementation of mobile-based application for Malang City public transportation route search,” *Int. J. Adv. Soft Comput. its Appl.*, vol. 8, no. 3, pp. 48–58, 2016.
- [253] N. Tjahjono, I. Hanafi, L. Latipun, and S. Suyadi, “Attitudes and Responses Residents Against Traffic Noise in Malang City, East Java, Indonesia,”

- Indones. J. ...*, vol. 11, no. 2, pp. 56–63, 2020, doi:
10.21776/ub.jpjpal.2020.011.02.01.
- [254] E. Winansiha, Antariksa, Surjono, and A. Setyoleksono, “Policy Support on Walkability in Malang City,” *J. Tata Kota dan Drh.*, vol. 7, no. 1, pp. 51–54, 2015.
- [255] M. F. N. Arifin, “The Impact of Migrant Population Activities and Their Push Factors on The Issue of Traffic in Malang City,” *J. Int. Conf. Proc.*, vol. 3, no. 1, pp. 161–166, 2020, doi: 10.32535/jicp.v2i4.791.
- [256] D. Ettema, T. Gärling, L. E. Olsson, M. Friman, and S. Moerdijk, “The road to happiness: Measuring Dutch car drivers’ satisfaction with travel,” *Transp. Policy*, vol. 27, no. May, pp. 171–178, 2013, doi: 10.1016/j.tranpol.2012.12.006.
- [257] M. Stauffacher, R. Schlich, K. W. Axhausen, and R. Scholz, “The diversity of travel behaviour: motives and social interactions in leisure time activities,” *Arbeitsberichte Verkehr-und Raumplanung*, 30x, IVT, ETH Zurich, Zurich, no. November, pp. 1–50, 2005, [Online]. Available: <http://e-collection.library.ethz.ch/eserv/eth:28934/eth-28934-01.pdf>
- [258] C. J. Bergstad *et al.*, “Subjective well-being related to satisfaction with daily travel,” *Transportation (Amst.)*, vol. 38, no. 1, pp. 1–15, 2011, doi: 10.1007/s11116-010-9283-z.
- [259] Irish Aid, “Income Security: Why It Matters for Older People Everywhere,” 2016, [Online]. Available: https://www.ageaction.ie/sites/default/files/attachments/age_action_income_security_booklet_jan_2016.pdf
- [260] I. Meloni, M. Bez, and E. Spissu, “Activity-based model of women’s activity-travel patterns,” *Transp. Res. Rec.*, no. 2125, pp. 26–35, 2009, doi: 10.3141/2125-04.

- [261] W. Elias, J. Benjamin, and Y. Shiftan, “Gender differences in activity and travel behavior in the Arab world,” *Transp. Policy*, vol. 44, pp. 19–27, 2015, doi: 10.1016/j.tranpol.2015.07.001.
- [262] M. I. O. Sánchez and E. M. González, “Gender Differences in Commuting Behavior: Women’s Greater Sensitivity,” *Transp. Res. Procedia*, vol. 18, no. June, pp. 66–72, 2016, doi: 10.1016/j.trpro.2016.12.009.
- [263] V. Basarić, A. Vujičić, J. M. Simić, V. Bogdanović, and N. Saulić, “Gender and Age Differences in the Travel Behavior - A Novi Sad Case Study,” *Transp. Res. Procedia*, vol. 14, pp. 4324–4333, 2016, doi: 10.1016/j.trpro.2016.05.354.
- [264] A. Press and B. Environment, “Women ’ s Gender-Role and its Influence on Travel Behaviour,” vol. 10, no. 1, pp. 61–68, 2013.
- [265] M. Manoj and A. Verma, “Activity-travel behaviour of non-workers belonging to different income group households in Bangalore , India,” *JTRG*, vol. 49, pp. 99–109, 2015, doi: 10.1016/j.jtrangeo.2015.10.017.
- [266] S. Jamal and K. B. Newbold, “Factors Associated with Travel Behavior of Millennials and Older Adults : A Scoping Review,” 2020.
- [267] M. Tajalli and A. Hajbabaie, “On the relationships between commuting mode choice and public health,” *J. Transp. Heal.*, vol. 4, pp. 267–277, 2017, doi: 10.1016/j.jth.2016.12.007.
- [268] R. L. White, M. J. Babic, P. D. Parker, D. R. Lubans, T. Astell-Burt, and C. Lonsdale, “Domain-Specific Physical Activity and Mental Health: A Meta-analysis,” *Am. J. Prev. Med.*, vol. 52, no. 5, pp. 653–666, May 2017, doi: 10.1016/j.amepre.2016.12.008.
- [269] D. K. Humphreys, A. Goodman, and D. Ogilvie, “Associations between active commuting and physical and mental wellbeing,” *Prev. Med. (Baltim).*, vol. 57, no. 2, pp. 135–139, Aug. 2013, doi: 10.1016/j.ypmed.2013.04.008.

- [270] L. Carstensen, “Studying the strengths of older Americans,” *Chron. High. Educ.*, vol. 43, pp. B3--B4, 1996.
- [271] K. Tomioka, N. Kurumatani, and H. Hosoi, “Age and gender differences in the association between social participation and instrumental activities of daily living among community-dwelling elderly,” pp. 1–10, 2017, doi: 10.1186/s12877-017-0491-7.
- [272] B. J. Kramer, “Gain in the caregiving experience: Where are we? What next?,” *Gerontologist*, vol. 37, no. 2, pp. 218–232, 1997, doi: 10.1093/geront/37.2.218.
- [273] A. Waqar, M. Husin Gultom, A. Hannan Qureshi, L. Evianti Tanjung, and H. R. Almujiabah, “Complexities to the deployment of cloud computing for sustainability of small construction projects: Evidence from Pakistan,” *Ain Shams Eng. J.*, vol. 14, no. 12, p. 102559, 2023, doi: 10.1016/j.asej.2023.102559.
- [274] M. Pinquart and S. Sörensen, “Influences on loneliness in older adults: A meta-analysis,” *Basic Appl. Soc. Psych.*, vol. 23, no. 4, pp. 245–266, 2003, doi: 10.1207/S15324834BASP2304_2.
- [275] Y. O. Susilo and E. Avineri, “The impacts of household structure on the individual stochastic travel and out-of-home activity time budgets,” no. June 2013, pp. 454–470, 2014, doi: 10.1002/atr.
- [276] J. E. Ruseski, B. R. Humphreys, K. Hallmann, and C. Breuer, “Family structure, time constraints, and sport participation,” *Eur. Rev. Aging Phys. Act.*, vol. 8, no. 2, pp. 57–66, 2011, doi: 10.1007/s11556-011-0084-y.
- [277] M. Rizki, T. B. Joewono, P. F. Belgiawan, and M. Z. Irawan, “The travel behaviour of ride-sourcing users, and their perception of the usefulness of ride-sourcing based on the users’ previous modes of transport: A case study in Bandung City, Indonesia,” *IATSS Res.*, vol. 45, no. 2, pp. 267–276, 2021, doi: 10.1016/j.iatssr.2020.11.005.

- [278] F. Alemi, G. Circella, S. Handy, and P. Mokhtarian, “What influences travelers to use Uber? Exploring the factors affecting the adoption of on-demand ride services in California,” *Travel Behav. Soc.*, vol. 13, no. July 2017, pp. 88–104, 2018, doi: 10.1016/j.tbs.2018.06.002.
- [279] D. Deka and D. Fei, “A comparison of the personal and neighborhood characteristics associated with ridesourcing, transit use, and driving with NHTS data,” *J. Transp. Geogr.*, vol. 76, no. March, pp. 24–33, 2019, doi: 10.1016/j.jtrangeo.2019.03.001.
- [280] A. Waqar, Andri, A. H. Qureshi, H. R. Almujiyah, L. E. Tanjung, and C. Utami, “Evaluation of success factors of utilizing AI in digital transformation of health and safety management systems in modern construction projects,” *Ain Shams Eng. J.*, vol. 14, no. 11, p. 102551, 2023, doi: 10.1016/j.asej.2023.102551.
- [281] W. Hook and M. Replogle, “Motorization and non-motorized transport in Asia: Transport system evolution in China, Japan and Indonesia,” *Land use policy*, vol. 13, no. 1, pp. 69–84, 1996, doi: 10.1016/0264-8377(95)00025-9.
- [282] Q. Tang and X. Hu, *Triggering behavior changes with information and incentives: An active traffic and demand management-oriented review*, 1st ed., vol. 3. Elsevier Inc., 2019. doi: 10.1016/bs.atpp.2019.05.002.
- [283] M. Hilbrecht, B. Smale, and S. E. Mock, “Highway to health? Commute time and well-being among Canadian adults,” *World Leis. J.*, vol. 56, no. 2, pp. 151–163, Apr. 2014, doi: 10.1080/16078055.2014.903723.
- [284] M. Sweet and P. Kanaroglou, “Gender differences: The role of travel and time use in subjective well-being,” *Transp. Res. Part F Traffic Psychol. Behav.*, vol. 40, pp. 23–34, 2016, doi: 10.1016/j.trf.2016.03.006.
- [285] R. L. Mackett, “Children’s travel behaviour and its health implications,” *Transp. Policy*, vol. 26, pp. 66–72, 2013, doi: 10.1016/j.tranpol.2012.01.002.

- [286] D. Babu and M. V. L. R. Anjaneyulu, “Exploratory analysis on worker’s independent and joint travel patterns during weekdays and weekends,” *Transp. Eng.*, vol. 5, p. 100073, 2021, doi: 10.1016/j.treng.2021.100073.
- [287] G. Mattioli, K. Lucas, and G. Marsden, “Reprint of Transport poverty and fuel poverty in the UK: From analogy to comparison,” *Transp. Policy*, vol. 65, no. June 2017, pp. 114–125, 2018, doi: 10.1016/j.tranpol.2018.02.019.
- [288] A. Soltani, D. Pojani, S. Askari, and H. E. Masoumi, “Socio-demographic and built environment determinants of car use among older adults in Iran,” *J. Transp. Geogr.*, vol. 68, no. November 2017, pp. 109–117, 2018, doi: 10.1016/j.jtrangeo.2018.03.001.
- [289] P. van den Berg, F. Sharmeen, and M. Weijs-Perrée, “On the subjective quality of social Interactions: Influence of neighborhood walkability, social cohesion and mobility choices,” *Transp. Res. Part A Policy Pract.*, vol. 106, no. December 2016, pp. 309–319, 2017, doi: 10.1016/j.tra.2017.09.021.
- [290] C. Willis, A. Nyquist, R. Jahnsen, C. Elliott, and A. Ullenhag, “Enabling physical activity participation for children and youth with disabilities following a goal-directed, family-centred intervention,” *Res. Dev. Disabil.*, vol. 77, no. November 2016, pp. 30–39, 2018, doi: 10.1016/j.ridd.2018.03.010.
- [291] Y. Gao, *Travel Satisfaction and Subjective Well-Being: A Behavioral Modeling Perspective*, vol. 1, no. 2018. 2018. [Online]. Available: www.tue.nl/taverne
- [292] W. Li, W. Feng, and H. Z. Yuan, “Multimode traffic travel behavior characteristics analysis and congestion governance research,” *J. Adv. Transp.*, vol. 2020, 2020, doi: 10.1155/2020/6678158.
- [293] A. J. Pel, M. C. J. Bliemer, and S. P. Hoogendoorn, “A review on travel behaviour modelling in dynamic traffic simulation models for evacuations,” *Transportation (Amst.)*, vol. 39, no. 1, pp. 97–123, 2012, doi: 10.1007/s11116-011-9320-6.

- [294] L. Frank, B. Giles-Corti, and R. Ewing, “The influence of the built environment on transport and health,” *J. Transp. Heal.*, vol. 3, no. 4, pp. 423–425, 2016, doi: 10.1016/j.jth.2016.11.004.
- [295] T. Gärling, D. Ettema, F. F. Connolly, M. Friman, and L. E. Olsson, “Review and assessment of self-reports of travel-related emotional wellbeing,” *J. Transp. Heal.*, vol. 17, no. March, pp. 1–10, 2020, doi: 10.1016/j.jth.2020.100843.
- [296] D. Saarloos, J. E. Kim, and H. Timmermans, “The built environment and health: Introducing individual space-time behavior,” *Int. J. Environ. Res. Public Health*, vol. 6, no. 6, pp. 1724–1743, 2009, doi: 10.3390/ijerph6061724.
- [297] S. Rasouli and H. Timmermans, “Accounting for Heterogeneity in Travel Episode Satisfaction Using a Random Parameters Panel Effects Regression Model,” *Procedia Environ. Sci.*, vol. 22, pp. 35–42, 2014, doi: 10.1016/j.proenv.2014.11.004.
- [298] M. Young and S. Farber, “The who, why, and when of Uber and other ride-hailing trips: An examination of a large sample household travel survey,” *Transp. Res. Part A Policy Pract.*, vol. 119, no. November 2018, pp. 383–392, 2019, doi: 10.1016/j.tra.2018.11.018.
- [299] M. Z. Irawan, P. F. Belgiawan, A. K. M. Tarigan, and F. Wijanarko, “To compete or not compete: exploring the relationships between motorcycle-based ride-sourcing, motorcycle taxis, and public transport in the Jakarta metropolitan area,” *Transportation (Amst.)*, vol. 47, no. 5, pp. 2367–2389, 2019, doi: 10.1007/s11116-019-10019-5.

APPENDIX

Survei Diari Aktivitas Seseorang

INSTRUKSI UNTUK MENDATA KEGIATAN HARIAN ANDA:

1. Surveyor akan membantu menjelaskan dan akan membantu dalam pengumpulan nantinya
2. Tolong berikan informasi dasar seperti tempat tinggal, RT/RW, gender, umur dan lain-lain
3. Anda diperbolehkan mengisinya di waktu yang membuat Anda merasa nyaman
4. Aktivis dibagi menjadi di rumah, di sekolah/kantor, dan di luar rumah atau tempat kerja/sekolah
5. Aktivitas di dalam lingkungan tempat tinggal, berarti aktivitas di dalam wilayah kelurahan
6. Di kendaraan berarti saat Anda berada di kendaraan
7. Tolong catat aktivitas yang Anda lakukan di rumah/sekolah/kantor/lingkungan tempat tinggal, dengan mengikuti contoh yang ada
8. Tolong catat moda perjalanan yang Anda gunakan, catat per 15 menit Anda gunakan

9. Kriteria aktivitas terdiri dari:

- | | |
|--|--|
| A : Tidur | H : Aktivitas dengan Anak di bawah 6 tahun, seperti (Jika dilakukan di luar rumah kode menjadi OH): |
| B : Kegiatan pribadi seperti: mandi, sikat gigi, berhias dan sebagainya | - Merawat/ <i>Baby sitting</i> |
| C : Makan dan minum di dalam rumah | - Bermain bersama |
| D : Aktivitas istirahat offline, seperti (Jika dilakukan di luar rumah kode menjadi OD): | - Memberi makan |
| - Menonton TV/mendengarkan radio | I : Aktivitas pekerjaan, seperti (Jika dilakukan di luar rumah kode menjadi OI): |
| - Mendengarkan radio | - Bekerja di atas meja di dalam ruangan |
| - Mendengarkan musik | - Melakukan penelitian/eksperimen di laboratorium |
| - Membaca majalah koran, koran, komik dsb | - Berbicara dengan klien di telpon |
| - Istirahat dan relaksasi | J : Dalam perjalanan (Mohon sampaikan kategori moda yang digunakan seperti disampaikan pada bagian 11 di bawah:) |
| Lainnya | K : Pekerjaan lapangan atau di luar kantor seperti mengoperasikan mesin atau alat berat, memantau pekerjaan di luar kantor/inspeksi, aktivitas engineering, dan sejenisnya |

- E : Aktivitas istirahat online (Jika dilakukan di luar rumah kode menjadi OE):
- Browsing
 - Social media
 - Main game online
 - Aktivitas online lainnya
- F : Aktivitas sosial dan keluarga, seperti (Jika dilakukan di luar rumah kode menjadi OE):
- Ngobrol bersama teman/keluarga
 - Ngobrol bersama teman/keluarga di telepon
 - Berjalan-jalan/bersepeda bersama dengan pasangan atau anak-anak atau anggota keluarga lainnya
 - Mengunjungi rumah teman/sahabat, atau keluarga atau relasi
 - Beribadah di luar rumah
- G : Aktivitas rumah tangga, seperti (Jika dilakukan di luar rumah kode menjadi OG):
- Membersihkan rumah, memasak, membuat kue/minuman, mencuci, menyeterika, etc
- L : Penjualan ke rumah-rumah atau kantor-kantor/sales, pengantaran/delivery, pembelian/purchasing
- M : Aktivitas belajar ((Jika dilakukan di luar rumah kode menjadi OM)
- N : Aktivitas belajar di luar lingkungan sekolah, seperti kunjungan ke kebun binatang, museum dan sejenisnya
- O : Makan dan minum di luar rumah
- P : Berbelanja kebutuhan sehari-hari atau *grocery shopping (non-sight-seeing shopping)*
- Q : *Online shopping*
- R : *Sight-seeing shopping* seperti ke shopping/trade mall/ factory outlet
- S : Aktivitas organisasi, sukarelawan, politik, kepemudaaan, pramuka, keagamaan dan sejenisnya
- T : Berolahraga
- U : Melakukan perawatan kesehatan ke RS, puskesmas, klinik atau dokter pribadi
- V : Aktivitas mengantar menjemput anak/anggota keluarga lainnya/teman/sahabat/relasi
- W : Berlibur

11. Kriteria moda terdiri dari:

- | | |
|--|--|
| 1 : Berjalan kaki | 12 : Bus Besar dan Medium Non AC |
| 2 : Berjalan kaki dari/ke stasiun/halte bus dan sejenisnya | 13 : Bus kecil/Angkot |
| 3 : Bersepeda | 14 : Taksi |
| 4 : Mengendarai motor | 15 : Taksi Online |
| 5 : Sedan, jeep, kijang dan sejenisnya | 16 : Ojeg |
| 6 : Ojeg online | 17 : Ojeg Online |
| 7 : Taxi (mobil) online | 18 : Becak motor, bajaj dan sejenisnya |
| 8 : Truk | 19 : Bus sekolah/Karyawan |

- 9 : Kereta Api Eksekutif
 10 : Kereta Api Ekonomi
 11 : Bus Besar dan Medium dengan AC

- 20 : Delman
 21 : Lainnya

HARI 2:

Nama Surveyor	:	
Tanggal Survei	:	
Hari survey (1-21), Hari Kerja (1) atau Akhir Pekan (0)	:	
Nama Individu yang diwawancarai (Umur)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Nomor Individu	:	
Jam berapa Anda berangkat dari rumah	:	
Jam berapa Anda datang ke rumah	:	
Jam berapa Anda tidur hari ini	:	

Q1	Bagaimana menurut Anda kondisi hari ini memperhatikan aktivitas Anda pada hari ini?	Sangat Buruk	<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> </table>	1	2	3	4	5	6	7	Sangat Baik
1	2	3	4	5	6	7					
Q2	Bagaimana mood Anda hari ini memperhatikan aktivitas Anda pada hari ini?	Negative	<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> </table>	1	2	3	4	5	6	7	Positive
1	2	3	4	5	6	7					
Q3	Apakah kegiatan Anda hari ini mencapai tujuan yang Anda inginkan	Jauh lebih rendah dari tujuan yang saya harapkan	<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> </table>	1	2	3	4	5	6	7	Jauh lebih tinggi dari tujuan yang saya harapkan
1	2	3	4	5	6	7					
Q4	Bila memperhitungkan segalanya, bagaimana pengaruh kegiatan hari ini dengan kepuasan hidup Anda secara menyeluruh?	Sangat tidak puas	<table border="1"> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td> </tr> </table>	1	2	3	4	5	6	7	Sangat puas
1	2	3	4	5	6	7					

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	03.00						
	03.15						
	03.30						
	03.45						
	04.00						
	04.15						
	04.30						
	04.45						
	05.00						
	05.15						
	05.30						
	05.45						
	06.00						
	06.15						
	06.30						
	06.45						
	07.00						
	07.15						
	07.30						
	07.45						
	08.00						
	08.15						
	08.30						
	08.45						
	09.00						
	09.15						
	09.30						
	09.45						
	10.00						
	10.15						
	10.30						
	10.45						
	11.00						
	11.15						
	11.30						
	11.45						
	12.00						
	12.15						
	12.30						
	12.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	13.00						
	13.15						
	13.30						
	13.45						
	14.00						
	14.15						
	14.30						
	14.45						
	15.00						
	15.15						
	15.30						
	15.45						
	16.00						
	16.15						
	16.30						
	16.45						
	17.00						
	17.15						
	17.30						
	17.45						
	18.00						
	18.15						
	18.30						
	18.45						
	19.00						
	19.15						
	19.30						
	19.45						
	20.00						
	20.15						
	20.30						
	20.45						
	21.00						
	21.15						
	21.30						
	21.45						
	22.00						
	22.15						
	22.30						
	22.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ^{3/} JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	23.00						
	23.15						
	23.30						
	23.45						
	00.00						
	00.15						
	00.30						
	00.45						
	01.00						
	01.15						
	01.30						
	01.45						
	02.00						
	02.15						
	02.30						
	02.45						
	03.00						

¹ Aktivitas selain di tempat kerja/sekolah

² Aktivitas kedua ini atau *secondary activities* adalah aktivitas yang dilakukan bersamaan (multi-tasking) dengan kegiatan primer atau pertama. Kegiatan yang mungkin direcord adalah *passive leisure* dan makan atau kegiatan C, D dan E.

³ 1 untuk kegiatan yang melibatkan satu orang dan 2 untuk melibatkan lebih dari 2 orang. Kode 11 atau 21 bila pelibatan orang lain dilakukan secara off-line, dan 21 atau 22 bila melibatkan secara on-line

⁴ 1 untuk bila yang terlihat adalah anggota keluarga, 2 jika anggota keluarga besar, 3 jika kolega di tempat kerja atau komunitas bisnis, 4 untuk teman di sekolah atau komunitas, 5 untuk tetangga sekitar rumah, 6 untuk teman online.

⁵ Bagaimana rating perasaan Anda ketika melakukan aktivitas utama (primer)? Tidak Positif 1 7 Sangat Positif

⁶ Mohon dituliskan alamat/lokasi untuk kegiatan di tempat kerja/sekolah dan di tempat lain

HARI 3:

Nama Surveyor	:	
Tanggal Survei	:	
Hari survey (1-21), Hari Kerja (1) atau Akhir Pekan (0)	:	
Nama Individu yang diwawancarai (Umur)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Nomor Individu	:	
Jam berapa Anda berangkat dari rumah	:	
Jam berapa Anda datang ke rumah	:	
Jam berapa Anda tidur hari ini	:	

Q1	Bagaimana menurut Anda kondisi hari ini memperhatikan aktivitas Anda pada hari ini?	Sangat Buruk	1	2	3	4	5	6	7	Sangat Baik
Q2	Bagaimana mood Anda hari ini memperhatikan aktivitas Anda pada hari ini?	Negative	1	2	3	4	5	6	7	Positive
Q3	Apakah kegiatan Anda hari ini mencapai tujuan yang Anda inginkan	Jauh lebih rendah dari tujuan yang saya harapkan	1	2	3	4	5	6	7	Jauh lebih tinggi dari tujuan yang saya harapkan
Q4	Bila memperhitungkan segalanya, bagaimana pengaruh kegiatan hari ini dengan kepuasan hidup Anda secara menyeluruh?	Sangat tidak puas	1	2	3	4	5	6	7	Sangat puas

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	03.00						
	03.15						
	03.30						
	03.45						
	04.00						
	04.15						
	04.30						
	04.45						
	05.00						
	05.15						
	05.30						
	05.45						
	06.00						
	06.15						
	06.30						
	06.45						
	07.00						
	07.15						
	07.30						
	07.45						
	08.00						
	08.15						
	08.30						
	08.45						
	09.00						
	09.15						
	09.30						
	09.45						
	10.00						
	10.15						
	10.30						
	10.45						
	11.00						
	11.15						
	11.30						
	11.45						
	12.00						
	12.15						
	12.30						
	12.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	13.00						
	13.15						
	13.30						
	13.45						
	14.00						
	14.15						
	14.30						
	14.45						
	15.00						
	15.15						
	15.30						
	15.45						
	16.00						
	16.15						
	16.30						
	16.45						
	17.00						
	17.15						
	17.30						
	17.45						
	18.00						
	18.15						
	18.30						
	18.45						
	19.00						
	19.15						
	19.30						
	19.45						
	20.00						
	20.15						
	20.30						
	20.45						
	21.00						
	21.15						
	21.30						
	21.45						
	22.00						
	22.15						
	22.30						
	22.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	23.00						
	23.15						
	23.30						
	23.45						
	00.00						
	00.15						
	00.30						
	00.45						
	01.00						
	01.15						
	01.30						
	01.45						
	02.00						
	02.15						
	02.30						
	02.45						
	03.00						

¹ Aktivitas selain di tempat kerja/sekolah

² Aktivitas kedua ini atau *secondary activities* adalah aktivitas yang dilakukan bersamaan (multi-tasking) dengan kegiatan primer atau pertama. Kegiatan yang mungkin direcord adalah *passive leisure* dan makan atau kegiatan C, D dan E.

³ 1 untuk kegiatan yang melibatkan satu orang dan 2 untuk melibatkan lebih dari 2 orang. Kode 11 atau 21 bila pelibatan orang lain dilakukan secara off-line, dan 21 atau 22 bila melibatkan secara on-line

⁴ 1 untuk bila yang terlihat adalah anggota keluarga, 2 jika anggota keluarga besar, 3 jika kolega di tempat kerja atau komunitas bisnis, 4 untuk teman di sekolah atau komunitas, 5 untuk tetangga sekitar rumah, 6 untuk teman online.

⁵ Bagaimana rating perasaan Anda ketika melakukan aktivitas utama (primer)? Tidak Positif 1 7 Sangat Positif

⁶ Mohon dituliskan alamat/lokasi untuk kegiatan di tempat kerja/sekolah dan di tempat lain

HARI 4:

Nama Surveyor	:	
Tanggal Survei	:	
Hari survey (1-21), Hari Kerja (1) atau Akhir Pekan (0)	:	
Nama Individu yang diwawancarai (Umur)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Nomor Individu	:	
Jam berapa Anda berangkat dari rumah	:	
Jam berapa Anda datang ke rumah	:	
Jam berapa Anda tidur hari ini	:	

Q1	Bagaimana menurut Anda kondisi hari ini memperhatikan aktivitas Anda pada hari ini?	Sangat Buruk	1	2	3	4	5	6	7	Sangat Baik
Q2	Bagaimana mood Anda hari ini memperhatikan aktivitas Anda pada hari ini?	Negative	1	2	3	4	5	6	7	Positive
Q3	Apakah kegiatan Anda hari ini mencapai tujuan yang Anda inginkan	Jauh lebih rendah dari tujuan yang saya harapkan	1	2	3	4	5	6	7	Jauh lebih tinggi dari tujuan yang saya harapkan
Q4	Bila memperhitungkan segalanya, bagaimana pengaruh kegiatan hari ini dengan kepuasan hidup Anda secara menyeluruh?	Sangat tidak puas	1	2	3	4	5	6	7	Sangat puas

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	03.00						
	03.15						
	03.30						
	03.45						
	04.00						
	04.15						
	04.30						
	04.45						
	05.00						
	05.15						
	05.30						
	05.45						
	06.00						
	06.15						
	06.30						
	06.45						
	07.00						
	07.15						
	07.30						
	07.45						
	08.00						
	08.15						
	08.30						
	08.45						
	09.00						
	09.15						
	09.30						
	09.45						
	10.00						
	10.15						
	10.30						
	10.45						
	11.00						
	11.15						
	11.30						
	11.45						
	12.00						
	12.15						
	12.30						
	12.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	13.00						
	13.15						
	13.30						
	13.45						
	14.00						
	14.15						
	14.30						
	14.45						
	15.00						
	15.15						
	15.30						
	15.45						
	16.00						
	16.15						
	16.30						
	16.45						
	17.00						
	17.15						
	17.30						
	17.45						
	18.00						
	18.15						
	18.30						
	18.45						
	19.00						
	19.15						
	19.30						
	19.45						
	20.00						
	20.15						
	20.30						
	20.45						
	21.00						
	21.15						
	21.30						
	21.45						
	22.00						
	22.15						
	22.30						
	22.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	23.00						
	23.15						
	23.30						
	23.45						
	00.00						
	00.15						
	00.30						
	00.45						
	01.00						
	01.15						
	01.30						
	01.45						
	02.00						
	02.15						
	02.30						
	02.45						
	03.00						

¹ Aktivitas selain di tempat kerja/sekolah

² Aktivitas kedua ini atau *secondary activities* adalah aktivitas yang dilakukan bersamaan (multi-tasking) dengan kegiatan primer atau pertama. Kegiatan yang mungkin direcord adalah *passive leisure* dan makan atau kegiatan C, D dan E.

³ 1 untuk kegiatan yang melibatkan satu orang dan 2 untuk melibatkan lebih dari 2 orang. Kode 11 atau 21 bila pelibatan orang lain dilakukan secara off-line, dan 21 atau 22 bila melibatkan secara on-line

⁴ 1 untuk bila yang terlihat adalah anggota keluarga, 2 jika anggota keluarga besar, 3 jika kolega di tempat kerja atau komunitas bisnis, 4 untuk teman di sekolah atau komunitas, 5 untuk tetangga sekitar rumah, 6 untuk teman online.

⁵ Bagaimana rating perasaan Anda ketika melakukan aktivitas utama (primer)? Tidak Positif 1 7 Sangat Positif

⁶ Mohon dituliskan alamat/lokasi untuk kegiatan di tempat kerja/sekolah dan di tempat lain

HARI 5:

Nama Surveyor	:	
Tanggal Survei	:	
Hari survey (1-21), Hari Kerja (1) atau Akhir Pekan (0)	:	
Nama Individu yang diwawancarai (Umur)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Nomor Individu	:	
Jam berapa Anda berangkat dari rumah	:	
Jam berapa Anda datang ke rumah	:	
Jam berapa Anda tidur hari ini	:	

Q1	Bagaimana menurut Anda kondisi hari ini memperhatikan aktivitas Anda pada hari ini?	Sangat Buruk	1	2	3	4	5	6	7	Sangat Baik
Q2	Bagaimana mood Anda hari ini memperhatikan aktivitas Anda pada hari ini?	Negative	1	2	3	4	5	6	7	Positive
Q3	Apakah kegiatan Anda hari ini mencapai tujuan yang Anda inginkan	Jauh lebih rendah dari tujuan yang saya harapkan	1	2	3	4	5	6	7	Jauh lebih tinggi dari tujuan yang saya harapkan
Q4	Bila memperhitungkan segalanya, bagaimana pengaruh kegiatan hari ini dengan kepuasan hidup Anda secara menyeluruh?	Sangat tidak puas	1	2	3	4	5	6	7	Sangat puas

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	03.00						
	03.15						
	03.30						
	03.45						
	04.00						
	04.15						
	04.30						
	04.45						
	05.00						
	05.15						
	05.30						
	05.45						
	06.00						
	06.15						
	06.30						
	06.45						
	07.00						
	07.15						
	07.30						
	07.45						
	08.00						
	08.15						
	08.30						
	08.45						
	09.00						
	09.15						
	09.30						
	09.45						
	10.00						
	10.15						
	10.30						
	10.45						
	11.00						
	11.15						
	11.30						
	11.45						
	12.00						
	12.15						
	12.30						
	12.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	13.00						
	13.15						
	13.30						
	13.45						
	14.00						
	14.15						
	14.30						
	14.45						
	15.00						
	15.15						
	15.30						
	15.45						
	16.00						
	16.15						
	16.30						
	16.45						
	17.00						
	17.15						
	17.30						
	17.45						
	18.00						
	18.15						
	18.30						
	18.45						
	19.00						
	19.15						
	19.30						
	19.45						
	20.00						
	20.15						
	20.30						
	20.45						
	21.00						
	21.15						
	21.30						
	21.45						
	22.00						
	22.15						
	22.30						
	22.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ^{3/} JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	23.00						
	23.15						
	23.30						
	23.45						
	00.00						
	00.15						
	00.30						
	00.45						
	01.00						
	01.15						
	01.30						
	01.45						
	02.00						
	02.15						
	02.30						
	02.45						
	03.00						

¹ Aktivitas selain di tempat kerja/sekolah

² Aktivitas kedua ini atau *secondary activities* adalah aktivitas yang dilakukan bersamaan (multi-tasking) dengan kegiatan primer atau pertama. Kegiatan yang mungkin direcord adalah *passive leisure* dan makan atau kegiatan C, D dan E.

³ 1 untuk kegiatan yang melibatkan satu orang dan 2 untuk melibatkan lebih dari 2 orang. Kode 11 atau 21 bila pelibatan orang lain dilakukan secara off-line, dan 21 atau 22 bila melibatkan secara on-line

⁴ 1 untuk bila yang terlihat adalah anggota keluarga, 2 jika anggota keluarga besar, 3 jika kolega di tempat kerja atau komunitas bisnis, 4 untuk teman di sekolah atau komunitas, 5 untuk tetangga sekitar rumah, 6 untuk teman online.

⁵ Bagaimana rating perasaan Anda ketika melakukan aktivitas utama (primer)? Tidak Positif 1 7 Sangat Positif

⁶ Mohon dituliskan alamat/lokasi untuk kegiatan di tempat kerja/sekolah dan di tempat lain

HARI 6:

Nama Surveyor	:	
Tanggal Survei	:	
Hari survey (1-21), Hari Kerja (1) atau Akhir Pekan (0)	:	
Nama Individu yang diwawancarai (Umur)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Nomor Individu	:	
Jam berapa Anda berangkat dari rumah	:	
Jam berapa Anda datang ke rumah	:	
Jam berapa Anda tidur hari ini	:	

Q1	Bagaimana menurut Anda kondisi hari ini memperhatikan aktivitas Anda pada hari ini?	Sangat Buruk	1	2	3	4	5	6	7	Sangat Baik
Q2	Bagaimana mood Anda hari ini memperhatikan aktivitas Anda pada hari ini?	Negative	1	2	3	4	5	6	7	Positive
Q3	Apakah kegiatan Anda hari ini mencapai tujuan yang Anda inginkan	Jauh lebih rendah dari tujuan yang saya harapkan	1	2	3	4	5	6	7	Jauh lebih tinggi dari tujuan yang saya harapkan
Q4	Bila memperhitungkan segalanya, bagaimana pengaruh kegiatan hari ini dengan kepuasan hidup Anda secara menyeluruh?	Sangat tidak puas	1	2	3	4	5	6	7	Sangat puas

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	03.00						
	03.15						
	03.30						
	03.45						
	04.00						
	04.15						
	04.30						
	04.45						
	05.00						
	05.15						
	05.30						
	05.45						
	06.00						
	06.15						
	06.30						
	06.45						
	07.00						
	07.15						
	07.30						
	07.45						
	08.00						
	08.15						
	08.30						
	08.45						
	09.00						
	09.15						
	09.30						
	09.45						
	10.00						
	10.15						
	10.30						
	10.45						
	11.00						
	11.15						
	11.30						
	11.45						
	12.00						
	12.15						
	12.30						
	12.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	13.00						
	13.15						
	13.30						
	13.45						
	14.00						
	14.15						
	14.30						
	14.45						
	15.00						
	15.15						
	15.30						
	15.45						
	16.00						
	16.15						
	16.30						
	16.45						
	17.00						
	17.15						
	17.30						
	17.45						
	18.00						
	18.15						
	18.30						
	18.45						
	19.00						
	19.15						
	19.30						
	19.45						
	20.00						
	20.15						
	20.30						
	20.45						
	21.00						
	21.15						
	21.30						
	21.45						
	22.00						
	22.15						
	22.30						
	22.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ^{3/} JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	23.00						
	23.15						
	23.30						
	23.45						
	00.00						
	00.15						
	00.30						
	00.45						
	01.00						
	01.15						
	01.30						
	01.45						
	02.00						
	02.15						
	02.30						
	02.45						
	03.00						

¹ Aktivitas selain di tempat kerja/sekolah

² Aktivitas kedua ini atau *secondary activities* adalah aktivitas yang dilakukan bersamaan (multi-tasking) dengan kegiatan primer atau pertama. Kegiatan yang mungkin direcord adalah *passive leisure* dan makan atau kegiatan C, D dan E.

³ 1 untuk kegiatan yang melibatkan satu orang dan 2 untuk melibatkan lebih dari 2 orang. Kode 11 atau 21 bila pelibatan orang lain dilakukan secara off-line, dan 21 atau 22 bila melibatkan secara on-line

⁴ 1 untuk bila yang terlihat adalah anggota keluarga, 2 jika anggota keluarga besar, 3 jika kolega di tempat kerja atau komunitas bisnis, 4 untuk teman di sekolah atau komunitas, 5 untuk tetangga sekitar rumah, 6 untuk teman online.

⁵ Bagaimana rating perasaan Anda ketika melakukan aktivitas utama (primer)? Tidak Positif 1 7 Sangat Positif

⁶ Mohon dituliskan alamat/lokasi untuk kegiatan di tempat kerja/sekolah dan di tempat lain

HARI 7:

Nama Surveyor	:	
Tanggal Survei	:	
Hari survey (1-21), Hari Kerja (1) atau Akhir Pekan (0)	:	
Nama Individu yang diwawancarai (Umur)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Nomor Individu	:	
Jam berapa Anda berangkat dari rumah	:	
Jam berapa Anda datang ke rumah	:	
Jam berapa Anda tidur hari ini	:	

Q1	Bagaimana menurut Anda kondisi hari ini memperhatikan aktivitas Anda pada hari ini?	Sangat Buruk	1	2	3	4	5	6	7	Sangat Baik
Q2	Bagaimana mood Anda hari ini memperhatikan aktivitas Anda pada hari ini?	Negative	1	2	3	4	5	6	7	Positive
Q3	Apakah kegiatan Anda hari ini mencapai tujuan yang Anda inginkan	Jauh lebih rendah dari tujuan yang saya harapkan	1	2	3	4	5	6	7	Jauh lebih tinggi dari tujuan yang saya harapkan
Q4	Bila memperhitungkan segalanya, bagaimana pengaruh kegiatan hari ini dengan kepuasan hidup Anda secara menyeluruh?	Sangat tidak puas	1	2	3	4	5	6	7	Sangat puas

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	03.00						
	03.15						
	03.30						
	03.45						
	04.00						
	04.15						
	04.30						
	04.45						
	05.00						
	05.15						
	05.30						
	05.45						
	06.00						
	06.15						
	06.30						
	06.45						
	07.00						
	07.15						
	07.30						
	07.45						
	08.00						
	08.15						
	08.30						
	08.45						
	09.00						
	09.15						
	09.30						
	09.45						
	10.00						
	10.15						
	10.30						
	10.45						
	11.00						
	11.15						
	11.30						
	11.45						
	12.00						
	12.15						
	12.30						
	12.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	13.00						
	13.15						
	13.30						
	13.45						
	14.00						
	14.15						
	14.30						
	14.45						
	15.00						
	15.15						
	15.30						
	15.45						
	16.00						
	16.15						
	16.30						
	16.45						
	17.00						
	17.15						
	17.30						
	17.45						
	18.00						
	18.15						
	18.30						
	18.45						
	19.00						
	19.15						
	19.30						
	19.45						
	20.00						
	20.15						
	20.30						
	20.45						
	21.00						
	21.15						
	21.30						
	21.45						
	22.00						
	22.15						
	22.30						
	22.45						

NO	JAM	AKTIVITAS DI RUMAH	AKTIVITAS DI TEMPAT KERJA/ SEKOLAH	AKTIVITAS DI TEMPAT LAIN ¹	JENIS AKTIVITAS KEDUA ²	MELIBATKAN ORANG LAIN? ³ / JENIS RELASI DENGAN ORANG LAIN? ⁴	ALAMAT/ LOKASI DETIL ⁶
	23.00						
	23.15						
	23.30						
	23.45						
	00.00						
	00.15						
	00.30						
	00.45						
	01.00						
	01.15						
	01.30						
	01.45						
	02.00						
	02.15						
	02.30						
	02.45						
	03.00						

¹ Aktivitas selain di tempat kerja/sekolah

² Aktivitas kedua ini atau *secondary activities* adalah aktivitas yang dilakukan bersamaan (multi-tasking) dengan kegiatan primer atau pertama. Kegiatan yang mungkin direcord adalah *passive leisure* dan makan atau kegiatan C, D dan E.

³ 1 untuk kegiatan yang melibatkan satu orang dan 2 untuk melibatkan lebih dari 2 orang. Kode 11 atau 21 bila pelibatan orang lain dilakukan secara off-line, dan 21 atau 22 bila melibatkan secara on-line

⁴ 1 untuk bila yang terlihat adalah anggota keluarga, 2 jika anggota keluarga besar, 3 jika kolega di tempat kerja atau komunitas bisnis, 4 untuk teman di sekolah atau komunitas, 5 untuk tetangga sekitar rumah, 6 untuk teman online.

⁵ Bagaimana rating perasaan Anda ketika melakukan aktivitas utama (primer)? Tidak Positif 1 7 Sangat Positif

⁶ Mohon dituliskan alamat/lokasi untuk kegiatan di tempat kerja/sekolah dan di tempat lain

SURVEI RUMAH TANGGA 1 (*HOUSEHOLD SURVEY*)

Survey ini merupakan survey yang melibatkan pandangan rumah tangga dan anggota didalamnya. Survey ini terdiri dari 8 (delapan) bagian yaitu, komposisi anggota dalam rumah tangga, akomodasi, komunitas dan lingkungan sekitar, pembagian akomodasi dan akses jaringan (internet), perilaku perjalanan/transportasi, balita/remaja dalam rumah tangga, dan penghasilan.

Dalam proses survey ini, Anda akan didampingi/dibantu oleh surveyor, sehingga Anda dapat dengan mudah menjawab setiap pertanyaan. Jawablah setiap pertanyaan pada kolom jawab yang disediakan. Terimakasih untuk keikutsertaan Anda dalam survey ini.

Nama Kepala Keluarga (KK)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Tanggal Survei	:	
Nama Surveyor	:	

A. KOMPOSISI RUMAH TANGGA (*HOUSEHOLD COMPOSITION*)

1. Berapa banyak jumlah anggota keluarga dalam rumah tangga Anda (termasuk anak)?.....
orang
2. Dapatkah anda menyebutkan nama Anda (Kepala Keluarga)?.....
 - 2.1 Dapatkan anda menyebutkan nama anggota keluarga (rumah tangga) dan hubungannya dengan Anda?

Keterangan :

Kode	Hubungan Keluarga	Kode	Hubungan Keluarga	Kode	Hubungan Keluarga
1.	Suami/Istri/Pasangan	6.	Orang Tua	11.	Cucu
2.	Anak Kandung	7.	Orang Tua Tiri	12.	Kakek/Nenek
3.	Anak Tiri	8.	Mertua	13.	Teman Kost
4.	Anak Angkat	9.	Adik/Kakak Laki- laki/Perempuan	14.	Hubungan kekerabatan lain
5.	Menantu Laki- laki/Menantu Perempuan	10.	Adik/Kakak Ipar Laki- laki/Perempuan	15.	Hubungan non- kekerabatan lain

(Urutan dalam menyebutkan nama anggota keluarga akan digunakan seterusnya dalam form survei wawancara rumah tangga)

Contoh:

No	Nama	Hubungan Keluarga (Kode)	Gender
1	<i>Nur Eny F</i>	<i>1 (contoh)</i>	<i>P (Perempuan)</i>
2	<i>Hasan</i>	<i>2 (contoh)</i>	<i>L (laki-laki)</i>
3	<i>Husein</i>	<i>2 (contoh)</i>	<i>L (laki-laki)</i>
4	<i>Mas'adi</i>	<i>8 (contoh)</i>	<i>L (laki-laki)</i>

No	Nama	Hubungan Keluarga (Kode)	Gender
1			
2			
3			
4			

3. Dapatkah Anda menginformasikan usia Anda?tahun

3.1 Dapatkah Anda menginformasikan usia Anggota keluarga dalam rumah tangga Anda?

Contoh:

No	Kode	Nama	Usia
1	1	<i>Nur Eny F (Nama suami/istri/pasangan atau yang menjadi urutan pertama pada pertanyaan sebelumnya)</i>	32 tahun
2	2	<i>Hasan (Nama anak kandung atau yang menjadi urutan kedua pada pertanyaan sebelumnya)</i>	2 tahun
3	2	<i>Husein (Nama anak kandung 2 atau yang menjadi urutan ketiga pada pertanyaan sebelumnya)</i>	0 tahun
4	8	<i>Mas'adi (Nama orang tua atau yang menjadi urutan keempat pada pertanyaan sebelumnya)</i>	70 tahun

No	Kode	Nama	Usia
1			.....tahun
2			.....tahun
3			.....tahun

No	Kode	Nama	Usia
4			.....tahun
			.....tahun
			.....tahun

4. Apakah aktivitas Anda sehari-hari? (Jawaban: A-M)

Contoh: Apakah aktivitas Anda sehari-hari? (Jawaban: A-M)

- | | |
|--------------------------------|---|
| A. Bekerja (Permanen) | H. Mahasiswa (Diploma, Institut atau Universitas) |
| B. Bekerja (Kontrak/Sementara) | I. Mahasiswa (Pasca Sarjana) |
| C. Bekerja (Part Time) | J. Ibu Rumah Tangga |
| D. Pelajar (TK) | K. Pensiunan |
| E. Pelajar (SD) | L. Tidak Bekerja/Menganggur |
| F. Pelajar (SMP) | M. Lainnya, mohon sebutkan: |
| G. Pelajar (SMA) | |

4.1 Apakah aktivitas sehari-hari anggota keluarga Dalam rumah tangga anda?

Contoh:

No	Kode	Nama	Aktivitas
1	1	<i>Nur Eny F</i>	<i>B (contoh)</i>
2	2	<i>Hasan</i>	<i>G (contoh)</i>
3	2	<i>Husein</i>	<i>E (contoh)</i>
4	8	<i>Mas 'adi</i>	<i>K (contoh)</i>

No	Kode	Nama	Aktivitas
1			
2			
3			
4			

5. Apakah jenis lapangan pekerjaan Anda? (Jawaban: A-N)

- | | |
|-----------------------------------|-------------------------------|
| A. Perikanan/Pertanian/Perhutanan | H. Penyediaan Listrik/Gas/Air |
| B. Pertambangan | I. Jasa Pemerintah Pusat |
| C. Industri/Manufacture | J. Jasa Pemerintah Daerah |
| D. Konstruksi | K. Penyewaan/Rental |

- E. Komunikasi dan Transportasi
- F. Bank/Finance/Asuransi
- G. Usaha dagang/Wiraswasta
- L. Industri Jasa/Service
- M. Militer/Polisi
- N. Pengajar (Ustadz/Guru/Dosen)
- O. Lainnya

5.1 Apabila anggota keluarga dalam rumah tangga Anda seorang pekerja, apakah jenis lapangan pekerjaannya?

No	Kode	Nama	Pekerjaan
1		<i>(Nama suami/istri/pasangan atau yang menjadi urutan pertama pada pertanyaan sebelumnya)</i>	<i>G (contoh)</i>

6. Apakah status perkawinan Anda? (Jawaban: A-F)

- A. Menikah
- B. Tinggal bersama
- C. Single/Belum Menikah
- D. Janda/Duda
- E. Bercerai

6.1 Dapatkah anda meinformasikan status perkawinan anggota keluarga dalam rumah tangga Anda (usia di atas 16 tahun)?

No	Kode	Nama	Status Perkawinan
		<input type="checkbox"/>	

7. Apakah pendidikan terakhir Anda? (Jawaban: A-G)

- A. Sekolah Dasar
- B. Sekolah Menengah Pertama
- C. Sekolah Menengah Atas
- D. Diploma (D3)
- E. Sarjana(S1)
- F. Master/Doktor (S2/S3)
- G. Tanpa Latar Belakang Pendidikan

7.1 Apakah pendidikan terakhir anggota keluarga dalam rumah tangga Anda?

No	Kode	Nama	Pendidikan

B. AKOMODASI (TEMPAT TINGGAL)

8. Apakah jenis tempat tinggal Anda? (*Jawaban: A-G*)

- A. Permanen A (Rumah 1-2 lantai untuk kelas atas, dengan material konstruksi yang baik, garasi untuk >2 mobil dan taman yang luas)
- B. Permanen B (Rumah 1-2 lantai 100-200 m², untuk kelas menengah ke atas, dengan material konstruksi yang baik, garasi untuk 1-2 mobil, dengan taman yang cukup besar)
- C. Permanen C (Rumah satu lantai, 45-100 m², untuk kelas menengah dengan ada/tidak garasi dan taman yang kecil)
- D. Permanen D (Rumah sederhana, 21-44 m² untuk kelas menengah ke bawah, dengan ada/tidak taman kecil)
- E. Rumah semi permanen, dengan taman
- F. Rumah sementara, tanpa taman
- G. Lainnya, tolong sebutkan:

9. Dengan cara apa, Anda menempati tempat tinggal ini? (*Jawaban: A-G*)

- A. Kepunyaan sendiri
- B. Membeli sendiri (bantuan pinjaman, dll)
- C. Menyewa (tahunan)
- D. Menyewa (bulanan)
- E. Rumah dinas
- F. Tinggal tanpa biaya sewa
- G. Lainnya: tolong sebutkan:

9.1 Jika Anda memilih pilihan no C atau D, dari siapa Anda menyewa property tersebut? (*Jawaban: A-D*)

- A. Sewa khusus (*private rent*)
- B. Perusahaan/anggota keluarga lain
- C. Sahabat atau Relasi
- D. Lainnya: tolong sebutkan:

10. Berapa jauh tempat tinggal anda dari:

No	Lokasi	Kendaraan Pribadi		Kendaraan Umum	
		Km	Menit	Km	Menit
1	Pusat Kota				

No	Lokasi	Kendaraan Pribadi		Kendaraan Umum	
		Km	Menit	Km	Menit
2	bank/ktr. Pos				
3	TK				
4	Playgroup				
5	SD				
6	SMP/SMA				
7	Rumah Sakit				
8	Stasiun				
9	Halte Bus				
10	Supermarket				
11	Pasar				
12	Taman Kota				
13	Kantor Pemerintahan				
14	Tempat Perbelanjaan/Shopping Centre				
15	Puskesmas atau klinik kedokteran				

11.1 Berapa banyak transportasi umum yang dapat Anda gunakan untuk ke Pusat Kota? ...

C. LINGKUNGAN TEMPAT TINGGAL

11. (Berilah tanda silang pada pilihan jawaban Anda pada kolom SS/S/C/TS/STS)

Keterangan: SS= Sangat Setuju S= Setuju C=Cukup/Biasa saja TS=Tidak Setuju STS=Sangat Tidak Setuju

Contoh:

No	Pertanyaan	STS	TS	C	S	SS
1	Apa Anda pikir anda tinggal di lingkungan tempat tinggal yang baik/nyaman?					
2	Memiliki infrastruktur yang baik (misal: jalan yg baik, sistem sanitasi)				X	

No	Pertanyaan	SS	S	C	TS	STS
1	Apa Anda pikir anda tinggal di lingkungan tempat tinggal yang baik/nyaman?					
2	Memiliki infrastruktur yang baik (misal: jalan yg baik, sistem sanitasi)					
3	Merupakan lingkungan yang bersih dan tertata rapih?					
4	Merupakan area yang aman dengan kriminalitas rendah?					
5	Ditemukan kegiatan penyalahgunaan narkoba dan minuman keras?					
6	Ditemukan aksi perusakan (mis: graffiti) yang mengganggu kenyamanan?					
7	Ditemukan aksi pemuda yang tidak jelas yang mengganggu kenyamanan?					
8	Merupakan tempat dengan yang indah?					
9	Merupakan tempat yang tenang dan damai?					
10	Merupakan tempat yang aman untuk anak-anak bermain?					
11	Anda memiliki tetangga yang bersahabat?					
12	Merupakan tempat yang terkoneksi dengan sistem transportasi publik?					
13	Memiliki tempat parkir untuk setiap rumah, dan tempat parkir umum?					
14	Memiliki fasilitas umum yg baik (masjid, gereja, taman, gedung aula, dll)					
15	Memiliki fasilitas kesehatan yg baik (mudah ditemui puskesmas, klinik dan rumah sakit)?					
16	Memiliki tempat belanja/swalayan/supermarket yang besar dan baik?					
17	Memiliki pasar tradisional yang baik?					
18	Memiliki sekolah yang berstandar baik?					
19	Apakah tidak pernah atau jarang terjadi kemacetan?					
20	Apakah memiliki lalu lintas yang aman?					
21	Apakah Anda merasa hidup di lingkungan tempat tinggal Anda?					

No	Pertanyaan	SS	S	C	TS	STS
22	Apakah Anda bahagia di lingkungan tempat tinggal Anda?					
23	Apakah Anda sering berkomunikasi dengan tetangga di sekitar rumah Anda?					
24	Apakah orang-orang di sekitar rumah Anda ini saling mengenal?					
25	Apakah sering terdapat pertemuan antar warga masyarakat di sekitar rumah Anda?					
26	Apakah Anda sering mengikut acara pertemuan warga tersebut?					

D. AKSES INTERNET

12. Apakah Anda memiliki akses internet? (*Jawaban: A-B*)

- A. Ya
- B. Tidak

14.1 Jika, YA, dimana anda terkoneksi dengan internet? (*Jawaban: A-F*)

- A. Mobile internet
- B. Di kantor/tempat bekerja
- C. Di kafe internet, dll
- D. Di tempat teman
- E. Di perpustakaan publik
- F. Di perangkat mobile (Blackberry/Android)
- G. Lainnya: mohon sebutkan: ...

14.2 Jika, TIDAK, apakah anda familiar menggunakan internet? (*Jawaban: A-B*)

- A. Ya
- B. Tidak

14.3 Jika, YA, untuk keperluan apa Anda menggunakan internet? (*Jawaban: A-H, jawaban bisa lebih dari satu*)

- A. Akses ke social media (seperti: penggunaan Facebook, Instagram, YouTube dan sebagainya)
- B. Akses ke aktivitas leisure (seperti: game online dan sebagainya)
- C. Berkomunikasi dengan keluarga, teman kerja dan teman-teman lainya
- D. Akses ke belanja online (seperti tokopedia, bukalapak, shoppee, lazada dan sebagainya)
- E. Menggunakan transportasi online (seperti: Gojek, Grab dan sebagainya)
- F. Akses ke urusan pekerjaan seperti memeriksa email, browsing untuk keperluan pekerjaan dan sebagainya

G. Lainnya, mohon sebutkan:

H. Lainnya, mohon sebutkan:

14.4 Jika, YA, seberapa intensif Anda melakukan kegiatan online dalam satu hari? (*Jawaban:*

A-F)

A. 0 s.d 30 menit/hari

F. 150 s.d 180 menit/hari

B. 30 s.d 60 menit/hari

G. 180 s.d 210 menit/hari

C. 60 s.d 90 menit/hari

H. 210 s.d 240 menit/hari

D. 90 s.d 120 menit/hari

I. >240 menit/hari

E. 120 s.d 150 menit/hari

E. SOCIAL NETWORK

15. Coba Anda bayangkan orang-orang yang mempunyai **hubungan sangat dekat** dengan Anda. Orang ini bisa saja anggota keluarga Anda (seperti istri/suami, anak-anak Anda, bapak/ibu, adik/kakak), anggota keluarga besar Anda (seperti sepupu, paman/bibi, kakek/nenek), pacar atau teman sangat dekat, teman-teman di sekolah atau teman-teman di kantor.

15.1 Berapa orangkah orang yang Anda definisikan mempunyai **hubungan sangat dekat** dengan Anda?

A. 1

D. 5 - 7 orang

B. 2 - 3 orang

E. > 7 orang

C. 4 - 5 orang

F. Tidak Ada

15.2 Berapa kali Anda **dalam satu hari** berhubungan dengan orang yang **hubungannya sangat dekat** dengan Anda menggunakan telpon atau social media call (seperti Skype atau WhatsApp call atau Facebook call atau Line call dan sebagainya) ?

A. 0 s.d 1 kali/hari

D. 5 s.d 7 kali/hari

B. 2 s.d 3 kali/hari

E. > 7 kali /hari

C. 4 s.d 5 kali/hari

15.3 Berapa lama kira-kira Anda **dalam satu hari** berhubungan dengan orang yang sangat dekat hubungannya dengan Anda menggunakan telpon atau social media call (seperti Skype atau WhatsApp call atau Facebook call atau Line call dan sebagainya) ?

- A. 0 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- F. 100 s.d 120 menit/hari
- D. 60 s.d 75 menit/hari
- E. 75 s.d 100 menit/hari
- G. >120 menit/hari

16. Coba Anda bayangkan orang-orang yang mempunyai **hubungan cukup dekat tapi tidak sangat dekat** dengan Anda. Orang ini bisa saja anggota keluarga Anda (seperti istri/suami, anak-anak Anda, bapak/ibu, adik/kakak), anggota keluarga besar Anda (seperti sepupu, paman/bibi, kakek/nenek), pacar atau teman sangat dekat, teman-teman di sekolah atau teman-teman di kantor.

16.1 Berapa orangkah orang yang Anda definisikan mempunyai **hubungan cukup dekat tapi tidak sangat dekat** dengan Anda?

- G. 1
- H. 2 - 3 orang
- I. 4 - 5 orang
- J. 5 - 7 orang
- K. > 7 orang
- L. Tidak Ada

16.2 Berapa kali Anda **dalam satu hari** berhubungan dengan orang yang **hubungan cukup dekat tapi tidak sangat dekat** dengan Anda menggunakan telpon atau social media call (seperti Skype atau WhatsApp call atau Facebook call atau Line call dan sebagainya) ?

- H. 0 s.d 1 kalo/hari
- I. 2 s.d 3 kali/hari
- J. 4 s.d 5 kali/hari
- K. 5 s.d 7 kali/hari
- L. > 7 kali /hari

16.3 Berapa lama kira-kira Anda **dalam satu hari** berhubungan dengan orang yang sangat dekat hubungannya dengan Anda menggunakan telpon atau social media call (seperti Skype atau WhatsApp call atau Facebook call atau Line call dan sebagainya) ?

- G. 0 s.d 15 menit/hari
- H. 15 s.d 30 menit/hari
- I. 30 s.d 45 menit/hari
- M. 45 s.d 60 menit/hari
- J. 60 s.d 75 menit/hari
- K. 75 s.d 100 menit/hari
- L. 100 s.d 120 menit/hari
- N. >120 menit/hari

E. PERILAKU PERJALANAN/TRANSPORTASI

17. Apakah Anda mempunyai kendaraan pribadi? (Jawaban: A-B)

- A. Ya
- B. Tidak

17.1 Jika, YA, berapa banyak kendaraan pribadi Anda?.....buah

17.2 Kendaraan jenis apa yang Anda punyai? (*Jawaban: A-E*)

- A. Sedan, Jeep, Kijang dan sejenisnya
B. Station wagon atau van seperti VW Combi, Suzuki Carry, Daihatsu zebra, Suzuki MPV dan sejenisnya
C. Pick-up
D. Motor
E. Lebih dari 1 jenis, sebutkan:
F. Lebih dari 2 jenis, sebutkan:
G. Lainnya

17.3 Seberapa sering Anda menggunakannya? (*Jawaban: A-F*)

- A. Setiap hari
B. Beberapa hari dalam seminggu
C. Satu hari dalam seminggu
D. Pada hari kerja saja (weekdays)
E. Pada hari libur (weekend)
F. Lainnya, mohon sebutkan:.....

17.4 Apakah Anda menggunakan kendaraan pribadi tersebut secara penuh atau secara parsial?

(*Jawaban: A-E*)

- A. Secara menyeluruh
B. Secara parsial, dan terintegrasi dengan moda transportasi, tolong sebutkan:.....

17.5 Apakah Anda juga menggunakan moda transportasi lainnya? (*Jawaban: A-B*)

- A. Ya
B. Tidak

17.6 Jika anda menjawab YA mohon sebutkan moda transportasi lainnya: (*Jawaban: A-E*)

- A. Angkutan umum Bus seperti Angkot, Bus Sedang, Bus Besar, TMB dan sejenisnya
B. Angkutan umum KA
C. Bus Karyawan
D. Ojeg
E. Sepeda
F. Taksi
G. Lainnya, mohon sebutkan:.....

17.7 Seberapa sering Anda menggunakan moda transportasi lainnya? (*Jawaban: A-F*)

- A. Setiap hari
B. Beberapa hari dalam seminggu
C. Satu hari dalam seminggu
D. Pada hari kerja saja (weekdays)
E. Pada hari libur (weekend)
F. Lainnya, mohon sebutkan:.....

18. Apabila pada pertanyaan No.17 Anda menyatakan TIDAK, bagaimana cara Anda melakukan perjalanan/aktivitas? (*Jawaban: A-D*)

- A. Transportasi umum, seperti angkot, bus sedang, bus besar, KA, TMB dan sejenisnya
B. Angkutan KA
C. Taksi, ojeg atau bajaj
D. Bus Karyawan
E. Mobil bersama (*car sharing*)
F. Transportasi tidak bermotor

G. Lainnya: tolong sebutkan: ...

19. Apakah anda berbagi dengan anggota keluarga lainnya dalam hal penggunaan kendaraan pribadi? (Jawaban: A-B)

- A. Ya
- B. Tidak

19.1 Jika, YA, bagaimana Anda berbagi kendaraan tersebut? (Jawaban: A-D)

- A. Menggunakannya secara bergantian
- B. Menggunakannya secara bersama di setiap aktivitas
- C. Menggunakan secara bergantian dan secara bersama di setiap aktivitas
- D. Lainnya, tolong sebutkan: ...

F. PENDAPATAN RUMAH TANGGA

20. Berapa hari Anda bekerja dalam satu minggu? (Jawaban: A-F)

- A. Kurang dari 3 hari /minggu
- B. 3 hari /minggu
- C. 4 hari /minggu
- D. 5 hari /minggu
- E. 6 hari /minggu
- F. 7 hari /minggu

a. Jika ada anggota keluarga dalam rumah tangga Anda bekerja, berapa hari mereka bekerja /minggu? (Jawaban: A-F)

No	Kode	Nama	Bekerja dalam seminggu
1			
2			

21. Apakah Anda memiliki pekerjaan lain di samping pekerjaan utama? (Jawaban: A-F)

- A. Ya
- B. Tidak

21.1 Jika, YA, apa jenis pekerjaan disamping pekerjaan utama Anda? (Jawaban: A-D)

- A. Pekerjaan /bisnis sendiri
- B. Bekerja dengan relasi bisnis
- C. Bekerja padaperusahaan lain
- D. Lainnya, tolong sebutkan: ...

22. Berapa jumlah pendapatan/bulan rumah tangga Anda? (Jawaban: A-F)

- A. kurang dari Rp.1.000.000
- B. Rp.1.000.000 – Rp.3.000.000
- C. Rp.3.000.000 – Rp. 6.000.000
- D. Rp.6.000.000 – Rp. 9.000.000
- E. Rp.9.000.000 – Rp. 15.000.000
- F. Rp.15.000.000 – Rp. 20.000.000
- G. Di atas Rp 20.000.000

23. Berapa persentase biaya transportasi dari pendapatan Anda? (*Jawaban: A-F*)

A. 0 – 10%

D. 30 – 40%

B. 10 – 20%

E. lebih dari 40%

C. 20 – 30%

F. tidak mengetahui

SURVEI RUMAH TANGGA 2-AKTIVITAS FISIK (HOUSEHOLD SURVEY-PHYSICAL ACTIVITY)

Survey ini akan mempertanyakan aktivitas fisik dan sosial individu, serta komunikasi dalam keluarga (rumah tangga), perilaku/gaya hidup dan kualitas hidup.

Dalam proses survey ini, Anda akan didampingi/dibantu oleh surveyor, sehingga Anda dapat dengan mudah menjawab setiap pertanyaan. Jawablah setiap pertanyaan pada kolom jawab yang disediakan. Terimakasih untuk keikutsertaan Anda dalam survey ini.

Nama Kepala Keluarga (KK)	:	
Alamat Rumah	:	
Kelurahan, Kecamatan, Wilayah Pengembangan, Kota	:	
Nomor KK	:	
Tanggal Survei	:	
Nama Surveyor	:	

A. AKTIVITAS FISIK

1. Tolong sebutkan berat dan tinggi badan Anda!.....kg.....cm

1.1 Untuk seluruh anggota keluarga dalam rumah tangga Anda, tolong sebutkan berat dan tinggi badannya! (*Urutan nama anggota keluarga disesuaikan dengan pertanyaan pada kuesioner Rumah Tangga-1*)

Contoh:

No	Kode	Nama	Berat	Tinggi
1	1	<i>Nur Eny F</i>	62 kg	165 cm
2	2	<i>Hasan</i>	12 kg	110 cm
3	2	<i>Husein</i>	5 kg	60 cm
4	8	<i>Masa'di</i>	40 kg	150 cm

No		Nama	Berat	Tinggi
1			.....kg	.....cm
2			.....kg	.....cm
3			.....kg	.....cm
4			.....kg	.....cm

2. Apakah Anda memiliki pekerjaan atau kegiatan sukarela (tidak dibayar) di luar rumah?
(Jawaban A-B)

Contoh: Apakah Anda memiliki pekerjaan atau kegiatan sukarela (tidak dibayar) di luar rumah? (Jawaban A-B)

Jika responden menjawab "TIDAK", lanjut ke pertanyaan nomor 9)

- A. 1.Ya
- B. 2.Tidak

2.1 Untuk seluruh anggota keluarga dalam rumah tangga Anda, apakah mereka memiliki pekerjaan atau kegiatan sukarela (tidak dibayar) di luar rumah? (Urutan nama anggota keluarga disesuaikan dengan pertanyaan pada kuesioner Rumah Tangga-1)

Contoh:

No	Kode	Nama	Pekerjaan atau kegiatan sukarela
1	1	Nur Eny F	B

No	Kode	Nama	Pekerjaan atau kegiatan sukarela
1			
2			
3			
4			

3. Aktivitas Berat

3.1 Selama 7 hari yang lalu, berapa hari dalam 1 minggu anda melakukan aktivitas berat (mengangkat beban berat, menaiki tangga, dll) sebagai bagian dari pekerjaan Anda?..... hari per minggu

3.2 Selain itu, berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas fisik berat sebagai bagian dari pekerjaan Anda? (Jawaban: A-I)

- F. 0 s.d 30 menit/hari
- G. 30 s.d 60 menit/hari
- H. 60 s.d 90 menit/hari
- I. 90 s.d 120 menit/hari
- J. 120 s.d 150 menit/hari
- K. 150 s.d 180 menit/hari
- L. 180 s.d 210 menit/hari
- M. 210 s.d 240 menit/hari
- N. >240 menit/hari

3.3 Bagaimana dengan keluarga Anda? (Urutan nama anggota keluarga disesuaikan dengan pertanyaan pada kuesioner Rumah Tangga-1)

Contoh:

No	Kode	Nama	Jumlah hari melakukan aktivitas berat	Berapa lama dalam 1 hari melakukan aktivitas berat
1	1	<i>Nur Eny F</i>	0 hari per 1 minggu	<i>A (contoh)</i>
2	2	<i>Hasan</i>	0 hari per 1 minggu	<i>A (contoh)</i>
3	2	<i>Husein</i>	0 hari per 1 minggu	<i>A (contoh)</i>
4	8	<i>Mas'Adi</i>	0 hari per 1 minggu	<i>A (contoh)</i>

No	Kode	Nama	Jumlah hari melakukan aktivitas berat	Berapa lama dalam 1 hari melakukan aktivitas berat
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

4. Aktivitas fisik moderat/sedang

4.1 Pikirkan kembali tentang aktivitas fisik yang Anda lakukan setidaknya selama 10 menit dalam satu waktu. Selama 7 hari yang lalu, berapa hari Anda melakukan aktivitas fisik moderat/sedang seperti membawa beban ringan, sebagai bagian dari pekerjaan Anda? (tidak termasuk “berjalan kaki”).....hari per 1 minggu

4.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas fisik moderat/sedang sebagai bagian dari pekerjaan Anda? (*Jawaban: A-I*)

- | | |
|---------------------------|---------------------------|
| A. 10 s.d 30 menit/hari | F. 150 s.d 180 menit/hari |
| B. 30 s.d 60 menit/hari | G. 180 s.d 210 menit/hari |
| C. 60 s.d 90 menit/hari | H. 210 s.d 240 menit/hari |
| D. 90 s.d 120 menit/hari | I. >240 menit/hari |
| E. 120 s.d 150 menit/hari | |

4.3 Bagaimana dengan keluarga Anda? (*Urutan nama anggota keluarga disesuaikan dengan pertanyaan pada kuesioner Rumah Tangga-1*)

No	Kode	Nama	Jumlah hari melakukan aktivitas moderat/sedang	Berapa lama dalam 1 hari melakukan aktivitas moderat/sedang
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

5. Berjalan kaki

5.1 Selama 7 hari yang lalu, berapa hari Anda berjalan selama setidaknya 10 menit, sebagai bagian dari pekerjaan Anda? (tidak termasuk berjalan kaki sebagai bagian dari perilaku perjalanan Anda dari dan atau ke tempat kerja/sekolah).....hari/minggu

5.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk berjalan kaki sebagai bagian dari pekerjaan/sekolah mereka? (Jawaban: A-H)

- A. 10 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

5.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berjalan kaki	Berapa lama dalam 1 hari melakukan aktivitas berjalan kaki
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

6. Aktivitas perjalanan dengan kendaraan bermotor

6.1 Selama 7 hari yang lalu, berapa hari anda melakukan perjalanan dengan kendaraan bermotor seperti kereta, bus, mobil, motor, tram?hari/minggu

6.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan perjalanan dengan kendaraan bermotor? (Jawaban: A-H)

- A. 0 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

6.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berkendara bermotor	Berapa lama dalam 1 hari melakukan aktivitas berkendara bermotor
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

7. Aktivitas perjalanan dengan sepeda

7.1 Selama 7 hari yang lalu, berapa hari Anda menggunakan sepeda setidaknya selama 10 menit dalam satu waktu untuk berpergian dari satu tempat ke tempat lain?
.....hari/minggu

7.2 Selama 7 hari yang lalu, berapa hari Anda menggunakan sepeda setidaknya selama 10 menit dalam satu waktu untuk berpergian dari satu tempat ke tempat lain? waban: A-H)

- A. 10 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

7.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas bersepeda	Berapa lama dalam 1 hari melakukan aktivitas bersepeda
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

8. Aktivitas perjalanan dengan berjalan kaki

8.1 Selama 7 hari yang lalu, berapa hari anda berjalan kaki setidaknya selama 10 menit, untuk berpergian dari satu tempat ke tempat lain?hari/minggu

8.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk berjalan kaki untuk berpergian dari satu tempat ke tempat lain? (Jawaban: A-H)

- A. 10 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

8.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berjalan kaki	Berapa lama dalam 1 hari melakukan aktivitas berjalan kaki
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

9. Aktivitas berat di pekarangan/halaman atau di dalam rumah

9.1 Selama 7 hari yang lalu di sekitar rumah Anda (seperti pekerjaan rumah, berkebun, dll) setidaknya selama 10 menit dalam satu waktu, berapa hari Anda melakukan aktivitas fisik berat (seperti mengangkat beban berat, dll) di pekarangan/halaman atau di dalam rumah Anda?hari/minggu

9.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas fisik berat di pekarangan/halaman atau di dalam rumah Anda? (Jawaban: A-H)

- A. 10 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

9.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berat di pekarangan/halaman	Berapa lama dalam 1 hari melakukan aktivitas berat di pekarangan/halaman
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

10. Aktivitas moderat/ sedang di pekarangan/halaman atau di dalam rumah

10.1 Selama 7 hari yang lalu di sekitar rumah Anda (seperti pekerjaan rumah, berkebun, dll) setidaknya selama 10 menit dalam satu waktu, berapa hari Anda melakukan aktivitas fisik sedang/moderat (seperti mengangkat beban ringan, menyapu dll) di pekarangan/halaman atau di dalam rumah Anda?.....hari/minggu

10.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas fisik sedang/moderat di pekarangan/halaman atau di dalam rumah Anda?

(Jawaban: A-H)

A. 10 s.d 15 menit/hari

E. 60 s.d 75 menit/hari

B. 15 s.d 30 menit/hari

F. 75 s.d 100 menit/hari

C. 30 s.d 45 menit/hari

G. 100 s.d 120 menit/hari

D. 45 s.d 60 menit/hari

H. >120 menit/hari

10.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas moderat/ sedang di pekarangan/halaman	Berapa lama dalam 1 hari melakukan aktivitas moderat/ sedang di pekarangan/halaman
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

No	Kode	Nama	Jumlah hari melakukan aktivitas moderat/sedang di pekarangan/halaman	Berapa lama dalam 1 hari melakukan aktivitas moderat/sedang di pekarangan/halaman

11. Aktivitas duduk

11.1 Selama 7 hari yang lalu, berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk duduk (seperti duduk saat bekerja, les, waktu luang, saat membaca buku, menonton televisi, dll) pada hari kerja (*weekdays*)? (*Jawaban: A-I*)

- | | |
|---------------------------|---------------------------|
| A. 0 s.d 30 menit/hari | F. 150 s.d 180 menit/hari |
| B. 30 s.d 60 menit/hari | G. 180 s.d 210 menit/hari |
| C. 60 s.d 90 menit/hari | H. 210 s.d 240 menit/hari |
| D. 90 s.d 120 menit/hari | I. >240 menit/hari |
| E. 120 s.d 150 menit/hari | |

11.2 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Berapa lama dalam 1 hari melakukan aktivitas duduk
1			
2			
3			
4			

B. AKTIVITAS FISIK DI WAKTU LUANG

12. Berjalan kaki di waktu luang atau tidak dalam rangka melakukan perjalanan

12.1 Dengan tidak menghitung kegiatan berjalan kaki yang sudah disebutkan sebelumnya, selama 7 hari yang lalu, berapa hari Anda berjalan kaki setidaknya selama 10 menit di waktu luang Anda?

12.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk berjalan kaki di waktu luang Anda? (*Jawaban: A-H*)

- A. 10 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

12.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berjalan kaki di waktu luang	Berapa lama dalam 1 hari melakukan aktivitas berjalan kaki di waktu luang
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

13. Persepsi dalam melakukan aktivitas berjalan kaki di waktu luang!

13.1 Seberapa senang Anda ketika Anda berjalan kaki di waktu luang Anda selama 7 hari yang lalu?

tdk senang 1 2 3 4 5 6 7 sgt senang

13.2 Bandingkan dengan tahun lalu, seberapa sering Anda berjalan kaki di waktu luang Anda?

lbh jarang 1 2 3 4 5 6 7 lbh sering

13.3 Bagaimana dengan keluarga Anda?

Contoh:

No	Kode	Nama	Seberapa senang berjalan kaki di waktu luang	Seberapa sering berjalan kaki di waktu luang dibandingkan dengan tahun lalu
1	1	Nur Eny F	tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
2				
3				
4	8	Mas'adi	tdk senang 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering

No	Kode	Nama	Seberapa senang berjalan kaki di waktu luang	Seberapa sering berjalan kaki di waktu luang dibandingkan dengan tahun lalu
1			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
2			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
3			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
4			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering

14. Aktivitas fisik berat di waktu luang atau berolahraga berat

14.1 Coba pikirkan mengenai aktivitas fisik yang Anda lakukan setidaknya selama 10 menit.

Selama 7 hari yang lalu, berapa hari Anda melakukan aktivitas fisik berat seperti aerobic, lari, bersepeda cepat, berenang, bermain bola, dll di waktu luang Anda?.....hari/minggu

14.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas fisik berat seperti aerobic, lari, bersepeda cepat, berenang, bermain bola, dll di waktu luang Anda? (*Jawaban: A-H*)

M. 0 s.d 15 menit/hari

Q. 60 s.d 75 menit/hari

N. 15 s.d 30 menit/hari

R. 75 s.d 100 menit/hari

O. 30 s.d 45 menit/hari

S. 100 s.d 120 menit/hari

P. 45 s.d 60 menit/hari

T. >120 menit/hari

14.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berolahraga berat	Berapa lama dalam 1 hari melakukan aktivitas berolahraga berat
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

No	Kode	Nama	Jumlah hari melakukan aktivitas berolahraga berat	Berapa lama dalam 1 hari melakukan aktivitas berolahraga berat

15. Persepsi melakukan aktivitas fisik berat di waktu luang atau berolahraga berat!

15.1 Seberapa senang Anda ketika Anda melakukan aktivitas fisik berat di waktu luang Anda selama 7 hari yang lalu?

tdk senang 1 2 3 4 5 6 7 sgt senang

15.2 Bandingkan dengan tahun lalu, seberapa sering Anda melakukan aktivitas fisik berat di waktu luang Anda?

lbh jarang 1 2 3 4 5 6 7 lbh sering

15.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Seberapa senang berolahraga berat di waktu luang	Seberapa sering berolahraga berat di waktu luang dibandingkan dengan tahun lalu
1			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh s
2			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
3			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
4			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering

16. Aktivitas fisik moderat/sedang di waktu luang atau berolahraga moderat/sedang

16.1 Coba pikirkan mengenai aktivitas fisik yang Anda lakukan setidaknya selama 10 menit.

Selama 7 hari yang lalu, berapa hari Anda melakukan aktivitas fisik sedang/moderat seperti bersepeda ringan, renang ringan, tenis, dll di waktu luang Anda?
.....hari/minggu

16.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas fisik sedang/moderat seperti bersepeda ringan, renang ringan, tenis, dll di waktu luang Anda? (Jawaban: A-H)

- A. 10 s.d 15 menit/hari
- B. 15 s.d 30 menit/hari
- C. 30 s.d 45 menit/hari
- D. 45 s.d 60 menit/hari
- E. 60 s.d 75 menit/hari
- F. 75 s.d 100 menit/hari
- G. 100 s.d 120 menit/hari
- H. >120 menit/hari

16.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas berolahraga moderat/sedang	Berapa lama dalam 1 hari melakukan aktivitas berolahraga moderat/sedang
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

17. Persepsi melakukan aktivitas moderat/sedang di waktu luang atau berolahraga moderat/sedang

17.1 Seberapa senang Anda ketika Anda melakukan aktivitas fisik sedang/moderat di waktu luang Anda selama 7 hari yang lalu?

tdk senang 1 2 3 4 5 6 7 sgt senang

17.2 Bandingkan dengan tahun lalu, seberapa sering Anda melakukan aktivitas fisik sedang/moderat di waktu luang Anda?

lbh jarang 1 2 3 4 5 6 7 lbh sering

17.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Seberapa senang berolahraga moderat/sedang di waktu luang	Seberapa sering berolahraga moderat/sedang di waktu luang dibandingkan dengan tahun lalu
1			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
2			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
3			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
4			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering

C. AKTIVITAS SOSIAL DAN KOMUNIKASI DALAM KELUARGA

18. Aktivitas sosial dan komunikasi dalam keluarga

18.1 Coba pikirkan mengenai aktivitas sosial yang Anda lakukan setidaknya selama 10 menit. Selama 7 hari yang lalu, berapa hari Anda melakukan aktivitas sosial seperti kegiatan sukarela, organisasi, penyelenggaraan acara, bersosialisasi, dll?

18.2 Berapa lama (waktu) Anda terbiasa meluangkan waktu dalam satu hari untuk melakukan aktivitas sosial? (Jawaban A-H)

- | | |
|-------------------------|---------------------------|
| A. 0 s.d 15 menit/hari | E. 60 s.d 75 menit/hari |
| B. 15 s.d 30 menit/hari | F. 75 s.d 100 menit/hari |
| C. 30 s.d 45 menit/hari | G. 100 s.d 120 menit/hari |
| D. 45 s.d 60 menit/hari | H. >120 menit/hari |

18.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas sosial	Berapa lama dalam 1 hari melakukan aktivitas sosial
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

19. Persepsi dalam melakukan aktivitas sosial!

19.1 Seberapa senang Anda ketika Anda melakukan aktivitas sosial?

tdk senang 1 2 3 4 5 6 7 sgt senang

19.2 Bandingkan dengan tahun lalu, seberapa sering Anda melakukan aktivitas sosial?

lbh jarang 1 2 3 4 5 6 7 lbh sering

19.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Seberapa senang melakukan aktivitas sosial	Seberapa sering melakukan aktivitas sosial dibandingkan dengan tahun lalu
1			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
2			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
3			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
4			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering

20. Aktivitas bersama keluarga

20.1 Selama 7 hari yang lalu, berapa hari Anda biasa mengisi waktu dengan berkomunikasi atau beraktivitas bersama anggota keluarga pada hari kerja (weekday)?

20.2 Selama 7 hari yang lalu, berapa lama (waktu) Anda biasa mengisi waktu dengan berkomunikasi atau beraktivitas bersama anggota keluarga pada akhir pekan (weekend)?

(Jawaban A-H)

A. 0 s.d 15 menit/hari

E. 60 s.d 75 menit/hari

B. 15 s.d 30 menit/hari

F. 75 s.d 100 menit/hari

C. 30 s.d 45 menit/hari

G. 100 s.d 120 menit/hari

D. 45 s.d 60 menit/hari

H. >120 menit/hari

20.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Jumlah hari melakukan aktivitas keluarga	Berapa lama dalam 1 hari melakukan aktivitas keluarga
1			.....hari per 1 minggu	
2			.....hari per 1 minggu	
3			.....hari per 1 minggu	
4			.....hari per 1 minggu	

21. Persepsi melakukan aktivitas bersama keluarga!

21.1 Seberapa senang Anda ketika Anda melakukan aktivitas komunikasi bersama anggota keluarga?

tdk senang 1 2 3 4 5 6 7 sgt senang

21.2 Bandingkan dengan tahun lalu, seberapa sering Anda melakukan aktivitas komunikasi bersama anggota keluarga?

lbh jarang 1 2 3 4 5 6 7 lbh sering

21.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Seberapa senang melakukan aktivitas keluarga	Seberapa sering melakukan keluarga dibandingkan dengan tahun lalu
1			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
2			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
3			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering
4			tdk senang 1 2 3 4 5 6 7 sgt senang	Lbh jarang 1 2 3 4 5 6 7 lbh sering

D. PERILAKU/KEBIASAAN DALAM GAYA HIDUP

22. Perilaku/kebiasaan dalam gaya hidup

No	Pertanyaan	Seberapa sering sarapan setiap hari
1	Bandingkan dengan tahun lalu, seberapa sering Anda sarapan setiap hari?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
2	Bandingkan dengan tahun lalu, seberapa sering Anda tidur selama rata-rata 7-8 jam?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
3	Bandingkan dengan tahun lalu, seberapa sering Anda makan dengan gizi yang seimbang?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
4	Bandingkan dengan tahun lalu, seberapa sering Anda merokok?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
5	Bandingkan dengan tahun lalu, seberapa sering Anda melakukan aktivitas fisik dan olahraga rutin?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
6	Bandingkan dengan tahun lalu, seberapa sering Anda minum minuman berakohol terlalu banyak?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
7	Bandingkan dengan tahun lalu, seberapa sering Anda bekerja kurang dari 9 jam/hari?	Lbh jarang 1 2 3 4 5 6 7 lbh sering
8	Bandingkan dengan tahun lalu, seberapa sering Anda mengalami stress/tekanan?	Lbh jarang 1 2 3 4 5 6 7 lbh sering

23. Mohon pilih ekspresikan perilaku/kebiasaan dalam gaya hidup keluarga Anda!

Mohon pilih salah satu rating dari range berikut: Lbh jarang 1 2 3 4 5 6 7 lbh sering

Contoh:

No	Kode	Nama	Pertanyaan No:							
			1	2	3	4	5	6	7	8
1	1	Nur Eny F.	7	2	3	1	7	1	6	7

No	Kode	Nama	1	2	3	4	5	6	7	8
1										
2										
3										
4										

No	Kode	Nama	1	2	3	4	5	6	7	8

E. KESEHATAN DAN KAITANNYA DENGAN KUALITAS HIDUP

24. Persepsi tentang kesehatan Anda!

24.1 Secara umum, Anda berpikir bahwa kesehatan Anda?
 sgt buruk 1 2 3 4 5 6 7 sgt baik

24.2 Bandingkan dengan tahun lalu, bagaimana Anda berpikir tentang kesehatan Anda secara umum?

lhb buruk 1 2 3 4 5 6 7 lhb baik

24.3 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Seberapa baik kesehatan Anda	Seberapa baik kesehatan Anda dibandingkan dengan tahun lalu
1			Sgt buruk 1 2 3 4 5 6 7 sgt baik	Lbh buruk 1 2 3 4 5 6 7 lhb t
2			Sgt buruk 1 2 3 4 5 6 7 sgt baik	Lbh buruk 1 2 3 4 5 6 7 lhb t
3			Sgt buruk 1 2 3 4 5 6 7 sgt baik	Lbh buruk 1 2 3 4 5 6 7 lhb t
4			Sgt buruk 1 2 3 4 5 6 7 sgt baik	Lbh buruk 1 2 3 4 5 6 7 lhb t

25. Pertanyaan berikut ini berkaitan dengan aktivitas Anda sehari-hari. Apakah kondisi kesehatan Anda saat ini membatasi Anda dalam beraktivitas? Seberapa besar?

A. YA, Sangat membatasi B. YA, hanya sedikit membatasi C. Tidak membatasi sama sekali

No	Pertanyaan	Membatasi atau Tidak? (Jawaban A-C)
1	Aktivitas berat (lari, mengangkat beban berat, dan olahraga berat lainnya)	
2	Aktivitas sedang (bowling, golf, memindahkan meja, dll)	

No	Pertanyaan	Membatasi atau Tidak? (Jawaban A-C)
3	Mengangkat atau membawa barang belanjaan (groceries)	
4	Menaiki beberapa anak tangga	
5	Menaiki satu anak tangga	
6	Berlutut, berputar dll	
7	Berjalan lebih dari 1 mil	
8	Berjalan beberapa ratus yard	
9	Berjalan seratus yard	
10	Mandi dan berpakaian	

25.1 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Pertanyaan/Jawaban A-C										
			1	2	3	4	5	6	7	8	9	10	
1													
2													
3													
4													

26. Selama 4 minggu yang lalu, berapa banyak (waktu) Anda mendapat masalah berikut pada saat bekerja atau aktivitas harian lainnya sebagai akibat dari kondisi kesehatan Anda? (Jawaban A-E)

- A. Sepanjang Waktu B. Hampir Sepanjang Waktu C. Beberapa Waktu
D. Sangat Jarang E. Tidak Pernah

No	Pertanyaan	Berapa banyak waktu mendapat masalah (Jawaban A-E)
1	Memangkas waktu Anda untuk bekerja	
2	Pencapaian yang tidak seperti yang diharapkan/diinginkan	
3	Keterbatasan dalam pekerjaan atau aktivitas tertentu lainnya	

4	Kesulitan dalam bekerja atau berkegiatan	
---	--	--

26.1 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Pertanyaan/Jawaban A-E			
			1	2	3	4
1						
2						
3						
4						

27. Selama 4 minggu yang lalu, berapa banyak (waktu) Anda mendapat masalah berikut pada saat bekerja atau aktivitas harian lainnya sebagai akibat dari kondisi emosional Anda?

- A. Sepanjang Waktu B. Hampir Sepanjang Waktu C. Beberapa Waktu
D. Sangat Jarang E. Tidak Pernah

No	Pertanyaan	Berapa banyak waktu mendapat masalah (Jawaban A-E)
1	Memangkas waktu Anda untuk bekerja	
2	Pencapaian yang tidak seperti yang diharapkan/diinginkan	
3	Melakukan pekerjaan atau aktivitas lebih ceroboh dibandingkan biasanya	

27.1 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Pertanyaan/Jawaban A-E		
			1	2	3
1					
2					
3					
4					

28. Selama 4 minggu yang lalu, bagaimana kondisi Anda atas beberapa pertanyaan berikut mengganggu aktivitas Anda?

- A. Tidak sama sekali B. Sedikit C. Cukup
 D. Cukup banyak E. Sangat banyak

No	Pertanyaan	Seberapa Jauh Mengganggu (Jawaban A-E)
1	Selama 4 minggu yang lalu, sejauh apakah masalah kesehatan atau emosional Anda mengganggu aktivitas sosial Anda dengan keluarga, sahabat, tetangga, dll?	
2	Seberapa banyak sakit (jasmani) yang Anda alami selama 4 minggu terakhir?	
3	Selama 4 minggu terakhir, berapa banyak sakit tersebut mengganggu pekerjaan Anda (baik di dalam/luar rumah atau di tempat kerja)	

28.1 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Pertanyaan/Jawaban A-E		
			1	2	3
1					
2					
3					
4					

29. Pertanyaan berikut ini berkaitan dengan perasaan Anda dan keadaan yang terjadi selama 4 minggu terakhir. Untuk setiap pertanyaan, jawablah dengan memilih jawaban jawaban yang sesuai dengan perasaan Anda!

Berikut pilihan jawabannya:

- A. Sepanjang Waktu B. Hampir Sepanjang Waktu C. Beberapa Waktu
 D. Sangat Jarang E. Tidak Pernah

No	Pertanyaan	Berapa lama Anda merasakan berdasarkan pertanyaan berikut? (Jawaban A-E)
1	Apakah Anda merasa hidup?	
2	Apakah Anda merasa nervous?	
3	Apakah Anda merasa sangat down?	

No	Pertanyaan	Berapa lama Anda merasakan berdasarkan pertanyaan berikut? (<i>Jawaban A-E</i>)
4	Apakah Anda merasa tenang/damai?	
5	Apakah Anda memiliki banyak energi?	
6	Apakah Anda merasa depresi?	
7	Apakah Anda merasa terasing?	
8	Apakah Anda merasa bahagia?	
9	Apakah Anda merasa lelah?	

29.1 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Pertanyaan/Jawaban A-E								
			1	2	3	4	5	6	7	8	9
1											
2											
3											
4											

30. SALAH atau BENAR setiap pernyataan berikut ini untuk Anda?

Berikut pilihan jawabannya:

- A. Sangat Benar Sekali B. Benar C. Tidak Tahu
D. Salah E. Sangat Salah Sekali

No	Nama	Bagaimana perasaan Anda mengenai pertanyaan berikut? (<i>Jawaban A-E</i>)
1	Saya lebih mudah terserang sakit dibandingkan dengan orang lain	
2	Saya paling sehat dibandingkan dengan orang lain	
3	Saya pikir kesehatan saya memburuk	
4	Kesehatan saya sangat sempurna	

30.1 Bagaimana dengan keluarga Anda?

No	Kode	Nama	Pertanyaan/Jawaban A-E			
			1	2	3	4
1						
2						

No	Kode	Nama	Pertanyaan/ <i>Jawaban A-E</i>			
			1	2	3	4
3						
4						