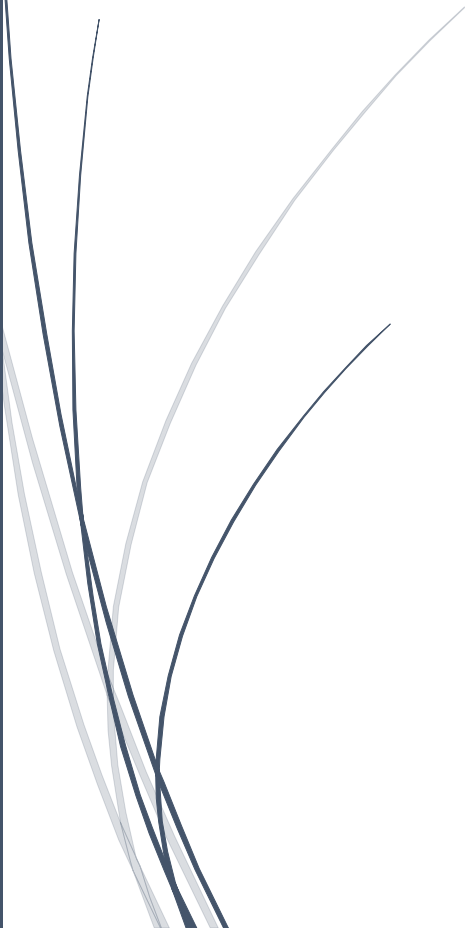


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Impact of investments in Active Living Environments

A case study of the
municipality of Eindhoven



Colophon

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Preface

During my internship at the Province of Overijssel, I came into contact with the subject matter surrounding healthy living environments. The province was at the time focussing on how this subject could be introduced as a standard for spatial planning decisions throughout the province. Iris Boers, my supervisor during this internship, passed her enthusiasm for the subject on to me. During my second internship at Ruimtevolk, I learned that “toekomstvisies” or in English policy outlooks towards the future encompass all major policy challenges we face today. This again included topics surrounding healthy and active living environments further sparking my interest. Resulting in the thesis topic as you see before you now. Therefore, I would like to thank Iris Boers and Bureau Ruimtevolk for their enthusiasm and help in the initial stages of my research.

I would like to thank Jeroen Eskens for getting me into contact with the municipality of Eindhoven, which was willing to help with my research. Two public administrators, whom I cannot name due to an agreement to keep their names anonymous, were very helpful with offering their time to interview them and with the check and distribution of the survey. Therefore, also a special thanks to these administrators.

Far and foremost my thanks goes out to my thesis supervisor, Dr. Pascal Beckers of the Radboud University for his advice, help, and patience during the writing process of this thesis. While it was not always easy, his help led me to finish my thesis eventually.

Finally, I would like to thank my colleagues at PAS BV, my friends, and my family for their support during the writing process of this thesis.

Summary

Only 50% of the Dutch population complies with the Dutch Physical activity norm (hereinafter referred to as PA-norm) (CBS & RIVM, 2022). By not complying with the PA-norm 50% of the population is facing serious health complications (WHO, 2022). The living environment plays a considerable role in determining whether the PA-norm is reached by individuals or not. The more active the living environment, the more people are induced to be more physically active within the living environment (RIVM, 2016). Thus, to increase compliance with the Dutch PA-norm, active living environments (hereinafter referred to as ALEs) must be improved or created. Over the past 5 years, the municipality of Eindhoven has invested in improving ALEs. By analysing the investments and policy decisions regarding ALEs made by the municipality of Eindhoven, policy recommendations could be made to make future investments in ALEs more efficient and effective.

This thesis aims to provide policy recommendations to the public administrators of the municipality of Eindhoven on how to best approach investments in improving and creating ALEs by analysing the impact of investments made to improve and create ALEs. To reach this aim the following research question was answered in this thesis: *“What is the impact of investments made by the municipality of Eindhoven to create and improve active living environments on the inhabitants of the municipality of Eindhoven?”*. The impact in this thesis is measured in three variables: compliance to the Dutch PA-norm, change in compliance to the Dutch PA-Norm (over the past five years), and opinion on investments.

To answer this question a mixed methods approach was utilized. The qualitative part consists of two in-depth interviews and a content analysis of municipal policy regarding ALEs. The quantitative part consisted surveying the population of Eindhoven. Investments in ALEs have only been made in certain city districts. External data was added for the control variables regarding city district characteristics and investments in the city districts.

The thesis showed no significant relation between investments in ALEs and the four independent variables. No differences were found between the inhabitants living in city districts that have seen investments as compared to inhabitants who did not live in these districts with regards to complying with Dutch PA-norm. Furthermore, it was observed that no significant effect exists between city districts with investments in ALEs and the change in compliance with the Dutch PA-norm over the past five years. In addition, no relation was

found between the investments in ALEs and the opinion of inhabitants regarding these investments. And finally, it was also noticed that the variable impact of investments, a combination of all variables mentioned above, was not divergent between city districts with ALE investments.

Combined with the fact that the models themselves are not statistically significant meant that no concluding answer could be given to the main research question and further research is needed to better understand the impact of investments in ALEs.

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1. Introduction

Two-thirds of the people above 15 years old in the EU are not physically active at the recommended levels (Edwards & Tsouros, 2006). Already in 2006 physical inactivity across Europe has been seen by the World Health Organisation (WHO) as a problem, and they are advocating for the need to stop the ongoing decline in physical activity (PA) across all age groups in comparison to the past decades (Edwards & Tsouros, 2006). In 2021, as compared to 2006, there has been a significant improvement in PA levels amongst the Dutch population. Approximately 50% of the population complied with the Dutch Norm of Healthy Activity in 2021 (NNGB) (CBS & RIVM, 2022).

Even though the levels of PA have improved, it is still not at the optimal level in which everybody meets the norm (RIVM, 2022; Kenniscentrum Sport en bewegen, 2022). In 2006 Edwards and Tsouros concluded that: *“Physical inactivity causes an estimated 600.000 deaths per year in the European Union and leads to a loss of 5.3 million years of healthy life expectancy per year due to premature mortality and disability (Edwards & Tsouros, 2006, pp. 2)”*. The risk of contracting chronic diseases, like cardiovascular disease, diabetes, and certain types of cancer, is increased by physical inactivity (Blair, 2009; Cunningham, et al., 2020; Hall, et al., 2021; Janssen & Le Blanc, 2010; Kannel & Sorlie, 1979; Kohl et al., 2012; Martinez-Gonzalez, et al., 2001; Penedo & Dahn, 2005; Reiner, et al., 2013; Rütten & Abu-Omar, 2004; Van Lenthe, et al., 2005; Warburton, et al., 2006; Warburton & Bredin, 2017). As of yet, there is still 50% of the Dutch population not getting enough physical activity and thus at risk of the negative health implications of not reaching the recommended levels (CBS & RIVM, 2022). By investing in preventative measures in the living environment, thus essentially creating/improving active living environments (ALEs), the number of inhabitants complying with the norm can increase. Decreasing the negative health effects amongst the Dutch population (Slinger, et al., 2014; Mah, et al., 2020; Mah, 2021; Hajna, et al., 2018; Calogiuri and Chroni, 2014; Creatore, et al., 2016; Wasfi, et al., 2018; RIVM, 2016). While many researchers found that ALEs have positive effects on physical activity, there is little known about the impact of investments in improving/creating ALEs on the inhabitants in those living environments (Slinger, et al., 2014; Mah, et al., 2020; Mah, 2021; Hajna, et al., 2018; Calogiuri and Chroni, 2014; Creatore, et al., 2016; Wasfi, et al., 2018; RIVM, 2016). The majority of the research focussed on the already

established ALEs and their effects. By looking at the impact of investments to create/improve ALEs, the investments could become more targeted toward desired results.

This research aims to assess the impact of the investments made by the municipality of Eindhoven to improve or create ALEs and to give policy recommendations to the public administrators of the municipality of Eindhoven to improve the impact of future investments in ALEs.

The municipality of Eindhoven has invested in creating/improving ALEs over the past years, and this municipality is both a unique and a representative case. Investments are context specific. The investments can have different outcomes, depending on neighbourhood and personal characteristics of inhabitants in this environment, the investments can have different outcomes, making them not directly comparable and thus unique. However, certain investments, e.g. the Cruyff Courts, are implemented in different municipalities with the same end goal in mind; improving the ALE. Therefore, there are a few representative investments that could be implemented with that goal in mind. Making some investments as unique, like the Urban Sports Park and the specific road adjustments to give priority to pedestrians and cyclists and some as representative, e.g. the Cruyff Courts. Consequently, this municipality was chosen for this specific case study¹.

This research aim leads to the main question this thesis tries to answer:

“What is the impact of investments made by the municipality of Eindhoven to create/improve active living environments on the inhabitants of the municipality of Eindhoven?”

Based on this research question the following sub-questions were formulated:

1. Why is physical activity important and what role do active living environments play in improving physical activity?
2. How are ALEs created/improved and which neighbourhood and personal characteristics influence the PA behaviour and perceptions of inhabitants to experience active living environments?
3. What was the policy trend regarding ALEs over the past 10 years regarding ALEs and which interventions were implemented by the municipality of Eindhoven to improve/create ALEs?

¹ Further elaboration on this choice is stated in paragraph 3.3.2 of the research methodology

4. What do the inhabitants of Eindhoven think about these ins and did the investments in ALEs increase their levels of physical activity?

These questions are answered in 5 phases. The first phase is the literature review which will focus on answering the sub-questions 1 and 2. The second phase is the content analysis of the policy documents of the municipality of Eindhoven combined with in-depth interviews to give a full overview of the context surrounding the investments in ALEs and provides an overview of the investments made to create/improve ALEs in the municipality of Eindhoven. As stated before, Phase 3 consists of respondent recruitment for the survey and conducting the survey itself. Phase 4 is the analysis of the survey data based on OLS regressions and t-tests. Phase 5 is the conclusion of this thesis, giving answers to the sub-questions, and to the main research question. This chapter also gives an overview of the limitation of this research and gives policy recommendations based on the findings of this thesis.

The scientific relevance of this research lies in the fact that little to no research or monitoring has been done to create an overview of the impact of investments made to create/improve active living environments (ALEs). Research purely analysed the effects of already existing ALEs (Slinger, et al., 2014; Mah, et al., 2020; Mah, 2021; Hajna, et al., 2018; Calogiuri and Chroni, 2014; Creatore, et al., 2016; Wasfi, et al., 2018; RIVM, 2016). Ideally, this research should encompass the whole investment process (measure the impact before the investments, during the build and afterwards) it was not feasible to achieve that in this master thesis research. The choice was made to retroactively question inhabitants on the changes in behaviour of the past 5 years, their general compliance with the PA-norm, and their opinion on neighbourhood investments in combination with a policy analysis and in-depth interviews to provide the context for this research. Thus, still providing an initial step towards analysing investments in ALEs.

The social relevance has already partially been addressed in the problem statement. The level of non-conformance to the PA-Norm leads to long-term health risks, like chronic illnesses (Blair, 2009; Cunningham, et al., 2020; Hall, et al., 2021; Janssen & Le Blanc, 2010; Kannel & Sorlie, 1979; Kohl et al., 2012; Martinez-Gonzalez, et al., 2001; Penedo & Dahn, 2005; Reiner, et al., 2013; Rütten & Abu-Omar, 2004; Van Lenthe, et al., 2005; Warburton, et al., 2006; Warburton & Bredin, 2017). This rise in chronic illnesses can also be seen as an attributing factor in the rising healthcare costs. The RIVM (Vonk et al., 2020) estimated the rise in healthcare costs to continue till 2060 with approximately 2,6% a year within the

Netherlands. This leads to an increase in costs to about 291 billion euros in 2060 (Vonk et al., 2020). By increasing physical activity of the Dutch population, chronic illness can be prevented and the rise in healthcare costs might not become as high as predicted (De Greef, 2006).

The thesis consists of the following chapters. Chapter two presents the literature framework. Chapter three will give an overview of the methodological approach of the thesis. In chapter four the policy regarding ALEs will be reviewed and combined with further insight based on two in-depth interviews. The interventions made in the municipality of Eindhoven will also be further elaborated on in this chapter. Chapter five will focus on the view of the inhabitants, and show the results and analysis of the survey. The conclusion, limitations and policy recommendations will then follow in chapter six.

2. Literature review

As stated in the introduction, physical activity (PA) is important for public health and interventions in the living environment can promote health. This chapter will further elaborate on this relation and will result in a conceptual framework. This conceptual framework summarizes the expected relationship between variables as derived from the literature. In the first paragraph, the importance of PA is highlighted. Then the connection between PA and the living environment will be discussed. The third paragraph will zoom in further and will define an active living environment (ALE). The fourth paragraph will describe the health benefits of an active living environment. An overview of the components needed to create an active living environment will be given in the fifth paragraph. The sixth paragraph will discuss the differences in physical activity based on differences in neighbourhood- and personal characteristics. This chapter will conclude with the conceptual framework.

2.1 The importance of physical activity

Within the Netherlands, 2,3% of the total burden of disease and 6.000 deaths are related to physical inactivity (RIVM, 2022²; VZinfo, 2022). The health risks of physical inactivity have been extensively researched over the years (Blair, 2009; Cunningham, et al., 2020; Hall, et al., 2021; Janssen & Le Blanc, 2010; Kannel & Sorlie, 1979; Kohl et al., 2012; Martinez-Gonzalez, et al., 2001; Penedo & Dahn, 2005; Reiner, et al., 2013; Rütten & Abu-Omar, 2004; Van Lenthe, et al., 2005; Warburton, et al., 2006; Warburton & Bredin, 2017). The WHO (2022) has summarized all health risks and benefits on their website, as accessed on the 8th of December 2022. These risks and benefits were corroborated by all previously named research and will thus serve as an overview of the findings of these sources. Physical inactivity leads to (WHO, 2022):

- A decrease in muscular and cardiorespiratory fitness
- Reduction in bone and functional health
- Higher risk of hypertension, coronary heart disease, stroke, diabetes, various types of cancers (including breast and colon cancer) and depression.
- Higher risk of falls as well as hip or vertebral fractures
- Higher body weight, thus higher risk of obesity and correlated diseases.

Physical activity in children can promote (WHO, 2022):

- Physical fitness

- Cardiometabolic health (blood pressure, dyslipidaemia, glucose and insulin resistance)
- Bone health
- Cognitive outcomes (academic performance, executive function)
- Mental health (reduced symptoms of depression)
- Reduced adiposity

Physical activity in adults and older adults improves (WHO, 2022):

- | | |
|--|----------------------------------|
| - Risk of all-cause mortality | - Mental health |
| - Risk of cardiovascular disease mortality | - Cognitive health |
| - Incident hypertension | - Sleep |
| - Incident site-specific cancers | - Measures of adiposity may also |
| - Incident type-2 diabetes | improve. |
| - Prevent falls | |

Even though percentages do differ between the different studies of the specific effects, the benefits of physical activity and the risk of physical inactivity have a significant impact on public health as stated by all abovementioned authors. The lower the physical inactivity levels are within a country the better (Blair, 2009; Cunningham, et al., 2020; Hall, et al., 2021; Janssen & Le Blanc, 2010; Kannel & Sorlie, 1979; Kohl 3rd, et al., 2012; Martinez-Gonzalez, et al., 2001; Penedo & Dahn, 2005; Reiner, et al., 2013; Rütten & Abu-Omar, 2004; Van Lenthe, et al., 2005; Warburton, et al., 2006; Warburton & Bredin, 2017, WHO, 2022). As of yet, 50% of the Dutch population is (still) not getting enough physical activity (CBS, 2021) and is thus at risk for the negative health implications of not reaching the recommended PA levels.

2.2 Effect of the (built) living environment on physical activity

Lewin (1935) found that the behaviour of people regarding physical activity is dependent on available resources and on the environment in which they live. This can also be denoted by the formula $B = f(P, E)$, meaning Behaviour = function of a person (P) interacting with the environment (E) (Lewin, 1935). According to Lewin (1935), the environment is in demand qualities only, meaning that the environment should represent the needs of the person living within the environment to be met or not met to have an effect.

This formula was further elaborated by Carp (1979) to see if there were differences in physical activity between a group of elderly living in enriched environments compared to a

group of elderly living in unenriched environments. He found that the elderly who maintained their activity levels, who showed better levels of self-evaluations regarding their health, and who overall lived longer also showed a high satisfaction rate regarding their living environment (Carp, 1979). Satisfaction rate regarding their environment was of greater importance than living in enriched or unenriched environments. The elderly living in unenriched environments could maintain their activity levels as long as they are satisfied with their living environment (Carp, 1979). However, the elderly who are unsatisfied with their living environment and lived in unenriched environments do not have the means to live in enriched environments. Therefore, there is a possibility of self-selection bias within the results. The elderly chose or had access to live in their respective living environments and had taken action to meet their own needs versus the other group who did not have access to or did not want to make use of the same facilities, and therefore choose the environment in which they live (Carp, 1979). Thus, the function of P and E should be specified to a person's needs and the environmental resources, transforming the relation to $B=f(P(\text{needs}), E(\text{resources}))$ (Lewin, 1935; Murray, 1938; Maslow, 1954; Erikson, 1950; White, 1959; Allport 1955; Freud, 1924 as summarized in Carp, 1979). The group of elderly living in the care facility also had a significantly higher I.Q. level compared to the other group. Meaning that there might have been personality differences between the two groups. However, due to limitations in data they did not further investigate this difference (Carp, 1979).

Later on, at the beginning of the twenty-first century, many more researchers started focusing on the relation between the (built) living environment and physical activity (Frank, et al., 2001; Handy et al., 2002; Craig et al., 2002; Cervero and Duncan, 2003; Yang, et al., 2003; Lopez, 2004; Sallis and Glanz, 2006). Frank et al., (2001) stated that public health research had already shown that daily physical activity might be increased most efficiently by creating living environments in which physical activity is encouraged. Defining them as "Health-promotive environments" (Frank et al., 2001). While public health is at the root of spatial planning, a disconnect had developed between public health and spatial planning due to a separation of responsibilities and institutional barriers (Frank et al., 2001). This disconnect resulted in the increasing influence of lobbyists from the automotive industry and an increase in policies by the US policymakers to promote car accessibility (Frank et al., 2001). This trend to increase car accessibility within cities has later become a global phenomenon (Frank et al., 2001). Consequently, bike and walking routes were cut off which led to a loss of means for active

mobility and thus a decrease in physical activity (Frank, et al., 2001). Frank et al. (2001) conclude that the underlying costs and benefits of public health should be reintroduced in spatial planning decisions, for example by making it easier to walk and cycle during public daily activities/commuting (Frank, et al., 2001). By rebuilding the positive connection between living environments and physical activity, physical activity can be increased (Frank, et al., 2001).

Compared to Frank et al. (2001), Cervero and Duncan (2003), only found a modest and sometimes even insignificant effect of walking and cycling on the urban landscapes of the San Francisco Bay Area. The well-connected streets and proximity of facilities did show *“to induce nonmotorized transport, but various exogenous factors, such as topography, darkness and rainfall, had far stronger influences (Cervero and Duncan, 2003, pp. 1482)”*.

Yang et al., (2003) disputed this claim by stating that the availability and access of sports facilities, the proximity of the facilities to home and the general living environment do have an influence on physical activity levels and sport participation. They also state that growing up/living in an urban versus a rural area was a better predictor of sport and physical activity than the geographical location of the home (Yang et al., 2003). The difference in Finland is quite significant, in urban environments higher levels of physical activity are found (Yang et al., 2003). However, urban, and rural areas offer different ways of being physically active. In rural areas hunting, boating, skiing, and swimming in lakes are possibilities. Whereas within the city the sports facilities and parks offer other ways of being physically active, creating a possible difference in the participation of organised versus unorganised sports activities (Yang, et al., 2003). They concluded that differences in the living environment did actually result in differences in unorganised and organised sport activities of boys and that the difference was more pronounced in the organised sports activities rather than the unorganised sports activities (Yang et al., 2003). However, the living environment had limited to no influence on the sports activities of girls. This difference most likely stems from the fact that boys most often participate in group sports, which are more widely accessible, and girls focus more on individual sports, which are less accessible in Finland (Yang, et al., 2003). In urban environments, participation in sports was significantly more common than in rural areas and when the father participated in organised sports activities it was very likely that the children would also participate in organised sports activities (Yang, et al., 2003). In conclusion, both organized and unorganized facilities should be available in a living environment to

accommodate different needs of being physically active in order to promote physical activity in both rural and urban environments (Yang, et al., 2003).

The relation between the built environment and physical activity is further elaborated by Sallis and Glanz (2006). According to them, the built environment does affect children's weight by influencing their eating habits and physical activity. The built environment can attribute to physical activity in three ways: through active recreation in both publicly accessible facilities, like parks, active recreation in organized sports facilities, thus by being active as part of a sports club, and active transportation, taking the bike and/or walking from and to your destinations (Sallis and Glanz, 2006). However, Sallis and Glanz (2006) also made two side notes. The first states that: *"The link between physical activity and the built environment is less conclusive than research in other areas covered (Sallis and Glanz, 2006, pp. 90)"*. This is due to the fact that in all studies regarding the living environment there is the possibility of self-selection, since it can never be conclusively proven that people are being physically active in a park, because the park is close by, or they want to be physically active and therefore live near the park (Sallis and Glanz, 2006; Cerin et. al., 2008 & Kaczynski & Mowen, 2011; as cited in Calogiuri & Chroni, 2014). They state this can be prevented by focusing on people already living within the environment, before the environmental change, like building a park or building a trail happens (Sallis and Glanz, 2006).

The second side note they make is the fact that the living environment can also be a (physical) barrier to being physically active (Sallis and Glanz, 2006). Environmental barriers are defined as: *"Real-world conditions that place restrictions on physical activity, such as the lack of bike lanes on roads (Frank et al., 2001, pp. 208)"*. Frank et al., (2001), state that the adaption to the use of the car had resulted in barriers for pedestrians and cyclists to get around through the means of active transportation (Frank, et al., 2001). Later on, the notion that the living environment could also be a barrier to physical activity was taken up by countless others (Bodde and Seo, 2009, Martin et al., 2013, Hansen, et al., 2015, Cleland et al., 2015, Joseph et al., 2015). Although Bodde and Seo (2009), as well as Martin, et al., (2013), focus more on the effect of physical or mental disabilities and access to the living environment, the other authors do state that while the living environment can contribute to physical activity, it can also have the opposite effect (Hansen, et al., 2015; Cleland, et al., 2015; Joseph, et al., 2015). They state that if the functionality or the connection between destinations and convenience is not in place, then physical activity can actually be demotivated. Other barriers

are safety concerns, lack of (diverse) facilities (e.g., parks, walking and cycling paths, playgrounds etc.), weather concerns, and lack of active role models, (Hansen, et al., 2015; Cleland, et al., 2015; Joseph, et al., 2015).

In conclusion, many international researchers, except for Cervero and Duncan (2003), argue that there is a connection between the living environment and physical activity (Frank, et al., 2001; Handy et al., 2002; Craig et al., 2002; Yang, et al., 2003; Lopez, 2004; Sallis and Glanz, 2006; Jongenmeel-Grimmen et. al., 2014). However, certain side nodes have to be considered: namely the self-selection bias (Sallis and Glanz, 2006; Cerin et. al., 2008 & Kaczynski & Mowen, 2011; as cited in Calogiuri & Chroni, 2014) and the fact that the living environment can also be a barrier to be physically active (Franken, et al., 2001; Bodde and Seo, 2009, Martin et al., 2013, Hansen, et al., 2015, Cleland et al., 2015, Joseph et al., 2015).

2.3 Definition of an active living environment

While the connection between the (built) living environment and physical activity has been extensively studied over time, the terms used by researchers shifted to the connection between the active living environment (ALE) and physical activity (PA) (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021). Within this paragraph, there will first be a discussion of the definitions given in international literature. Since the definition of ALEs differ between countries (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021) and the case study focuses on the municipality of Eindhoven a second definition will be given based on Dutch literature in the second paragraph. Defining these terms will help to understand what active living environments are and how they can be created or improved by investments in these environments.

2.3.1. The international definition

Some researchers define an active living environment as: “a part of the living environment with certain qualities (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022), whereas others determine if a living environment is active based on certain criteria (Herrmann, et al., 2019; Christina, et al., 2021). The third option focuses on how the natural environment is beneficial in promoting PA levels and thus is part of an active living environment (Cerin et. al., 2008 & Kaczynski & Mowen, 2011; Sharpe et. al., 2004; Cohen et. al., 2007 & Libret et. al., 2006; as

cited in Calogiuri & Chroni, 2014). To give a complete definition of ALEs all three parts will be discussed in order.

Mah et al., (2020, pp. 1) define an active living environment (ALE) as an environment which is *“easily navigable with well-connected walking paths, have a number and variety of destinations and is more densely populated.”* This definition is stooled on the idea that favourable ALEs encourage active living, and thus an environment in which a base level of physical activity (PA) is built in within your daily routine, like walking around the neighbourhood after dinner (Mah et al., 2020). However, in later research, Mah concluded that ALEs are *“The extent to which our neighbourhoods are designed to promote active living (Mah, 2021, pp. 1)”*. It became more dynamic in comparison to the previous definition (Mah, 2021). Tobin, et al., 2022, building on the definition of Mah, defined ALEs as: *“the emergent natural, built and social properties of neighbourhoods that promote physical activity and health and allow for equitable access to health-enhancing resources, Tobin, et al. 2022, pp. 5.”* All three definitions define an ALE as a part of the environment with certain qualities.

In contrast or the second way of defining ALEs, Herrmann, et al., (2019) and Christina, et al., (2021) assess if a living environment is active by evaluating it based on certain variables which promote physical activity within the living environment. Herrmann et al., (2019) assess if a (Canadian) living environment is active through the variables: three-way intersection density of roads and footpaths, weighted dwelling density, and points of interest, when in urban areas a measure of access to public transportation was added. These three variables were picked based on a correlation study between variables found in other literature and their effect on physical activity. The variables considered in the correlation study were higher street connectivity (route directness and intersection density), population and dwelling density and diversity in nearby destinations, which were therefore the main premises of their set of variables (Herrmann, et al., 2019). Their definition is thus more focused on active living environments as environments in which active mobility is promoted. In 2021, Christina, et al., assessed if a living environment is active by two variables built on the basis of *“the availability, and use of PA equipment/resources in the home and neighbourhood (Christina, et al., 2021, pp. 2)”*. They created two dichotomous variables to indicate whether adolescents had access to PA equipment available in and around their homes and PA resources in the neighbourhood. PA equipment consists of objects, e.g., a basketball, skateboard etc., whereas the resources are facilities, thus bicycle lanes and sports facilities (Christina, et al., 2021). This created a score

for both categories into ranges, 0-8 for equipment or 0-5 for their neighbourhood, if they scored an 8 and 5 in the categories then the environment is an active living environment, whereas if both scores are 0, the environment is not an active living environment (Christina et al., 2021). Thus, while variables can differ between studies, ALEs, according to Herrmann et al., (2019) and Christina et al., (2021), are only ALEs if they pass certain assessments.

A third possible way of defining ALEs is by stating they should contain qualities ascribed to a natural living environment since high-quality natural environments promote physical activity (Calogiuri & Chroni, 2014). Within this research there is again the possibility of self-selection; people with high PA levels choose to live in natural environments which allows them to be physically active (Calogiuri & Chroni, 2014). However, researchers who included the possibility of self-selection showed its effects as neglectable, meaning that a high-quality natural environment increases levels of physical activity (Cerin et. al., 2008 & Kaczynski & Mowen, 2011; as cited in Calogiuri & Chroni, 2014). Research regarding this relation also determined that people who visit natural environments, like parks and other green spaces, were more likely to meet the minimum level of recommended level of physical activity (Sharpe et. al., 2004; Cohen et. al., 2007 & Libret et. al., 2006; as cited in Calogiuri & Chroni, 2014). Thus, natural environments are, at least partially, included within an active living environment.

The abovementioned sources all qualify an Active Living Environment (ALE) as an environment which promotes physical activity. However, researchers vary in which variables they use to further specify the definition, and, consequently, vary in scope (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021; Calogiuri & Chroni, 2014). The consensus seems to be that the environment should contain the resources needed to be physically active at a base level, thus being able to use active forms of transportation, should contain high-quality greenery and the environment should have low barriers to be physically active, e.g. it should be safe to use the public space (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021).

However, all of them specify that an active living environment (and its definition) is dependable on the location in which the research was conducted (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021). For example, within the United States of America (USA) the used resources and facilities differ from the resources available in Finland and Canada (Yang, et al., 2003; Lopez, 2004; Sallis and Glanz, 2006; Herrmann, et al., 2019; Christina, et al., 2021) thus the activities and means by which the

population is physically active may vary between countries. Therefore, the following paragraph will focus further on the Netherlands and the findings of Dutch researchers regarding the effects of active living environments and their effects on physical activity.

2.3.2 “Beweegvriendelijke Leefomgevingen” the Dutch definition of ALEs

Within Dutch research regarding physical activity and the living environment the definition of an active living environment, or in Dutch a *“Beweegvriendelijke leefomgeving”* (literally translated to English: movement-friendly living environment) seems to be considered by many researchers as a self-explanatory variable, namely; an environment that is inviting/friendly to be physically active in and thus no further explanation regarding the variable is given (Duijvestijn, et al., 2010; Van Lenthe, et al., 2017; Van de berg, et al., 2009; De Vries, et al., 2011; Storm, et al., 2007). Not all researchers, however, follow this trajectory (Engbers, et al., 2010; Cammelbeeck, et al., 2014; Slinger, et al., 2014). The following paragraphs will discuss the views of these researchers to conclude with a singular Dutch definition of ALEs.

Engbers, et al., (2010)² state that an active living environment should promote functional movement, in informal facilities, and exercise, in formal facilities. Therefore, an active living environment is an environment in which informal facilities, like sidewalks and bicycle lanes, are easily accessible, clean, safe, and green and in which formal facilities, like playgrounds and (multifunctional) sports facilities, are safely accessible, and offer accommodations for different age and societal groups (Engbers, et al., 2010).

Cammelbeeck, et al., (2014) define an active living environment as an environment with six characteristics. The first two are conditions of the living environment itself; Accessible public facilities to promote PA, e.g., playgrounds, parks, and bicycle lanes, thus making public space accessible to be physically active in. As well as the second characteristic, the environment should be stimulating to be physically active, thus it has to have low environmental barriers to be physically active (Cammelbeeck, et al., 2014). The last four characteristics, three to six, are included in the definition to keep the people living within the active living environment engaged with the facilities, thus promoting sustainable usage of the active living environment (Cammelbeeck, et al., 2014). The last four characteristics are: The

² Engbers, et al., (2010) state in the TNO-rapport to define an active living environment, the paper follows with a long list of recommendations and norms to create an ALE, however, no specific definition of what an Active living environment is. Therefore, the interpretation of their definition is based on the criteria given.

public facilities should be connected to a range of organized activities, since only providing public facilities is not enough to stimulate society to make use of the public space (Cammelbeeck, et al., 2014). To further promote the use of the active living environment, it should be clean, safe, accessible for all and challenging, which is the fourth characteristic (Cammelbeeck, et al., 2014). The fifth characteristic is the fact that the active living environment should be established through a public-private partnership to incorporate the wishes of the people on how they want to be physically active into account. The sixth and last characteristic is for the investment into the active living environment to be at the right level of scale needed (Cammelbeeck, et al., 2014).

A much shorter and more concise definition was given by Slinger, et al.: *“An active living environment stimulates, facilitates and is enticing to practise sports and be physically active (Slinger, et al., 2014, pp. 3).”* Additionally, they do state several conditions to classify an environment as an active living environment. These conditions are sufficient availability of (green) recreational public space, both formal and informal, these public spaces should be safely accessible, have access to (either/or) high-quality greenery and water, and there should be a sufficient level of social cohesion, which contributes to an overall feeling of safety (Wendel-Vos, 2005 & De Vries, 2011, as cited in Slinger, et al., 2014).

In conclusion, the definition of an active living environment within the Netherlands is, at first glance, self-explanatory within the Dutch translation of ALE, namely: *“Beweegvriendelijke leefomgeving”*, which means, literally translated, a movement-friendly environment. However, according to Engbers, et al., (2010), Cammelbeeck, et al., (2014) Slinger, et al., (2014), several conditions have to be met for an environment to be classified as active. The definition derived from Engbers, et al., (2010) gives a very concise summary: an active living environment is an environment in which informal facilities, like sidewalks and bicycle lanes, are easily accessible, clean, safe, and green and in which formal facilities, like playgrounds and (multifunctional) sports facilities, are safely accessible, and offer accommodations for different age and societal groups (Engbers, et al., 2010).

2.3.3 Overview of both definitions

This paragraph tries to highlight the differences and similarities between both definitions. As stated before, defining these terms will help to understand what active living environments (ALEs) are and how they can be created or improved by investments in these environments.

Both definitions already differ in the broadest sense: promote physical activity (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021) versus, the Dutch definition: it should be movement-friendly (Duijvestijn, et al., 2010; Van Lenthe, et al., 2017; Van de berg, et al., 2009; De Vries, et al., 2011; Storm, et al., 2007). However, not all researchers follow this trajectory (Engbers, et al., 2010; Cammelbeeck, et al., 2014; Slinger, et al., 2014). The international definition is goal-oriented (e.g., What should an environment do?), while the Dutch definition is more conditional; stating what an environment should be. The specifications made to both definitions also seem to have slight differences. Both state that ALEs have to have low physical barriers (i.e., ALEs have to be safe and clean), and should be green. Both definitions also state there should be resources, but the international definition states that these resources need to promote physical activity at the base level. Thus, by the availability of unorganized facilities and an active transportation network. The Dutch definition adds to this the consideration that formal facilities are important (as derived from Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021; Engbers, et al., 2010; Cammelbeeck, et al., 2014; Slinger, et al., 2014). Both the definition of ALEs, and the activities and means by which the population is physically active are dependable on the location in which the research was conducted (Mah, et al., 2020; Mah, 2021, Tobin, et al., 2022; Herrmann, et al., 2019; Christina, et al., 2021), the Dutch definition, as derived from Engbers et al., (2010) will be taken into account within this thesis: *“an active living environment is an environment in which informal facilities, like sidewalks and bicycle lanes, are easily accessible, clean, safe, and green and in which formal facilities, like playgrounds and (multifunctional) sports facilities, are safely accessible, and offer accommodations for different age and societal groups.”*

2.4 Health benefits of an active living environment

Slinger et al., (2014) created a short list of benefits of an active living environment based on their literature review. They concluded that the benefits of an ALE can be found on both an individual, and on a public level. The individual benefits are an improvement in both the physical and mental health of individuals living within the environment; thus, lower levels of obesity and the chronic disease attributed to obesity, and it stimulated the development of (motor skills of) children and lessens the loneliness experienced by the elderly (Slinger, et

al., 2014). The public health benefits of an active living environment arise out of the fact that more people choose forms of active mobility, consequently, people are more physically active, thus experience better physical and mental health and in turn healthcare costs will be lower and the liveability of neighbourhoods in ALEs is higher (Slinger, et al., 2014).

Lukmanji, et al., 2020, tried to find an association between mental health outcomes and ALEs. However, contradictory to known research they did not find results which supported the hypothesis that favourable ALEs and increased active mobility are associated with better mental outcomes. (Lukmanji, et al., 2020).

Mah (2021) concluded that people who lived in more favourable ALEs walk more, are less likely to be hospitalized and experience a lower risk of cardiometabolic mortality however, the effects are diminished for those with and at risk of type two diabetes. Cardiometabolic mortality is 22% lower for older women living in favourable ALEs than for women who live in less favourable ALEs (Mah, 2021). The cardiometabolic mortality rate for elderly women with type two diabetes in favourable ALEs is almost equal to the levels of cardiometabolic mortality for elderly women without type two diabetes, whereas the rate of cardiometabolic mortality in elderly with type two diabetes is higher for those living in less favourable ALEs (Mah, et al., 2020 & Mah, 2021). This concludes that favourable ALEs do improve the health of elderly women with type two diabetes. Another conclusion Mah (2021) made was that adults aged 45 and over experienced lower odds of hospitalization for both Acute Myocardial Infarction (AMI) and Congestive Heart Failure (CHF). The most significant difference was the hospitalization rate for Acute Myocardial Infarction, when living in favourable ALEs the odds of hospitalization were 24% lower as compared to those living in less favourable ALEs (Mah, 2021).

Hajna et al., (2018) found more favourable (lower) Body Mass Index values (BMI) and Systolic Blood Pressure (SBP) levels in residents that lived in the most active-living-friendly neighbourhoods compared to those living in the least active-living-friendly neighbourhoods. The risk of having a higher BMI and thus of obesity is higher in lower income groups as compared to higher income groups, which might explain differences in the effect of investments in ALEs amongst different income groups later on. This is (partially) explained due to living in less active-living-friendly environments (Hajna et al., 2018). Having high SBP for a long time can increase the risk of strokes, heart diseases and chronic kidney diseases (Sheps, 2020). However, both correlations are only partially explainable by the variable of living in

favourable versus non-favourable ALEs (Hajna, et al., 2018). They suspect the other variable that might explain the difference fully is the neighbourhood retail-food environment, since living in the least active-living-friendly neighbourhoods also mean living in a less favourable retail-food environment, thus more exposure to unhealthy food options rather than healthy food option (Hajna, et al., 2018). They suggest further research to confirm this relation (Hajna, et al., 2018).

When ALEs are also based in a natural environment, meaning they are located near high-quality greenery and/or near water, they promote health and well-being through the reduction of stress, the reduction in risk for poor mental health and the promotion of an active lifestyle (Calogiuri and Chroni, 2014). According to Calogiuri and Chroni (2014), some evidence can also be found that ALEs in combination with elements of a natural environment can increase the desire to be physically active, due to lower stress levels, and reduce the risk of chronic diseases, both cardiovascular diseases as well as certain types of cancer.

According to Creatore, et al. (2016), when the walkability of the neighbourhood is high, the inhabitants of that neighbourhood show a lower adjusted prevalence of overweight and obesity as well as declining levels of diabetes. Lower levels of walkability have significantly more effect on obesity when only taking the neighbourhoods with low walkability into account, thus lower walkability led to higher levels of obesity and prevalence of overweight. However, when a certain level of walkability within neighbourhoods is reached it does not cause even lower levels of obesity and overweight prevalence (Creatore, et al., 2016). Wasfi, et al., 2016, found an annual trend of a rise in the BMI of men. However when these men move to neighbourhoods with high walkability these BMI trajectories were decreased and, in some cases, even reversed. When moving to low-walkable neighbourhoods the rise in obesity is significantly higher than the average rise in BMI. However, they did not find a detectable influence of walkability on the body weight of women (Wasfi, et al., 2018).

The Dutch RIVM states that an ALE led to an increase in public health, due to an increase in physical activity the public experiences lower levels of obesity, cardiovascular diseases, and depression, as well as the secondary health effects of reductions in CO₂, NO₂ emissions and less noise pollution due to the switch to active modes of transportation (RIVM, 2016).

In short, ALEs have many health benefits on both physical and mental health, but mostly on obesity rates and consequent cardiovascular diseases (Slinger, et al., 2014; Mah, et

al., 2020; Mah, 2021; Hajna, et al., 2018; Calogiuri and Chroni, 2014; Creatore, et al., 2016; Wasfi, et al., 2018; RIVM, 2016). However, Lukmanji, et al., (2020) did not find a positive relation between ALEs and improved mental health, contrary to what was expected based on their literature review.

2.6 Components to create ALEs

This paragraph will focus on the components to create Active Living Environments (ALEs) and thus examples of investments municipalities can make to create ALEs. For this study ALEs will be broken up into three components; public organized facilities, public unorganized facilities, and physical mobility, based on the studies of Yang et al., (2003) and Sallis and Glanz (2006). This differentiation is also based on the mentioning of organized physical activity and unorganized physical activity in several papers investigating the effects of physical activity on health (Findley et al., 2009; Bengoechea et al., 2010; Mackenzie et al., 2015; Schmidt et al., 2017; Rodrigues et al., 2018 & Smith et al., 2022).

Within this paragraph these three components will be defined and explained with a few examples, followed by a small overview of prerequisites for ALEs to be successfully implemented as described by Cammelbeeck et al. (2014).

Public organized facilities are facilities belonging to sports clubs and other organizations which lend access to activity spaces (Yang et al., 2003; Sallis and Glanz, 2006). E.g., football clubs, tennis clubs, and playground organizations. Public access in these spaces is restricted and only for members of the organization to make use of.

Public unorganized facilities are all facilities with non-restricted accessibility (Yang et al., 2003; Sallis and Glanz, 2006). They are for all inhabitants to use, think of public playgrounds, parks, urban sports areas (skatepark/basketball fields) and outdoor fitness areas. There might be a restriction imposed by the municipality for use between certain hours to prevent nuisance. However, most of the time these spaces are always publicly accessible to everyone.

Then the third option contains all investments regarding to the promotion of physical mobility (Yang et al., 2003; Sallis and Glanz, 2006). This includes walking trails, sidewalks, bicycle lanes and the subsequent networks they form to get from one destination to another, like the daily home-work commute.

However, before any investments to create or improve ALEs are done, they state three prerequisites (Cammelbeeck, et al., 2014):

1. The investment should be based on a coherent vision in policy and design,
2. The investments should be made in collaboration with policymakers from different sectors and private stakeholders
3. As stated in the Dutch definition of ALEs, physical investments (the hardware of ALEs) should be combined with efforts to keep the people living within the active living environment engaged with the facilities, to promote sustainable usage of the active living environment. This is done by organizing sports and exercise activities and providing information, guidance, and communication about the development of ALEs (also called the software of ALEs).

When these prerequisites are met, then the hardware fitting with the wishes of all stakeholders can be implemented based on the principles as set out in her paper (Cammelbeeck, et al., 2014).

Thus, for an environment to be made into an ALE investments should be made based on the principles of Camelbeeck and thus include a mix of the facilities in the three categories which fit the specific wishes of the inhabitants of these environments.

2.7 Differences in the impact of ALEs

Throughout the literature review, several mentions have been made about differences between inhabitants and environments which influence the ability of inhabitants to be physically active. Lewin (1935) stated a difference in the availability of enriched environments. Carp (1979) mentioned a difference in IQ and PA levels, while Yang et al., (2003) stated a gender difference. This paragraph will focus further on the differences in the characteristics of inhabitants and neighbourhoods that directly affect physical activity levels. To be able to assess the impact of investments in ALEs on inhabitants in these environments all variables that possibly influence or mitigate this relation have to be known. The first focus will be on differences in personal characteristics after which the focus shifts to differences in neighbourhood qualities/environmental barriers.

2.7.1. Differences in personal characteristics

This paragraph will focus on the variables that can explain differences in physical activity and living active lifestyles among different inhabitants.

The research by Seefeldt et al. (2002) summarizes all literature up to 2002 with regard to differences in physical activity levels. In the paper Seefeldt et al. (2002), based on research from numerous researchers, differentiate between immutable and modifiable variables. Belonging to the first group are the variables: genotype, age, gender, race or ethnicity. The modifiable variables are personal traits, community settings, systems of support, environmental circumstances, economic status, occupation, physical disability (up to a certain level), educational level and opportunities for healthcare (Seefeldt et al., 2002).

However, some of these variables are strongly correlated to one another, e.g., having a low socio-economic status is often related to occupation, physical (dis)abilities, education level, access to certain environmental circumstances and healthcare, and in some cases race and/or ethnicity (Seefeldt et al., 2002). Due to this level of correlation certain variables have often been omitted in research to prevent multicollinearity (Seefeldt et al., 2002). The variables, as captured in the following quote, did often show little to no correlation, and did therefore become the standard control variables for the type of research dealing with physical activity. *“Despite limitations associated with theoretical frameworks, research design, validity of instruments and analysis of data, research during the past decade has clearly established that personal attributes such as age, gender, ethnicity, prior levels of fitness, educational level and social economic status influence individuals and groups in choices of lifestyle (Seefeldt et al., 2002, pp. 32)”*. In research regarding the living environment and physical activity, the variables mentioned within the quote are (almost) always taken into account as control variables (Lewin, 1935; Carp, 1979; Cauley et al., 1991; Giles-Corti & Donovan, 2002; Yang et al., 2003; Bengeoechea et al., 2010; Killgore & Schwab, 2012; Bhurosy et al., 2014 & Hajna et al., 2018). Therefore, it is likely that these variables, thus age, gender, ethnicity, prior levels of fitness, educational level, and social economic status, will also affect the impact of the investments in ALEs on the inhabitants in these environments.

2.7.2. Neighbourhood qualities and Environmental barriers

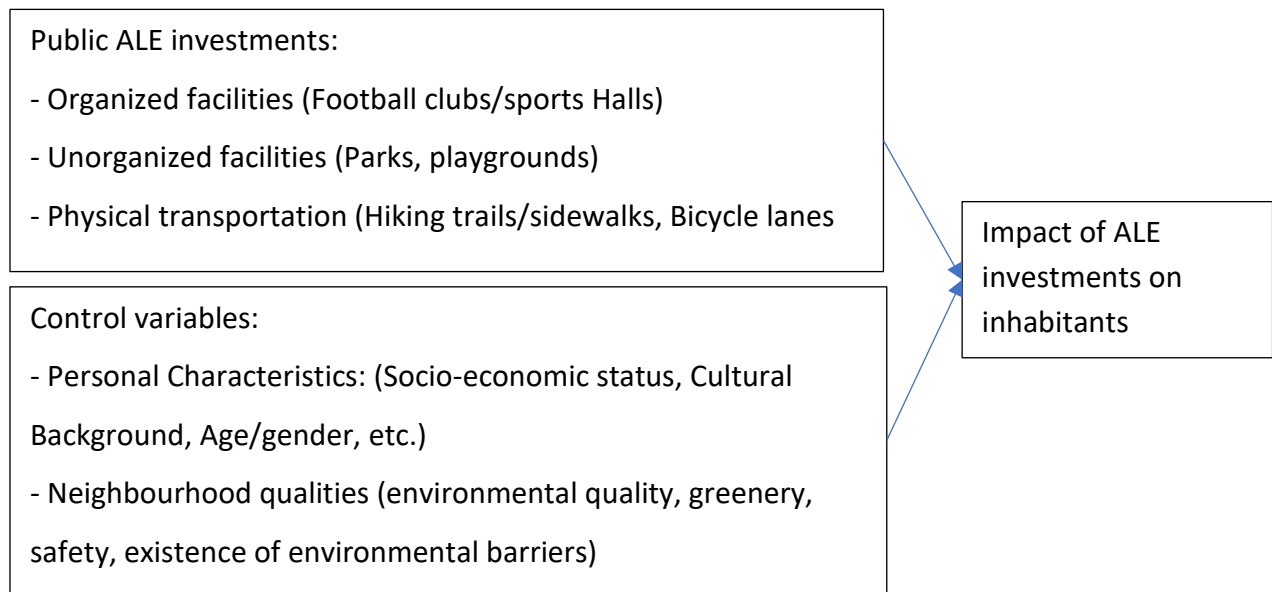
As stated before, several qualities within neighbourhoods affect physical activity (Frank, et al., 2001; Handy et al., 2002; Craig et al., 2002; Yang, et al., 2003; Lopez, 2004; Sallis and Glanz,

2006; Jongenmeel-Grimmen et. al., 2014). This effect can be altered by investments within these neighbourhoods, e.g., by investing in facilities to increase the quality of ALEs or to make the environment into an ALE, but the environment already had an effect before these changes (Frank, et al., 2001; Handy et al., 2002; Craig et al., 2002; Yang, et al., 2003; Lopez, 2004; Sallis and Glanz, 2006; Jongenmeel-Grimmen et. al., 2014). Therefore, certain control variables regarding the initial qualities of the environment have to be considered to accurately ascertain the impact investments made to increase the quality of ALEs or make an environment into an ALE. These qualities are based on the aforementioned literature regarding the environment and physical activity and the definition of ALEs and are:

- Overall neighbourhood quality, the higher the quality the better (Caligiuri & Chroni, 2014)
- Amount and quality of greenery in the environment (Mah et al., 2020; Mah et al., 2021; Tobin et al., 2022, Herrmann et al., 2019; Wendel-Vos, 2005 & De Vries, 2011, as cited in Slinger, et al., 2014)
- Satisfaction rate with the environment (Carp, 1979)
- Safety of inhabitants within the environment (Wendel-Vos, 2005 & De Vries, 2011, as cited in Slinger, et al., 2014)
- Accessibility to PA activities within the environment (Engbergs et al., 2010)
- Level of environmental barriers (Hansen, et al., 2015; Cleland, et al., 2015; Joseph, et al., 2015)

Summarized, all qualities as described in the definition of ALEs, derived from Engbers et al., (2010), are considered within this thesis: *“an active living environment is an environment in which informal facilities, like sidewalks and bicycle lanes, are easily accessible, clean, safe, and green and in which formal facilities, like playgrounds and (multifunctional) sports facilities are safely accessible, and offer accommodations for different age and societal groups.”*

2.8 Conceptual model



The conceptual model summarizes the relationship between the variables as described in the literature review. Based on the beforementioned literature it is to be expected that investments in ALEs, out of the three categories have a positive impact on the inhabitants of that living environment. The impact on inhabitants is expected to be an increase in physical activity and a more positive look towards their neighbourhood quality and investments in their district. However, the control variables have to be considered, since they affect the relation between the investments and the impact of these investments. E.g., the impact of investments made in an already high-quality neighbourhood is likely not to be as high in comparison to the same investment in a low-quality neighbourhood. Depending on the specific value of the control variables, they can have a dampening or an enhancing effect on the impact of investments on inhabitants.

3. Methodology

3.1 Research philosophy

Knowingly or unknowingly a researcher will be making numerous assumptions while conducting research (Burrell and Morgan, 2016). Underlying ideas and views as summarized in a research philosophy should be considered. The term research philosophy refers to a system of beliefs and assumptions about the development of knowledge and comprises of three parts: the ontology, the epistemology, and the methodological issues (Saunders et al., 2012). This paragraph will first describe each of the parts before concluding with a fitting research philosophy.

The ontological question “What is reality?” can have an answer based on realism or relativism (Saunders et al., 2012). This thesis takes a realistic view. It comprises the notion that only one reality exists, and this reality can be observed and analysed to get to the objective truth (Saunders et al., 2012). By conducting desk research, a survey, two in-depth interviews and then confirming the information of these sources with literature and each other, this thesis tries to gain an in-depth knowledge of this case and gets as close as possible to describing the objective impact of the investments made by the municipality of Eindhoven. However, while there is one reality out there, it does not mean everyone observes it the same way.

Therefore, the epistemology within this research is more based on relativistic viewpoints. Thus, constructive in nature rather than objective (Saunders et al., 2012). No observation is made without a personal framework: The interview can include a personal bias; the surveys might be coloured by political views and even the researcher might focus on more positive information regarding the subject in the desk research. Thus, even though one reality exists, personal context colour in part of the image.

The research strategy fitting the realist ontology and relativist epistemology is a case study (Yin, 2014; Rosenberg & Yates, 2007). It allows for both seemingly opposite views in ontology and epistemology to be combined in a mixed methods approach (Yin, 2014; Rosenberg & Yates, 2007). Combining a qualitative study, with regards to the in-depth interviews and the desk research, and a quantitative approach, the survey and its analysis.

In conclusion, a realist ontology, a relativist epistemology, and a case study mixed methods methodological approach fits within the research philosophy of critical realism (Easton, 2010, Bashkar, 2013).

3.2 Research approach

This paragraph will discuss the nature of this case study and three main research approaches, the qualitative -, the quantitative -, and the mixed methods approach. An argument will be given as to which approach is fitting for this thesis and the underlying theory.

Qualitative research is characterized by its aims, which are often towards gaining a deeper understanding of a certain topic or aspect of social life (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016). It is an approach to explore the meaning individuals or groups ascribe to social and/or human problems (Creswell, 2014). Questions with this research approach often start with why, how or what rather than asking how many or how much questions, which are often more focussed towards a quantitative approach. The advantages are gaining a deeper understanding of the research problem in a real-world context, the possibility to be deductive and inductive in the research approach, and the very detailed and in-depth data to describe the research (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016). The disadvantage is that it is time-consuming, it is often difficult to get concise and precise conclusions, and it is not generalizable due to the research being context-specific (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016).

Quantitative research is focused on (precise) testing of a hypothesis known in advance by using numerical data (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016). To test the hypothesis, the relationship between variables is closely examined, making it deductive in nature (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016). The advantages of quantitative research are the objectivity of the research, the high repetitiveness of the research, the generalizability, and the possibility to use large amounts of data (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016). The disadvantages are that it lacks contextual information, it is rigid in structure and there is a change of omitted variable bias (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016).

It is not possible to place these research approaches above one another due to their merits. Which one fits best depends on the research question, there is no superiority (McCusker, 2015, Creswell, 2014). However, a mixed methods approach can provide a

pragmatic solution to make use of the advantages of both research approaches, and to negate some disadvantages (Creswell, 2014 McCusker, 2015). The qualitative part of the mixed methods approach can provide a deeper understanding of the data collected in the quantitative part, giving the qualitative part more structure and more generalizability, while simultaneously incorporating contextual information to supplement the collected data in the quantitative part (Van Thiel, 2014; Creswell, 2014 McCusker, 2015; Bryman, 2016). This mixed methods approach fits the before mentioned research philosophy of critical realism, and case study research method (MERRIAM, 2009; STAKE, 2006; YIN, 2014). The research is deductive, it draws on theories found in the literature to test whether the impact of investments in ALEs improves the effects ALEs are acclaimed to have. Thus, testing the theory within this research (Van Thiel, 2014; Bryman, 2016). The deductive approach of research fits also in the mixed methods approach (Creswell, 2014 McCusker, 2015).

3.3 Research Strategy

This paragraph will focus on the specific strategy used to answer the main questions: What is the impact of investments made by the municipality of Eindhoven to create/improve active living environments on the inhabitants of the municipality of Eindhoven? As stated before the choice has been made for a mixed methods approach in a case study design. This paragraph will first discuss the different case study designs. Then the choices for a single case study design, and for the municipality of Eindhoven are elaborated. Afterwards, a short recap of the sub-questions will be given, followed by an explanation of the 5 phases of this thesis.

3.3.1 Choice for Case study design

A case study is a research design in which one or more cases are studied in an everyday and real-life setting (Van Thiel, 2014). There are four different case-study designs according to Van Thiel (2014) Yin (2003 & 2014), see figure 1.

There are four distinctive choices for case study designs. The choice was made for a single case study, even though the case study in itself is not in itself critical, unique, or revelatory (Yin, 2003).

However, it does have some unique features making it hard for this case to be compared to other cases and it is, in a certain way a representative or typical case for this research topic.

The first criterium is explained by the nature of the investments made regarding ALEs. Each investment is context specific, depending on neighbourhood and personal characteristics of the environment and its inhabitants the investments can have different outcomes, making them not directly comparable. The second explanation of the case being representative is the fact that the investments to increase/improve ALEs are often made with the same end goal in mind; improving the ALE. Therefore, there are a few typical investments which could be implemented with that goal in mind. Chapter 4 will show two of these investments with regard to Cruyff Courts and the Urban sport park. Consequently, a single-case study fits better in these circumstances than a multiple-case study approach (Van Thiel, 2014, Yin, 2003).

The second choice for a case study is surrounding the unit of analysis (Yin, 2003). This unit is the specific person/location/marketplace etc. the research focuses on and is related to the initial research question (Yin, 2003). The unit of analysis is the impact of investments made in ALEs on the inhabitants of the municipality of Eindhoven. This impact is measured in three variables, compliance to the Dutch PA-norm of inhabitants, changes in compliance with the Dutch PA-norm over the past 5 years and the opinion of investments made in the living

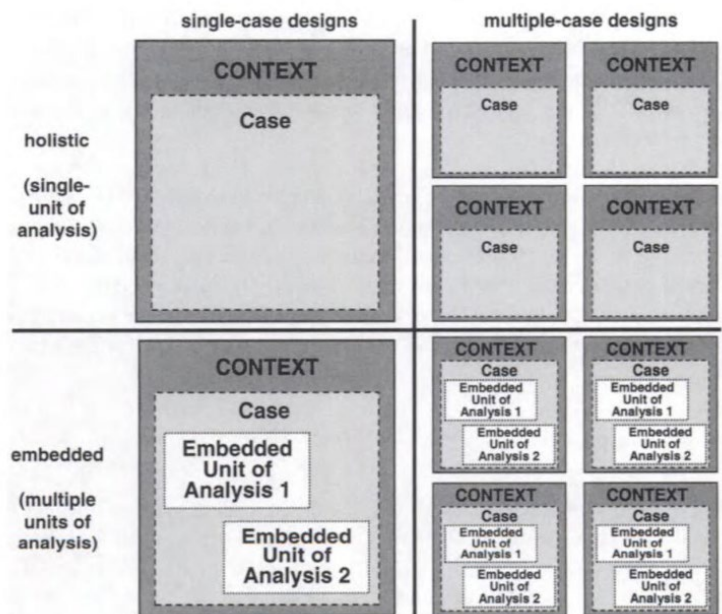


Figure 1 figure out of the paper by Yin (2003, pp. 40) Basic types of design for Case studies

environment of the inhabitants. Thus, there are 3 units of analysis (or three main dependable variables).

In conclusion, the study design is an embedded single case study design, due to the unique and at the same time representativeness of the case as well as the fact that it has three units of analysis.

3.3.2 Choice of municipality

The municipality of Eindhoven was specifically selected. The main reason was the integral approach they adopted after the 2014 reorganization, leading to further incorporation of topics like health, physical activity and policy regarding ALEs as compared to other municipalities at the time. Another reason was the fact that several projects were already executed since 2016 to increase the physical activity levels of its inhabitants, especially with regard to physical transportation (as will be discussed later on in the case study, chapter 4). The third reason is the fact that they responded positively and with interest in the research topic of this thesis.

3.3.3 The 5 research phases

As stated in the introduction the main research question is: What is the impact of investments made by the municipality of Eindhoven to create/improve active living environments on the inhabitants of the municipality of Eindhoven? Based on this research question the following sub-questions were formulated:

1. Why is physical activity important, what role do active living environments play in improving physical activity?
2. How are ALEs created/improved and which neighbourhood and personal characteristics influence the PA behaviour and perceptions of inhabitants to experience active living environments? What are possible interventions to create an ALE?
3. What was the policy trend regarding ALEs over the past 10 years regarding ALEs and which interventions were implemented by the municipality of Eindhoven to improve/create ALEs?
4. What do the inhabitants of Eindhoven think about these ins and did the investments in ALEs increase their levels of physical activity?

These main- and thus the sub-questions are answered in the five phases of this thesis. Phases one and two are qualitative in nature and phases three and four are quantitative in nature. Phase 5 is the concluding chapter in which all findings are brought together.

Phase one focussed on creating a theoretical framework on the basis of which further research was stooled. This framework was built by desk research and resulted in a conceptual framework. It answers sub-questions 1 to 2.

The second phase goes further into depth regarding the active living environment in the municipality of Eindhoven, by combining desk research and two in-depth interviews. In chapter two a review of the literature gave an overview of what an active living environment is why physical activity is important, which interventions are possible in the living environment to increase physical activity and how human experiences in the active and built environment can differ. Within the fourth chapter the focus shifts to the case study of the municipality of Eindhoven. A combination of desk research and two in-depth interviews have resulted in an overview of the interventions made in the municipality of Eindhoven and the ideas and goals behind those interventions. Thus, focusing on answering sub-question 3.

The third phase focuses on how the inhabitants of the municipality evaluate the impact of the investments of the municipality of Eindhoven on them. This information is gathered by a survey set out amongst the inhabitants of Eindhoven, combined with control variables of district characteristics. Therefore, this database consists of primary data, only collected through the means of this survey, and secondary data from municipal databases. This survey contained questions about their PA levels, changes in their PA levels over the past five years, their view regarding the quantity and quality of investments in their city districts, if and how often they make use of the interventions made by the municipality of Eindhoven and control variable questions regarding their background. The survey is included in appendix, 8.1. This phase will thus partially answer sub-question 4.

In phase four the first two parts will be combined to answer the main question and focuses of the analysis of the survey in chapter 5. This analysis is done by first quantifying the survey data, combining it with the secondary data and then running three OLS regressions and t-test analyses through STATA. Thus, completing the answer to sub-question 4.

This thesis concludes in phase 5, thus in the final chapter. This chapter answers the main questions and gives a short answer to the sub-questions. Based on these answers policy

recommendations for the municipality of Eindhoven will be made. This chapter will also discuss the limitations of the research and possible future research opportunities.

3.4 Research Design

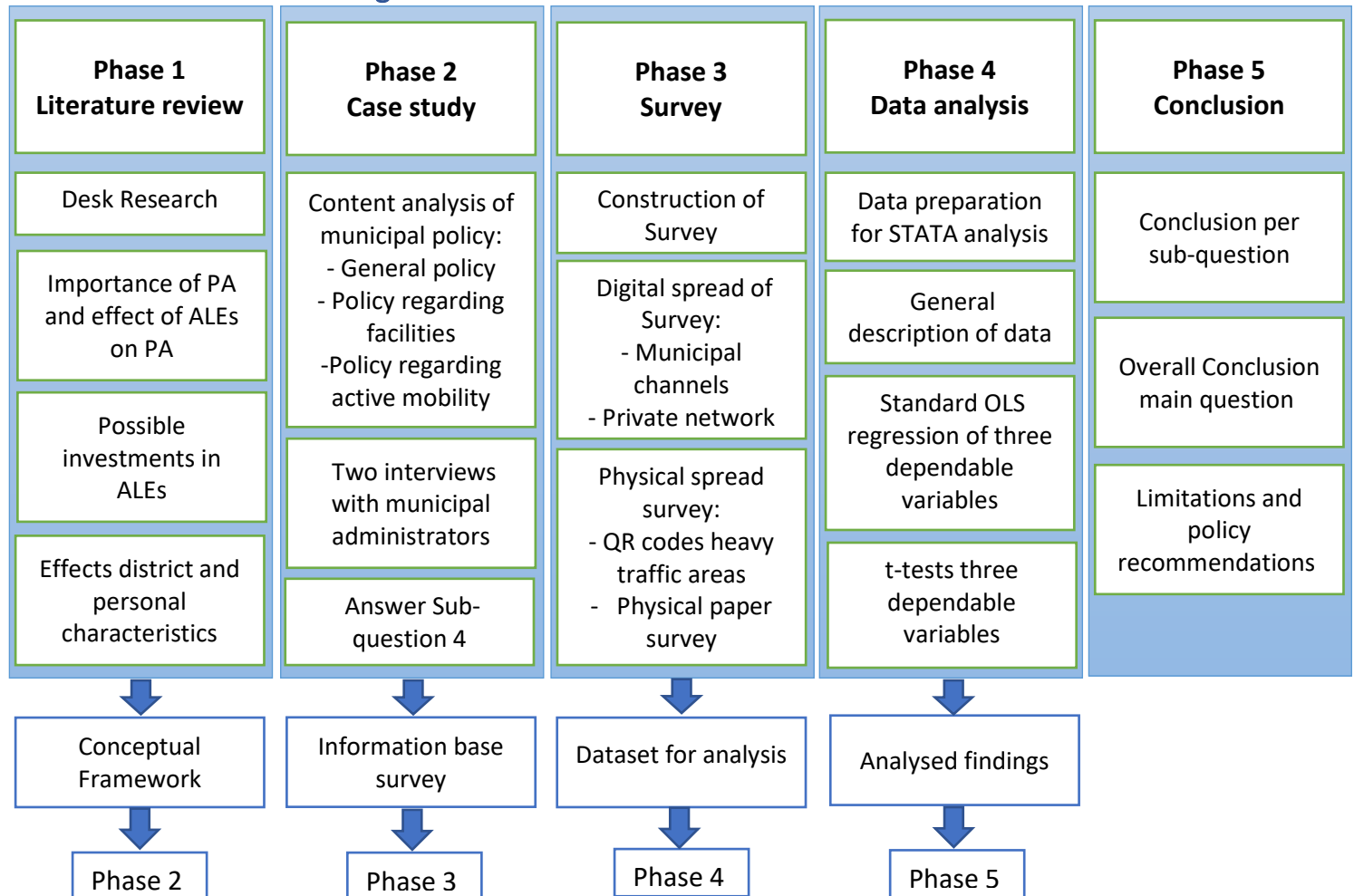


Figure 2 Research design in 5 phases (created by Author)

3.5 Strategy for data collection & respondents' recruitment

As stated, the thesis contains 3 phases in which sources and data were collected. Phase one, the literature review, phase two, the qualitative part; desk-research, semi-structured interviews, and phase three, the quantitative part; the survey.

3.5.1 Phase 1; literature review

The theoretical framework and resulting conceptual model are based on desk research. This research is based on existing data sources and theories to build new conclusions and other theories (Van Thiel, 2014). Suitable sources were picked from a pool of information. At the top of the funnel, sources used were often sources which were widely referenced within

the spatial planning field to base the ever smalling funnel within the literature review of off. The lower the funnel the less referenced the sources were. Therefore, these sources were verified by looking for research which would contradict or support the source. Both were taken into account when the contradictory piece was also supported by other literature. The desk research in the literature review also shows the historical development of theory regarding active living environments and explores the background and context of the research problem stated within this thesis (Van Thiel, 2014).

3.5.2 Phase 2; content analysis and in-depth interviews

The qualitative part, thus part one, focuses on gaining deeper insight into the interventions of the municipality of Eindhoven. This was achieved through desk research, specifically through content analysis and two interviews with public administrators of the municipality of Eindhoven.

3.5.2.1. Content analysis

The desk research specific to the case study contains a content analysis of documents and information from the website and database of the municipality of Eindhoven, as well as sent documents by the public administrators. This was done to get to a list of projects and investments made by the municipality of Eindhoven to create active living environments as well as to get a clear image of the reasons behind those investments. Since the main interest of content analysis is to distil the message of the author of the text to the audience (Van Thiel, 2014) this was the best way to get to know these reasons, especially in combination it the two in-depth interviews. The documents were all produced by the research situation itself, meaning that they were all documents from the municipality of Eindhoven. This was then structured chronologically to show the process of the last five to ten years to get to the investments made in the past five years and the effects they hoped these investments would have on the inhabitants of Eindhoven.

3.5.2.2. In-depth Interviews

As stated before, two interviews were conducted, both epistolary and in-depth in nature. Epistolary refers to one-to-one interviews that are mediated by technology (van Thiel, 2014). Normally with epistolary interviews the research questions and some information are sent beforehand (van Thiel, 2014). However, due to the nature of the interviews and the short

preparation time of the interviewees between scheduling and conducting the interviews only the goal and subject of this thesis were discussed through e-mail beforehand.

The interviews were semi-structured. Therefore, a short list of topics and main questions was prepared in order to structure the interviews (See appendix, 8.2), while also enabling the interviewee and interviewer to focus on certain topics not stipulated beforehand and to go further into depth regarding relevant topics relevant. Since, in contrast to structured interviews, deviation from the survey questions is possible (van Thiel, 2014). The added value of semi-structured interviews is the possibility to gain more in-depth knowledge by being able to ask detailed questions (Saunders et al., 2019).

Since it consists of only two interviews, these two interviews can only be seen as a way to gain a deeper understanding of the findings from the desk research.

3.5.3 Phase 3 and 4, the survey

The digital survey questions were based on the conceptual framework and the interventions of the municipality and can be found in appendix, 8.1. The target group of the survey were inhabitants of the municipality of Eindhoven, preferably from each district and with different backgrounds. The goal of the survey is to (subjectively) measure the impact of the investments made by the municipality to create active living environments. Prior to sending out the survey, several pilot tests were conducted by the thesis supervisor and two public administrators of the municipality of Eindhoven. The change was made from the neighbourhood level to the district level to increase comparability between groups since the likelihood of respondents from the same neighbourhood was smaller than the respondents coming from the same district.

After the small flaws and mistakes were rectified, the survey was sent back digitally to the public administrators of the municipality of Eindhoven. They then shared it on their socials regarding the project: “DE STAP naar gezonder” (translated: the step to healthier) and in their newsletter. To increase the number of respondents, flyers with a QR-code to the digital survey were hung around some key areas of Eindhoven which see a lot of foot traffic, as well as personal channels were used to contact friends and their families who live in Eindhoven. However, it proved challenging to find respondents for the survey. Data collection started on the 18th of July 2022 and ended on the 20th of September and attracted 51 respondents. The digital survey initially had 74 respondents. However, only 41 respondents completed the survey, thus creating an issue of non-response. The choice was made to go to Eindhoven and

conduct paper surveys for two days. Another 10 respondents were recruited on these two days, giving a total of 51 respondents to the survey.

By conducting a survey, it is possible to collect a considerable amount of data in a shorter time (Van Thiel, 2014). Since the survey is based on the conceptual framework and interviews it was possible to standardize the questions and make them closed-ended. Meaning; all questions have affixed answer categories, giving the respondents the possibility to tick the answers most applicable (Van Thiel, 2014). To prevent a lower level of standardization throughout the survey, the option “other” was only used in more sensitive questions regarding gender and cultural background in order not to exclude respondents on these premises. The questions regarding the investments and their active lifestyles did not include this answer option. When formulating the questions and during the build of the layout of the survey, the guidelines as stipulated by Van Thiel (2014) were followed.

3.6 Overview of interviewees

This paragraph will give a short overview of the two interviewees, keeping in mind the anonymity which was promised at the start of the interviews. Both are employed at the municipality of Eindhoven.

The first interviewee is from the Dutch “Ruimtelijke Domein” (literal translation: Spatial domain) department, as part of the team focussing on the aim of the municipality. Since the reorganization of the municipality in 2014, the RO department has been divided into three sectors, “Richten, Verrichten, Inrichten” or in English (To aim, execute and structure/furnish). The team focussing on the aim of the municipality takes stock of what has to happen within the Spatial domain with regards to city maintenance and transitions that are/should happen within the city. The interviewee spearheaded themes regarding the environment and healthy urbanization.

The second interviewee is also part of the spatial domain in the municipality but is focused on sports policy. The interviewee stated that while the team was not directly involved in spatial developments, the team was always asked to give input from this perspective. Team sports within the RO department is mainly focussed on upkeep and subsidies regarding organized facilities and on the goals as set out in the sports and movement vision, which will be discussed in chapter 4.

3.7 Survey data operationalisation

This paragraph will show how the data was operationalized in three categories: the dependent variables, the independent variables and the control variables. The first step is to state the definition of the variables, then how the variables were constructed from the survey data and or external database, how these variables scored and the meaning behind these scores.

3.7.1 Dependent variables

The dependent variables in this thesis are the collection of variables together forming the impact of the investments in the active living environment. The dependent variables are variables which are directly influenced by the independent variables (Van Thiel, 2014), thus by the investments in active living environments. Therefore, the dependent variables are:

- Conforming to the Dutch PA Norm (de NNGB). This variable is the sum of three aspects within this norm as measured within the survey. A negative score means a non-conformance to the PA norm, while a positive score means compliance with the PA norm, and the higher the score the better the person conforms to the Dutch NNGB norm. The three aspects are:
 - Low-level exertion. The question supporting this variable from the survey is: “How many hours a day are you physically active, with exception of sports participation or high-intensity physical activity?” The minimum level of low-level exertion is 150 minutes a week in order to comply with the PA-Norm, but more is better up until a certain point due to diminishing returns (RIVM, 2022). If a respondent does participate in low-medium exertion of 1 hour a day or less, the minimum of 150 minutes is harder to reach but still possible. However, it is the bare minimum and the more is better, thus 1 hour a week or less is given a negative score of -1. 1 to 2 hours a day reaches the minimum and is better than 1 hour a week or less, thus it is scored at one. The more hours the better, thus every subsequent step is an extra point. (2 to 3 hours= 2 points, 3 to 4 hours is 3 points, and more than 5 hours is scored at 4. Due to diminishing returns at higher exertion levels the score is cut off at a max of 4 for 5 hours a day or more (Kenniscentrum sport en bewegen, 2022).
 - High-level exertion. The question supporting this aspect is: “How many hours a week do you exercise?” with examples of high-exertion activities. The norm states compliance when twice a week 2 hours of intensive exertion to strengthen muscle

and bone are reached (RIVM, 2022). More hours of exercise a week, up until a certain point, is a positive, the variables are positively scored with each increasing hour of exercise. The score is capped at a maximum score of 5 since the additional value of an extra hour of exercise decreases with every hour of extra exercise (diminishing returns) (Kenniscentrum sport en Bewegen, 2022). Thus 2 hours of exercise is scored at 2, 3 hours at 3 etc. up until the 5-hour mark, 6 hours or more exercise per week is still scored at a 5. With zero hours of exercise scored at -5 and 1 hour of exercise at -1. They are negatively scored due to non-compliance with the PA-norm and there is a larger difference due to the fact that the additional value of one hour of exercise is far greater than not exercising at all (RIVM, 2022).

- Sequent sitting. The question supporting this variable is: “how many hours a day do you spend sitting at work?” The lower the number of hours of sequent sitting the better, but a limitation of long hours of sequent sitting of no longer than an hour with a 10-minute interruption is complying with the PA-Norm (Kenniscentrum Sport en Bewegen, 2022 & RIVM 2022). It is better to move around than to be seated for a longer period of time during the day. Therefore, this aspect has a negative impact on conforming to the Dutch NNGB score and is scored on a 5-point negative scale based on the number of hours per day performing seated work: till 2 hours = -1, 2 till 4 = -2, 4 till 6 = -3, 6 till 8 = -4, up until the last category: longer than 8 hours, which is scored -5.
- Change in conformance to the Dutch NNGB over the past 5 years. This variable is based on the same aspects of this norm as the compliance to the PA-norm score above and is also scored on a 5-point scale, from -2 up to 2. Each of the 3 aspects was asked as a statement over the past 5 years: “I started to participate more in low and medium level physical activity”, “I started to exercise more”, “I reduced the number of sequent hours of sitting”. When the respondents disagreed with the statement, thus stating they totally disagreed or disagreed the change was negative, corresponding to a negative scoring. When respondents agreed with the statement, thus scored totally agreed or agreed the change is positive and, therefore, scored positively. Totally disagreed is scored at -2, disagree at -1, neutral, no change at 0, agreed at 1, and totally agreed at 2. The weighted average was taken for each of the three aspects as explained above. A positive mark would mean a

positive change in conformance to the NNGB, and a negative mark would be a negative change or nonconformance to the NNGB.

- Opinion on investments in their city district. This variable is the sum of 10 separate statements rated on a 5-point scale, ranging from -2 at totally disagreeing with the statement, to 2 when totally agreeing with the statement. The higher the score the more inhabitants see investments happening in their neighbourhood. The lower the score the investments are seen as negative or at zero the investments are not noticed at all. To clarify, these are not opinions on the specific investments made, but on general investments in their city district over the past 5 years and are based on general statements (see appendix 8.1 for the specific questions in the survey). The questions surrounding this variable were asked before the respondents came to know about the actual investments. The following statements were put forward in the survey: The municipality has in the past 5 years invested in:
 - My neighbourhood
 - Increasing greenery in my neighbourhood
 - Cycling lanes
 - Playgrounds in my neighbourhood
 - Trottoirs (sidewalks)
 - Unorganized public sports facilities
 - A bicycle loaning system
 - Unorganized public parks
 - Public transport
 - Converting to a low-traffic city centre
- Impact of Investments, this variable is the sum of all three dependable variables mentioned above. It summarizes the main impact of these investments. When the score is very negative, the respondent scored negative on all three variables. This means that the respondent does not comply with the Dutch PA-Norm, experienced a negative change in compliance with the PA-norm over the past years and has negative opinions regarding investments made in their districts. When the score is very positive it signals a positive score on all three variables, thus compliance with the Dutch PA-Norm, a positive change in compliance and positive opinions regarding investments. Every score in between is a mix of scores between variables.

3.7.2 Independent variables

The independent variables are whether or not investments were made in the district the respondents lived in. All variables are dummy variables, 1 meaning the investment was made within the district, and 0 meaning it was not. The list of investments is based on the interview with public administrators from the municipality of Eindhoven and documents, they send over and from their website.

- Restructuring of the roads. This is a variable containing the restructures of certain roads to make these roads more accessible for physical modes of transportation. A score of 1 signalled that a road was restructured in this city district and zero if no investments was made. The investments were made at the:
 - Geldropseweg
 - Aalsterweg
 - Leenderweg
 - Vestdijk
- Bicycle highway investment Helmond Eindhoven.
- Urban sport Park, it is an investment in only one district, namely in the Strijp, but has a wider reach within the municipality.
- Availability of Cruyff court within the district. This is a dummy variable if over the past 5 years Cruyff Courts, which are small football fields, were installed in the neighbourhood it is scored at one if not zero.
- Investments in ALEs is a summarizing variable, the district in which is invested based on the list mentioned above is connotated with a one, and districts with no investments at all are connotated with a zero.

The table below shows an overview of the abovementioned main independent variables:

District	Geldropseweg	Leenderweg	Aalsterweg	Vestdijk	Total restructuring	Cycling lane Helmond	Urban sport park	Cruyff court	Investments in City district
Centrum				1	1	1			1
Gestel									
Stratum	1	1	1		1			1	1
Strijp							1	1	1
Tongelre	1				1			1	1
Woensel-Noord								1	1
Woensel-Zuid								1	1

Table 1 Summary Investments per city district based on interviews (Created by Author)

3.7.3 Control variables

The control variables are divided into two groups: The personal control variables and district variables. The personal variables were collected in the survey, while the control variables regarding the city districts are taken from central databases from the municipality of Eindhoven and the Dutch government.

The personal control variables are as follows:

- Gender, thus male or female.
- Age was answered in categories: Younger than 18, 18 till 25 and then for every 5-year possibility, thus 25 till 30, 31 till 35 etc. up until 80 years and older.
- Educational level was asked in five categories based on the Dutch schooling system, the higher the level of education the higher the score.
 - o Primary school, the lowest level, scored at 1
 - o Lower levels secondary school (VMBO, Havo-onderbouw, VWO- onderbouw, MBO 1), scored at a 2
 - o Higher levels secondary school, (Havo, VWO, MBO 2-4), scored at 3
 - o bachelor college level (HBO-, WO-Bachelor), scored at 4
 - o Master college level (HBO-, WO-Master of or higher), scored at 5.
- Cultural background, the options given were all based on the data from the municipality of Eindhoven about which cultural backgrounds were represented within the city of Eindhoven. This variable was encoded in Stata, giving a randomized sample to each of the cultural backgrounds.
- Household composition, a check to see if it was a one-person household, multiple-person household without children or a multiple-person household with children. This variable is scored on the (average) number of people per household. One-person household is scored at 1, multiple-person household without children at two, and the category with children at 3.
- Income was based upon the scale often used by CBS to rate low-, middle- and high-income earners. The variables were encoded from low income to high income on a scale of 1 to 3
 - o till €25.000 a year (Scored at 1)
 - o between €25.000 and €34.000 a year (scored at 2)
 - o over €34.000 a year (Scored at 3)

The district characteristics are based on the district the respondent stated they lived in.

To reiterate, due to the low number of respondents the choice was made for questions and variables at the district level instead of neighbourhood level, to make the data more comparable. Each district was attributed scores regarding the specific variables and are based upon external data. The data from “De Buurtkijker” is at a lower neighbourhood level than the level of this thesis, which is at the district level (Gemeente Eindhoven, 2022²)³. Therefore, the data retrieved from this database is always an average of the combined neighbourhood scores per district. Combined with the fact that this data is built from both the yearly survey set out amongst the inhabitants of the municipality of Eindhoven, as well as base variables to support the variables from the survey (Gemeente Eindhoven, 2022²). The following paragraph will explain these variables and the source of the data.

- Percentage Public Greenery: this variable is the percentage score calculated out of the number of hectares of public greenery in comparison to the total hectares of each neighbourhood. The higher the score the within each neighbourhood the greener the neighbourhood is. This data was collected from the Open database of the municipality of Eindhoven (Gemeente Eindhoven, 2022¹).
- Safety: this variable is retrieved from “De Buurtkijker” (Gemeente Eindhoven, 2022²). This variable is an average of sub-variables all scored on a scale from less favourable to most favourable within the database (Gemeente Eindhoven, 2022²). This average was combined with other neighbourhood scores and then again averaged at the district level. The least favourable was scored at a -2, less favourable at a -1, favourable at 1 and most favourable at a 2. Within the database the safety score was an average of the sub-variables:
 - Petty theft
 - Violence
 - Burglary
 - Perception of criminal activity
 - General score safety
 - Feeling of safety
- Score living environment; this variable was also retrieved from “De Buurtkijker (Gemeente Eindhoven, 2022²). This variable encompasses the pleasantness of living within the environment, purely from the perspective of enjoyment of living in the district. This variable is an average of sub-variables all scored on a scale from less favourable to most favourable within the database (Gemeente Eindhoven, 2022²). This average was

³ For more information about the build-up of the variables in this specific database see Gemeente Eindhoven, 2022²

combined with other neighbourhood scores and then again averaged at the district level. Least favourable was scored at a -2, less favourable at a -1, favourable at 1 and most favourable at a 2 The variable Living environment is based on the following sub-variables:

- Number of owner-occupied homes
- Experience of physical degradation
- Experience of social disturbances
- Experiences of traffic disturbances
- Percentage of dwellings versus empty buildings
- Disturbances/ destructions
- Facilities
- residential disturbances

- The liveability score: is a combination of all variables which characterize the inhabitants of the environment and, foremost, the qualities of the environment which influence the attractiveness to live within the area. It is a combined score concerning living, recreation, sports, spatial planning, safety, economic circumstances etc. It is made objective by only picking those variables which are objectifiable (Gemeente Eindhoven, 2022²). This variable is an average of sub-variables all scored on a scale from less favourable to most favourable within the database (Gemeente Eindhoven, 2022²). This average was combined with other neighbourhood scores and then again averaged at the district level. The least favourable was scored at a -2, less favourable at a -1, favourable at 1 and most favourable at a 2. The following sub-variables are considered:

- Work and free time
- Material wellbeing
- Environment
- Social cohesion
- Safety
- Wellbeing and health
- Living and the Living environment

Two of these scores have already been highlighted earlier since the literature review showed the importance of these highlighter variables in combination with the overall variable of liveability.

- Movement friendliness of the environment. This variable is a score created by public servants of the Dutch government and is represented in the Atlas of the living environment⁴. It is a calculated score based on the sub-variables (AtlasLeefomgeving, 2022¹):

⁴ For further information regarding the build-up of this variable see;
<https://nationaalgeoregister.nl/geonetwork/srv/dut/catalog.search#/metadata/7dde701b-5fdd-47fd-b81f-6dab7d156fce>

- Public organized (sports) facilities
 - Public unorganized facilities, e.g. playgrounds and other public sports facilities
 - General facilities
 - Recreational Green and Blue: This entails the recreational spaces in nature and at places with water
 - Bicycle lanes and walking trails
- Score “leefbarometer”. This variable is also created by public servants of the Dutch government. It is an objective score based on both subjective survey data and specific data collected within the specific districts and it is a score regarding the living environment of the inhabitants of the specific city districts. It is again based on several sub-variables at the district level (AtlasLeefomgeving, 2022²)⁵
- | | |
|----------------------------------|--------------------------------|
| ○ Type of housing | ○ Available facilities |
| ○ Characteristics of inhabitants | ○ The green and blue structure |
| ○ Criminality and safety scores | (amount greenery and water |
| ○ Number of parking spaces | within the district). |

3.7.4 Descriptive variables

These variables are considered in the survey but are not utilized within the regression models. They are more descriptive to say something about the general impression and use of the investments made by the municipality of Eindhoven.

Use of investments: This variable shows whether or not respondents make use of the facilities and physical mobility investments as invested in by the municipality. For each of the investments, a variable is created that depicts the use of the investment by the person in the city district, with a score of yes, sporadically and no.

Opinion per investments: This variable gives an overview of the opinion the respondent has regarding each of the investments made by the municipality. This variable is not the same as opinion on investments, since this variable is measured before any specific investments are mentioned and is based on general statements about municipal investments in their city district, while this variable is based on a question per investment on a scale of positive, negative or no opinion.

⁵ For further information regarding the build-up of this variable see:
<https://nationaalgeoregister.nl/geonetwork/srv/dut/catalog.search#/metadata/c567c20d-5bb9-4c45-bbce-3692955b4fab>

3.8 Reflection on validity, reliability, & ethics

Every form of research has some form of validity, reliability or ethical merit and issue which have to be addressed. This chapter will discuss all three in order.

3.8.1 Validity

Internal validity checks if the researcher measures what he/she is supposed to be measuring (Winter, 2000; Van Thiel, 2014; Bryman, 2016). Within case studies, the body of information is often considerable and there is always a risk of close contact with the researched (Winter, 2000; Van Thiel, 2014; Bryman, 2016). However, by limiting the number of in-depth interviews to two and comparing it to a content analysis of documents and information gathered from the municipal database on their website this influence is limited.

The researcher can also create biases within the research (Van Thiel, 2014; Bryman, 2016). Since the study was deductive, both the interviews and content analysis were based on theory. Consequently, the questions did bear clear and close relationships with the theoretical framework (Van Thiel, 2014), and it made it possible to know a little about what to expect before the interviews or analysis was done to see if it actually gathered the information needed. However, during the in-depth interviews specifically, the bias of the researcher can affect the questions asked and can colour what is said by the interviewee (Winter, 2000; Van Thiel, 2014; Bryman, 2016). The same goes for the interviewee, his/her opinions colour what answers are given, and which information is eventually given (Van Thiel, 2014; Winter, 2000). Therefore, there is no definitive way of concluding the interviews were taken into account without any bias.

To combat the internal validity problems a triangulation of different methods was used (Bryman, 2016), namely the interviews, the desk research (content analysis) and the survey. Especially the content analysis could confirm the information given by the interviewees and vice versa. In combination with the theoretical framework, it was possible to make sure the thesis is internally valid.

External validity describes the extent to which a study can be generalized (Winter, 2000; Van Thiel, 2014; Bryman, 2016). While it is an in-depth look at the municipality of Eindhoven, it is still only one municipality or one unit of observation. As well as the low number of respondents with regard to the survey within the municipality of Eindhoven harms the external validity of this thesis. Therefore, it is not possible to generalize the findings of this

thesis to all investments within the Netherlands, since it is just a small part of the whole (Van Thiel, 2014; Bryman, 2016).

Even though this thesis only had a small number of respondents, there was no non-response issue. Since the survey was sent out to all inhabitants of Eindhoven and not to specific persons of interest, making the sample as random as possible (Van Thiel, 2014; Bryman, 2016). Still of the 79 handed-in surveys, only 41 of them were completely filled out. Combining the digital results with the 10 respondents from the street surveys a total of 51 respondents were reached. Compared to a population of around 230.000 inhabitants the response is very low. Then there is also the issue of respondents giving politically correct answers (Van Thiel, 2014; Bryman, 2016). By making the survey closed-ended an attempt was made to counteract this problem as well as control questions were put in place in order to check the answers to the questions which were important for the research. Since the correlation between the control questions and actual questions was very high the issue of politically correct answers is very likely not applicable to this thesis. However, it can never be fully resolved (Winter, 2000; Van Thiel, 2014; Bryman, 2016).

3.8.2 Reliability

The reliability of a study is with regard to the accuracy and consistency with which variables are measured. The higher the level of accuracy and consistency the more reliable the research is (Winter, 2000; Van Thiel, 2014; Bryman, 2016). In other words, it makes the research repeatable instead of coincidental.

In general, the consistency of this thesis is also relatively high. The methods used can be applied to other municipalities and the steps taken within this thesis are carefully documented and disclosed. This makes the thesis repeatable and therefore the consistency can be considered high (Van Thiel, 2014; Bryman, 2016).

The accuracy of this thesis is relatively high. The survey was closed-ended meaning that the answer option will be the same when the survey is repeated and based on the theoretical framework, as well as the definition of the Dutch NNGB, which gave operationalizable variables. An hour stays an hour and exercising when given examples stay exercising for an hour. Opinion on investments is harder to capture, however, the thesis used 5 point scale from totally disagree to totally agree and proper explanation. Combined with the fact that the survey was piloted by both the thesis supervisors and the public administrators of the

municipality of Eindhoven, I dare to state the accuracy of the survey was on point. The accuracy of the interviews, however, is a point of discussion (Van Thiel, 2014; Bryman, 2016). Since it is harder to deduce variables from an interview, since it is not possible in a semi-structured interview to get the interviewee to respond exactly as planned, with specific phrases and terms (Van Thiel, 2014; Bryman, 2016). Therefore, the interview does leave room for interpretation and is not as accurate as the survey.

3.8.3 Ethics

To keep the research ethical, the four principles of ethics have been considered.

The first principle states no harm should be done to the participant in this research (Van Thiel, 2014; Bryman, 2016). This topic is not associated with very sensitive topics. Although the questionnaire got very personal with regard to their physical activity levels. However, the survey was free to be filled out and completely anonymously and nobody was forced to answer the questions.

The second principle states that participants have a right to privacy, and they may withdraw from the research or withhold information (Van Thiel, 2014; Bryman, 2016). All participants in the survey were anonymous, and the personal questions were generalized. Therefore, it is not (legally) possible to retrace information back to one of the respondents. The interviewees were not called by name during the research and the full transcript of the interviews is not freely available. Beforehand the questions were asked if it was okay to record the interview for this research and it was agreed upon that the tapes would only be for the transcription process and would afterwards be disposed of.

The third principle is the right of participant to give their informed consent (Van Thiel, 2014; Bryman, 2016). All information needed to make an informed decision was disclosed on the first page of the survey and in the e-mail to the interviewees. By then participation in the survey and the interview consent was given to use the data as disclosed beforehand (Van Thiel, 2014; Bryman, 2016).

The final principle is the fact that research should not be misleading (Van Thiel, 2014; Bryman, 2016). As stated by the previous right the information about what the thesis was about and what the goals for this research are, were disclosed beforehand.

4. ALEs in the municipality of Eindhoven

This chapter will focus on 3 different topics regarding ALEs in the municipality of Eindhoven. It will first give an overview of some general information regarding the municipality, the inhabitants, especially their diversity and their overall health scores. The second topic will zoom on the policy of the municipality of Eindhoven and will first discuss the general view regarding ALEs, health and physical activity and then focus on the specific policies regarding the unorganized and unorganized facilities and physical mobility. The third discussion will be about the investments made with regard to ALEs.

4.1 General information

The municipality of Eindhoven is located in the Brain port region of the Province of Brabant in the South of the Netherlands. The number of inhabitants of the municipality has steadily increased since 1996, from 197.374 inhabitants, to 238.326 inhabitants in 2022, an increase of 21%. Most inhabitant are in the age groups 35 to 45 and 45 to 65, namely 75.546 and 56.691 respectively (allecijfers, 2022). The average income is 28.400 euro's a year per inhabitant and 34.700 euros a year per earner (allecijfers, 2022). Of the inhabitants 61,48% have a Dutch cultural background and 38,52% have another cultural background (allecijfers, 2022). 25% have received lower education, 34,9% have received a mid-level education and 40,2% has had higher education.

Since the case study focuses on ALEs and their impact, it is also useful to consider some general health data as gathered and researched by the GGD Brabant-Zuid with regards to the “gezondheidsmonitor 2020-2021”, or, in English, health monitor (GGD Brabant-Zuid, 2021). The experienced health of the inhabitants of the municipality of Eindhoven is on average really good. 81%, age group 18 till 64, and 63%, age group 65 and older, are self-report to be in great health. A segment of the inhabitants of Eindhoven is overweight, 41% of the 18–64-year-olds and 58% of the 65 and up age group, and only 12% and 18% of these groups, respectively are obese. Which is lower than in most regions within Brabant (GGD Brabant-Zuid, 2021). Around 57% of the inhabitants aged 18-64, and 35% aged 65 and up comply with the Dutch norm of Healthy activity, therefore they do slightly better than the Dutch average of around 51% (or de beweegrichtlijnen) (GGD Brabant-Zuid, 2021). A side note has to be made about the impact of the Corona crisis. Due to the closure of sports clubs and other public spaces and the quarantine rules a large percentage (43% and 61% in the age groups 18 till 64 and 65+

respectively) have become less active, consequently the upward trend of the past few years before Corona is now (temporarily) a downward trend (GGD Barbant-Zuid, 2021).

4.2 Policy regarding ALEs

This paragraph will provide an overview of policies regarding ALEs in the municipality of Eindhoven. It incorporates the interviews conducted on the 26th of Mei 2022, and the 2nd of June 2022 with two civil servants from the municipality of Eindhoven. These statements will be combined with a content analysis of policy documents up until 2021 to provide a full overview. Since the focus of this thesis is with regard to investments made over the past 5 years within the municipality of Eindhoven, the policy review will not include the new coalition agreement of 2022 and other policy documents which have not been at least partially executed over the past 5 years. Firstly, the focus is on general policy trends regarding ALEs and Healthy living environments and secondly the focus shifts towards the more specific policy documents outlining policy regarding organized and unorganized facilities and physical mobility (the three aspects of ALEs).

4.2.1 General policy trends regarding ALEs and Healthy living environments

This paragraph focuses on the general policy trends, based on the interviews and general policy documents of the municipality of Eindhoven regarding health, physical activity, and active living environments.

The coalition agreements of 2014 and 2018 written by the municipal council of the municipality of Eindhoven show an increase in interest in policy surrounding active living environments (ALEs) (Gemeente Eindhoven, 2014 & 2018). While the agreement from 2014 did encompass one of the focus points of ALEs, namely physical mobility, it did also mention that investments in public organized facilities face cuts in spending (Gemeente Eindhoven, 2014). Additionally, no specific mentions are made towards increasing the quality of public unorganized spaces. From statements like: *“Within the Brainport region we would like to create a high-end, recognisable and green environment with a high residential quality (Gemeente Eindhoven, 2014, pp. 18)”* and *“to increase the environmental quality, we green ‘stony’ neighbourhoods (Gemeente Eindhoven, 2014, pp. 33)”*, it could be deduced that they are going to invest in these types of spaces. Due to the fact that only the physical mobility aspect was specifically considered in this coalition agreement, the fact that no specific mention is made regarding public unorganized facilities and public organized facilities were

facing cuts, it can be concluded that ALEs were not a specific point of interest from the coalition in 2014.

However, the coalition agreement of 2018 goes further than the previous agreement with regard to active living environments (ALEs) (Gemeente Eindhoven, 2018). This agreement specifically mentioned the term *“beweegvriendelijke leefomgeving”* (Or in English, active living environments) within the coalition agreement (Gemeente Eindhoven, 2018). Sports and physical activity is mentioned as one of the core topics for this coalition (Gemeente Eindhoven, 2018). They state to support sport associations and their volunteers, and to invest in sports across the board, so not only do they invest in organized (sports) facilities activities, but also the unorganized facilities to support sports like running, cycling, swimming, fitness, and urban sports, like free running, skating etc (Gemeente Eindhoven, 2018, pp. 33). The focus on increasing physical mobility infrastructure within the city also stayed a core goal of this coalition. Later on, they even state (literally translated to English): *“We want to set up the public space in such a way it promotes physical activity (Gemeente Eindhoven, pp. 33)”*. Which, in other words, can be interpreted as an aspiration to create Active Living Environments (ALEs). Therefore, it can be stated that the coalition of 2018 had a primary focus on ALEs while the coalition of 2014 did not (Gemeente Eindhoven, 2014 & 2018).

This trend, of increasing intrests in healthy and active living environments, is confirmed by the interviews as well as the omgevingsvisie (environmental vision) in which healthy and active living environments have even expressively been named (Gemeente Eindhoven, 2020, pp. 16); *“A healthy and future proof Eindhoven is a city in which inhabitants can live a safe and healthy life. Additionally, the public space is inviting to stay in, to meet others, and it promotes healthy behaviour and physical activity of inhabitants of all ages.”* A healthy Eindhoven entails *“physical, mental and social well-being, as well as resilience and vitality (Gemeente Eindhoven, 2020, pp. 16).”* Restating the importance of these themes for the municipality of Eindhoven.

During the interviews, it also became clear that the municipal council of 2018-2022, had an integral health team including the alderman of the social domain, the alderman of sports and the alderman of public space and greenery. However, the definition of health can be very broad, and thus interpreted in several ways. These different interpretations can also collide with one another. In this case, the alderman of traffic was thus not included in this team, while physical mobility definitely is an aspect of healthy and active living environments

(Yang et al., 2003; Sallis & Glanz, 2006). For civil servants, the interviewee said the following: the general feeling I have is that ideas and input with regards to healthy and active living environments amongst civil servants have been taken more seriously over the years. However, other public challenges, like sustainability, are often more integrated within municipal policy. Sometimes themes like sports and sustainability strengthen each other, but other times they can also collide, e.g. an artificial turf field can be very useful to get people to be active outdoors, however, it is not very sustainable. *“Therefore, having a certain policy is one thing, but translating policy is another thing entirely.”* The question remains if health should be as integrated as other themes like sustainability, climate adaptation etc. since all these themes are important.

To summarize, the municipality of Eindhoven has over the years become more active at the policy level regarding healthy and active living environments (Interviews, Gemeente Eindhoven, 2014, 2018 & 2020). However, as stated there as well are limitations to the execution of certain policies, especially when they collide with other public challenges.

4.2.1 Specific policies regarding ALEs

This paragraph will focus on specific policy documents relevant to the three aspects of ALEs, organized facilities, unorganized facilities, and physical mobility (Yang et al., 2003, Sallis & Glanz, 2006). The interviews showed how the municipality combined the first two aspects of ALEs into the category facilities, while the third aspect was kept as a separate category. Therefore, this paragraph will first focus on the policy regarding the facilities and secondly focus on policy regarding physical mobility.

4.2.1.1 policy regarding organized and unorganized facilities

The “gezondheidsnota” 2013-2016 (or policy on health) was a first step in the direction of increasing the health of inhabitants and investing in preventative measures (Gemeente Eindhoven, 2013¹). In this document, it is stated that the previous policy document regarding health was mainly focussed on lifestyle and interventions in the living environment, which was also a national policy (Gemeente Eindhoven, 2013¹). This trend, of keeping a broader perspective on health was continued in the policy paper of 2013, to paraphrase: *“Utilize the broad definition of health, which will entice all relevant institutions, organizations and municipal sectors to attribute to increasing health in the municipality of Eindhoven (Gemeente Eindhoven, 2013¹, pp. 5).”* Within this paper research from the RIVM is used to illustrate the

fact that health-increasing measures should mainly be implemented locally in two ways. Firstly, with environmental-specific interventions, e.g., physical interventions with regards to active mobility and social interventions aimed at socializing the environment. Secondly targeted lifestyle interventions, e.g., online coaching for inhabitants experiencing an increased risk of illness (RIVM, 2010, in Gemeente Eindhoven, 2013¹, pp. 6). However, the focus within the policy document after this explanation shifts from this broad view to a focus on lifestyle and behavioural interventions instead of environmental measures.

In 2016 the new note of health was introduced. However, the nota of health for the years 2016-2021 was not found anywhere online and was not available in the list of policy documents on the website of the municipality of Eindhoven. Therefore, this note is not taken into consideration within this thesis.

In 2016 the council of the municipality of Eindhoven also introduced the vision document: “Bewegen door verbinden” (Moving by connecting) (Gemeente Eindhoven, 2016¹). The facilities regarding ALEs, both organized and organized are broadly mentioned in the vision and the stated general ambition regarding sports and physical activity is; *“We are getting and keeping the inhabitants of Eindhoven in motion to create an active city with healthy citizens. Fun, the experience of sports, and physical activity are paramount. We grow to become an active city, that offers space for inhabitants to be challenged at their level and to become innovative in their physical activity and social meetups (Gemeente Eindhoven, 2016¹, pp. 16)”* They state four important steps to achieve this ambition. The first step is to get inhabitants from not participating in sports to adopt a vital and healthy lifestyle. This is achieved by introducing physical activity in a fun way in education, by highlighting the available facilities to the public in order that they are known, and to integrate the possibility of physical activity in public space in other programs that influence this public space (Gemeente Eindhoven, 2016¹). The second step is to organize activities at the public facilities, only building the facilities does not make people use them. By organizing activities in these spaces, they become more accessible and therefore are more used (Gemeente Eindhoven, 2016¹). Thirdly to get people to create this environment together with the already active volunteers that keep organized sports facilities afloat, since there is an increasing shortage of volunteers to keep the facilities up and running (Gemeente Eindhoven, 2016¹). The final step is to create open and accessible public spaces which are inviting for people to be active. This is achieved in two ways. By promoting and investing in unorganized facilities within the city,

especially around urban sports (which are increasing in popularity). The second way is by stimulating the multifunctional use of facilities, to maximize the efficiency of the already available facilities (Gemeente Eindhoven, 2016¹).

The interviews confirm this focus in policy regarding facilities. Before the reorganisation in 2014 of the municipality of Eindhoven, the policy field of sports and physical activity was separate from the programs operating in the spatial domain. Therefore, the policy field of sports and physical activity was fully focused on supporting organized facilities and organizations. The reorganization was meant to make better use of linkage opportunities (or in Dutch: meekoppelkansen) between the different domains, resulting in the grouping together of these two policy fields. By combining these groups, the realisation arose that sports and physical activity can also be incorporated within the public space, especially since individual sports, like running and cycling, and urban sports, skateboarding, basketball etc. became more popular. This resulted in this vision/ambition document regarding sports and physical activity as discussed above.

In conclusion, before 2014 sports and the spatial domain were two different policy fields, the sports domain was mostly only focused on supporting the organized sports facilities. Since the reorganization in 2014, the municipality created a new integral way of looking at the public space resulting in additional policies to promote sports and physical activity within the public space, especially by investing in public unorganized facilities to promote physical activity in this space.

4.2.1.2 Physical mobility

The third aspect of ALEs is physical mobility. According to the interview the city of Eindhoven has been a very car-focused city, it was proudly advertised that it was possible to park right underneath the central market. However, over the past 10 years this changed, cars are not only a source of pollution by emitting greenhouse gasses and the noise they make but are also taking up a lot of space. Due to the increase in economic activity in the Brainport region, the number of inhabitants is slowly increasing over the years, making the space cars take up more valuable. The policy shifted over the past 10 years towards creating a low-traffic city centre, which was not only going to safe space but also create a better living environment for inhabitants due to reductions in pollution.

The policy documents also show this shift. In the vision public space from 2006, still in use today, no specific mentions are made with regards to health, physical activity and or active living environments or towards reducing the number of cars in public spaces (Gemeente Eindhoven, 2006). The only mention with regards to a distant aspect of ALEs is increasing the independence of the elderly to get to general public facilities, e.g., the grocery-, and drugstore, by placing benches along the sidewalks, as well as improving the quality of the sidewalks by making sure they are even and free to walk on (Gemeente Eindhoven, 2006).

However, the mobility vision of 2013, in which an outlook to 2040 was made, ingrained this low-traffic mentality within the policy of the municipality of Eindhoven (Gemeente Eindhoven, 2006). The municipal councils express in this document the choice for an appealing, healthy, clean, green, social, energy-neutral, and safe living environment with a sustainable mobility network (Gemeente Eindhoven, 2013², pp. 7). This statement is further elaborated as: *“The city centre and residential areas are free of pollution hindrance, and nuisance of traffic and the quality of public space and greenery is good. ... It is a pleasant city to live, work and to just simply be. ... The air is clean, the noise is at a pleasant level, the number of traffic victims is kept at a minimum and above all the city has more opportunities to walk, cycle or use public transport in the space where this is possible but is car accessible in the spaces where it has to be (Gemeente Eindhoven, 2013², pp. 7)”*.

On the basis of the mobility policy, the policy document: “Agenda Fiets” (Agenda bicycle) further elaborates the policy outlines for a physical mobility network with regards to cycling (Gemeente Eindhoven, 2016²). The key concerns regarding ALE of this policy document are: making sure there is enough space to park bicycles, increasing the number of bicycle highways, increasing the flow of bike traffic, to stimulate inhabitants to take the bike instead of the car (Gemeente Eindhoven, 2016², pp. 7). Safety for cyclists is seen as an overarching prerequisite in order to be able to execute the key concerns (Gemeente Eindhoven, 2016²).

In short, the physical mobility aspect of ALEs is already very ingrained in the policy of the municipality of Eindhoven.

4.3 Investments in ALEs

As stated before based on the interviews, there is always a discrepancy between policy and the execution of said policy. An example given during the interview was: you can add new benches in the public space, so the elderly can take a break while taking a stroll, thus prompting them to be physically active. However, the same benches have structural maintenance costs, can be damaged needing repairs which are also costly, and can become a nuisance by attracting loiters. Within the municipality, there are no unlimited funds available. Consequently, choices have to be made about which investment is and is not to be realized. This paragraph gives an overview of actual investments made to increase the value of ALEs over the past 5 years, based on the two in-depth interviews. This paragraph will be discussed in three parts, coherent to the three aspects of ALEs. Thus, first, the focus will be on public organized facilities, then on public unorganized facilities and lastly on investments in physical mobility.

4.3.1 Investments in public organized facilities

As stated, before in the policy overview there are not many investments made in these types of facilities. Especially since policy over the past 10 years has included cuts in spending due to budget constraints. During the interviews, it became clear that these investments are mostly subsidies and the organisations using the space are often responsible for the build of the facilities they use. The municipality does not have much say in these developments, other than everything surrounding the zoning plans. Consequently, most of these investments are not listed on the municipal website or are to be released as plans before realisation. Therefore, within this thesis, the choice was made to exclude investments in these facilities.

4.3.2 Investments in public unorganized facilities

The municipality has heavily invested in public unorganized spaces, namely the Cruyff courts and the urban sports park. In the interviews, it became clear that these Cruyff courts are small football fields that have been built in mostly low social economic neighbourhoods. They do have a limited multifunctional purpose. They are mostly for the youth to play, but could, in theory, also be used by outdoor athletes as practice space. Another big investment was the Urban Sports Park. The interviewee stated that this facility was built based on the need for outdoor urban sports facilities, as was outlined in the sports policy document as well (Gemeente Eindhoven, 2016¹). It was completed during the Corona pandemic and, according

to the interviewee, is already heavily in use by the inhabitants of the municipality of Eindhoven. It includes space for BMX, skating and scooter riding, pathways for hikers, skaters and runners, a separate space for callisthenics and free running, a survival/obstacle run, a football cage and several other play -, and physical activity equipment. The interviewee stated that this facility does appeal to a larger area than just the city district in which this facility lies. Therefore, for the survey, this is a facility which will be broadly asked to each respondent, whereas the Cruyff courts are district specific and therefore only brought to the attention of respondents living within that city district.

4.3.3 Investments in physical mobility

This aspect of active living environments (ALEs) has seen the most investments within the municipality of Eindhoven. As already stated in their mobility visions the focus shifted from a car-oriented city to a city with a focus towards physical mobility (Gemeente Eindhoven, 2013² & 2016²). The interviews confirmed this finding and gave the most prominent examples over the past five years. Most car traffic was redirected to the ring-road surrounding Eindhoven. This gave space for the restructuring of three main roads: de Geldropseweg, de Leenderweg, de Aalsterweg and de Vestdijk. These roads were restructured in a way to give cyclists and pedestrians more space and priority. During the interviews, it became also clear that the rise in the number of electric bikes and speed pedelecs lead to investments in bicycle lanes. While most are still to be realized, the “fietssnelweg” (literal translation; bicycle highway) between Helmond and Eindhoven is already partially finished and in use and will thus be considered in the survey.

4.3.4 Summary of all investments

District	Geldropse- weg	Leender- weg	Aalsterweg	Vestdijk	Total restructurin g	Cycling lane Helmond	Urban sport park	Cruyff court	Investment in City District
Centrum				1	1	1			1
Gestel									
Stratum	1	1	1		1			1	1
Strijp							1	1	1
Tongelre	1				1			1	1
Woensel- Noord								1	1
Woensel-Zuid								1	1

Table 2 Summary list of investments based on interviews (created by Author)

All investments have been summarized per district the table 2.

5. The Survey Analysis

This chapter will encompass the analysis of the dataset created based on the survey. This analysis is done in three parts. The first part will discuss the general description of the variables. The second part will focus on the results of the OLS regressions based on the three dependable variables; compliance with the Dutch PA-norm, change in compliance with the Dutch PA-norm and opinion on investments. The third part will show the results of the t-tests.

5.1 General description

This paragraph will discuss the first analysis and overview of the data. This includes general information regarding respondents, neighbourhoods' characteristics, and a general analysis of the dependent and independent variables. These three components will be discussed in order.

5.1.1 General information respondents

This paragraph will give a short overview of the respondents. As can be deduced from figure 3, the categories Gender and household composition are both relatively equally spread between the possible sub-categories. However, within the other categories, city district, age, education, cultural background and income, there is a certain skewness in the results. This skewness will be discussed per variable.

Most respondents come from the city district the Strijp, which is a district where the Urban Sport Park and one of the Cruyff Courts were built. No large scale restructuring of the main road has taken place in this district. The other districts are evenly represented. In the age category, the number of respondents is relatively young and mostly in the sub-category of 18 to 25 years old, which combines to 33% of the 51 respondents. The municipal average of approximately this age group within the city is 14% (allecijfers, 2022). It is an approximation, since the age group in the municipal data is 15 to 25, making the real percentage lower than the given percentage. The skewness in age might also explain the skewness in the level of education. 73% of the respondents completed higher education, while the municipal average is 40,2% (allecijfers, 2022), which might be explained by the fact that this age group in the municipality mostly represent university students since Eindhoven is known for being a student city (Interviews). Within the income category, relatively many respondents stated they wanted to keep the information private and/or have a high income of over €34.000, - a year. These responders wanting to keep the information private are generally younger (age-

category 18 till 25), but there is no discernible difference in, level of education and stating they wanted to keep the information private (See Table age, educational level, and income in Appendix 8.3). The skewness of income in the higher category is explained due to the relatively high income per earner in the municipality, namely €34.700, - on average (allecijfers, 2022). The cultural background of the respondents is skewed towards two categories, namely Dutch and Chinese. It was to be expected that most respondents would be Dutch, 59,93% of the inhabitants have a Dutch background (allecijfers, 2022; CBS, 2022). However, the number of respondents with a Chinese background is surprising considering the cultural makeup of the inhabitant of the municipality of Eindhoven (Allecijfers, 2022).

Due to the small sample size of 51 respondents, the skewness in data might influence the results more significantly as compared to a situation with a higher sample size. However, low response rates are not necessarily leading to biased results.

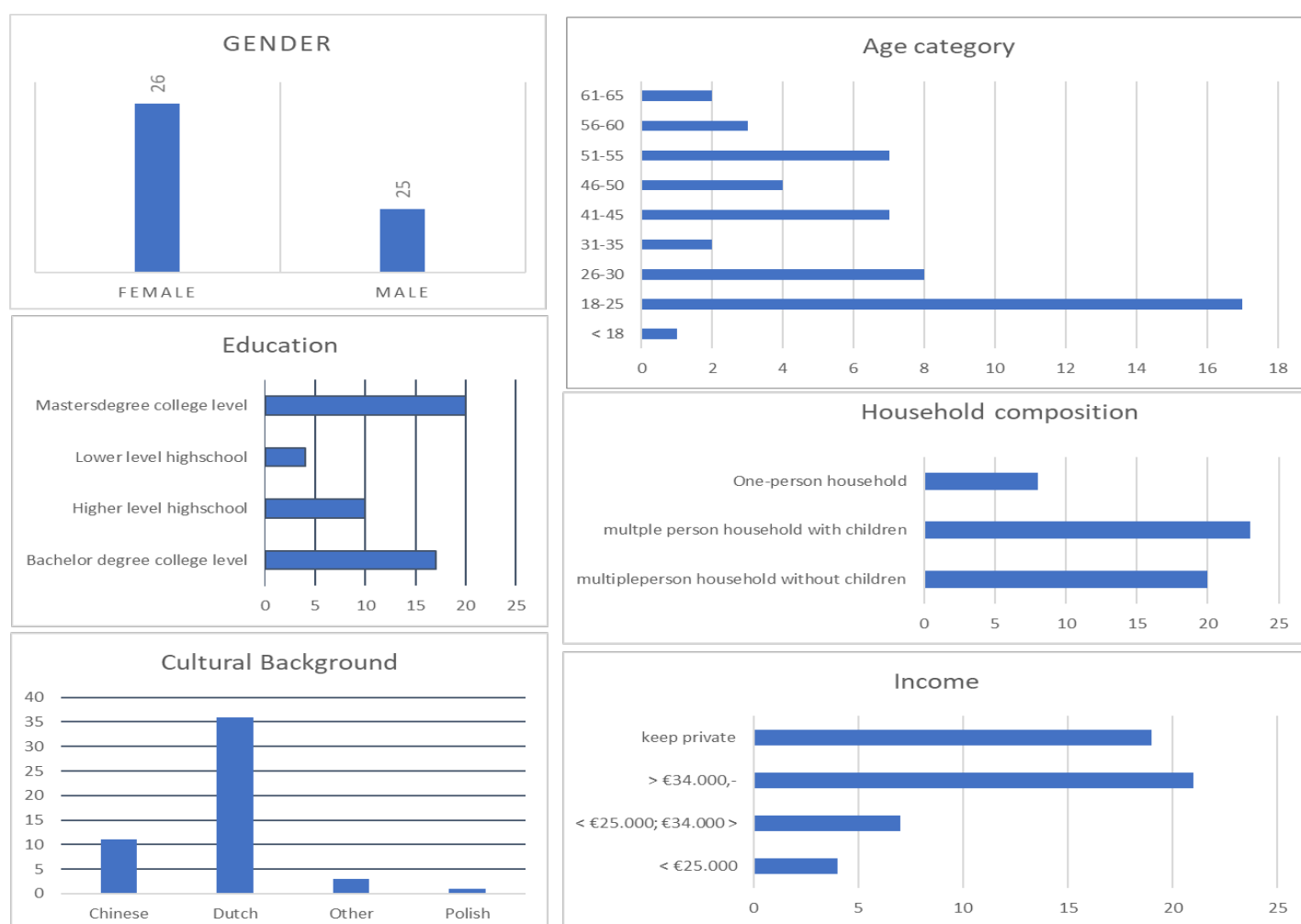


Figure 3 Graphs Data personal characteristics based on data collected in the Survey

5.1.2 General description environmental variables

This paragraph discusses the district control variables in their broadest range. The table below gives the full overview of these variables. The scores are colour coded on a scale from red to green. The red colour represents the lowest score, the green colour is the highest.

City District	Percentage public greenery	safety score	Score living environment	Liveability score	Movement friendliness	leefbarometer
Centrum	19%	1,00	0,00	1,67	3	2
Gestel	37%	2,09	1,64	1,91	4	2
Stratum	36%	2,65	1,80	2,40	4	3
Strijp	27%	2,92	1,85	2,54	4	5
Tongelre	43%	2,00	1,44	2,11	3	5
Woensel Noord	30%	2,24	2,12	2,00	4	3
Woensel Zuid	27%	1,13	1,07	1,21	4	2

Table 3 Combined table data as summarized in the dataset, see sources data operationalisation (table made by Author)

As can be seen from the table above the city district overall scoring the best is Strijp. Scoring highest on safety, liveability, movement friendliness and the leefbarometer. The city district scoring the worst is the city centre.

5.1.3 General analysis dependent and independent variables

This paragraph will first discuss the first general analysis of the dependent and then the independent variables.

5.1.3.1 Dependable variables

The three dependable variables are Compliance with the Dutch PA-norm, change in compliance with the Dutch PA-norm and Opinion on investments which together measure the impact of the investments on the inhabitants of the municipality of Eindhoven.

Kolom1	Standard deviation	Mean	Average	Min	Max
Compliance Dutch PA-Norm	-0,686	4,814	-0,686	-10	9
Change compliance Dutch PA-Norm	0,588	2,021	0,588	-5	5
Opinion on Investments	1,667	5,443	1,667	-10	18

Table 4 Main descriptions of dependent variables

All three scores are to be interpreted in the following way. A score of -10 on the variable compliance to the Dutch PA-Norm means that the person does not in the slightest comply with the Dutch PA-Norm, since they score negatively on each of the 3 markers. A score of 0 means just complying with the PA-Norm and just barely meeting all three markers. A score of 9 means high compliance with the PA-Norm and doing more than the bare minimum required by the 3 markers of the PA norm. As stated in the methodology chapter, these three

markers were long hours of sequent sitting, low/medium level exertion and high exertion norms. The Change in compliance to the Dutch PA-norm is interpreted as follows; A score of -5 means the respondent changed for the negative on the 3 markers of the PA-Norm, a 0 means no change and a 5 means a positive change on all 3 markers. Opinion on Investments is also scored from a negative to a positive scale. A negative score means that the opinion regarding the investments is negative, a score of 0 indicates indifference, and a positive score means a positive opinion of investments in the neighbourhood.

In the survey results it becomes clear that the respondents score on a wide range on each of the variables; from over-compliance to being very non-compliant to the PA-Norm, from large positive changes in compliance to a large negative change in compliance and a very positive opinion to a very negative opinion on investments in the respondent's neighbourhood. However, on average most respondents have a positive opinion regarding the investments made in their neighbourhood, most respondents do show a positive change in compliance with the Dutch PA-Norm, but, on average, the respondents do not fully comply with the Dutch PA-Norm. All three variables are skewed but normally distributed amongst the respondents. (See the graphs in figure 4 below).

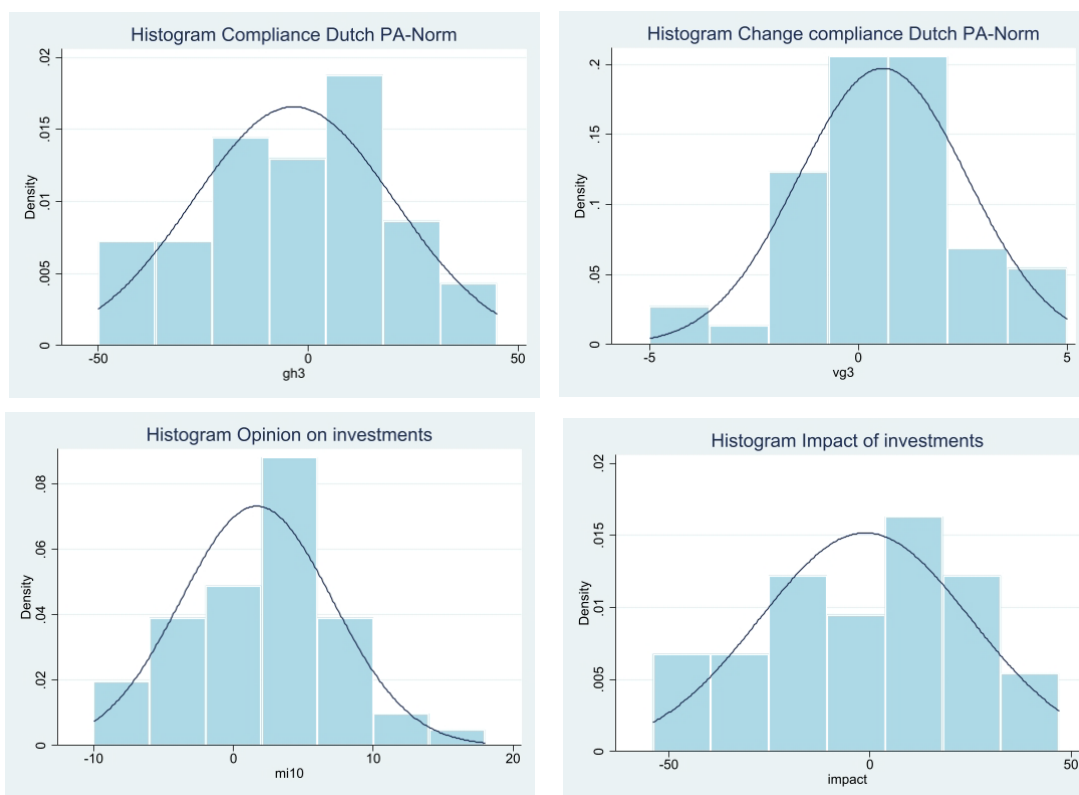


Figure 4 Graphs of main dependable variables based on survey data (created by Author)

5.1.3.2 Independent variables

The independent variables are all investments in ALEs which have been summarized in a dummy variable, as stated before in the methodology. The interviews and policy review showed that the district with no investments in ALEs is the city district Gestel. All other districts have seen some investments in the past years, see the table below (A one indicates this investment has happened in this district and no data means no investment has happened):

District	Geldropse- weg	Leenderweg	Aalsterweg	Vestdijk	Total restructuring	Cycling lane Helmond	Urban sport park	Cruyff court	Investments in City district
Centrum				1	1	1			1
Gestel									
Stratum	1	1	1		1			1	1
Strijp							1	1	1
Tongelre	1				1			1	1
Woensel- Noord								1	1
Woensel-Zuid								1	1

Table 5 Summary Investments per city district based on interviews (Created by Author)

The city district that has seen the most investments is Stratum. The second most investments are made in the districts Tongelre, Centrum and Tongelre. Then Woensel-Noord and Woensel-Zuid and no investments with regards to ALEs were made in Gestel.

5.1.4 General analysis descriptive variables

As stated in the methodology two variables were asked for in the survey, but not utilized in the regression models. The first variable was the use of investments. As can be seen in table 6 below of the 51 respondents in general 18 do make use of the investments that had a city-wide appeal, thus the restructuring of the roads, the bicycle highway and the Urban Sport Park. 11 Sporadically use each of these investments and a group of 22 respondents state not the make use of them. Of the 51 respondents, 32 lived in city districts which included a Cruyff Court, however, since they are most often geared towards children, with a limited general use it can be concluded that the Cruyff Courts are not used by any of the respondents.

	Use new bicycle lanes	Use walking paths/sidewalks	Go recreative cycling/walking	Use Urban sport park	Use Cruyff Court
Sporadically	11	11	11	11	0
Yes	18	18	18	18	0
No	22	22	22	22	32
Total	51	51	51	51	32

Table 6 Use of Investments, based on survey data (Created by Author)

The opinion regarding investments is in general very positive, 37 out of 51 of the respondents answered positive. Only 4 out of the 51 see them as negative and 10 do not have a clear opinion. Out of the respondents living in a city district with a Cruyff court 24 it is a positive investment, 3 think negatively and 5 have no opinion, see table 7 below.

	Opinion restructuring for cyclists	Opinion restructuring for pedestrians	Opinion Urban sport park	Opinion on Cruyff Courts
No Opinion	10	10	10	5
Negative	4	4	4	3
Positive	37	37	37	24
total	51	51	51	32

Table 7 Opinion per investment, based on survey data (created by Author)

5.2 Stata analysis

5.2.1 Check collinearity control variables

As was concluded in the literature review and reiterated in the methodology this thesis uses two sets of control variables: the personal control variables and the environmental control variables. The personal control and district control variables were already discussed previously in this chapter. However, to get the control variables ready for the OLS regressions a check for collinearity amongst control variables has to take place. This is done to prevent multicollinearity later on in the OLS regressions (Van Thiel, 2014).

Collinearity amongst the personal control variables is non-existent (see table 8)

	Gender	Income	Cultural background	Household composition	Education level	Age
Gender	1,0000					
Income	0,2246	1,0000				
Cultural background	0,2734	0,2134	1,0000			
Household composition	-0,1438	0,0843	-0,1975	1,0000		
Education level	0,0405	0,2890	0,1148	-0,0741	1,0000	
Age	0,1611	0,3406	0,2143	0,3470	-0,0951	1,0000

Table 8 Stata analysis Collinearity Personal characteristics (created by author)

The environmental control variables do show collinearity, see table 9 below:

	% public greenery	safety score	Score living environment	Liveability score	Movement friendliness	leefbarometer
% public greenery	1,0000					
safety score	0,2722	1,0000				
Score living environment	0,4796	0,8107	1,0000			
Liveability score	0,1662	0,9328	0,5808	1,0000		
Movement friendliness	0,1210	0,6040	0,7658	0,3095	1,0000	
leefbarometer	0,0934	0,7263	0,4411	0,7900	0,0672	1,0000

Table 9 Stata analysis Collinearity District characteristics (Created by Author)

Due to the fact from the “Buurtkijker” is stacking the data to calculate safety scores, score living environments and the liveability score these variables are strongly correlated. Another reason for the strong correlation is based on the fact that Liveability and the “leefbarometer” are both based on the same type of sub-variables. Even though both are from different databases they do, in essence, capture the same score (Atlasleefomgeving, 2022 & Gemeente Eindhoven, 2022). The choice was made for the leefbarometer, due to it taking more aspects of the existing living environment into account (Atlasleefomgeving, 2022 & Gemeente Eindhoven, 2022). The control variables safety score, score living environment and the liveability score are dropped to avoid multicollinearity in the OLS regressions. Since percentage greenery, movement-friendly living environments are experiencing little to no collinearity, both these variables are included in the OLS regressions. However, when running the initial OLS regressions it became clear that the variable % public greenery did show significant multicollinearity when combined with the investment dummies and other neighbourhood control variables in the OLS regression. Consequently, this control variable was also taken out of the regression models.

Thus, in conclusion, the personal characteristics show no collinearity, and thus are all used in the OLS regressions. However, only two control variables for the existing living environment (Movement friendliness and the leefbarometer) will be considered in the OLS regressions, the other variables are dropped to avoid multicollinearity.

5.2.2 Stata Analysis

This paragraph will show the results of the OLS regression with the three dependent variables; compliance to the PA-norm, change in compliance with the PA-norm and opinion on investments. These three variables combined represent the impact of investments on the inhabitants of the municipality of Eindhoven. After the discussion of the OLS regressions, the t-tests on these three variables will be discussed.

5.2.2.1 OLS regression

	COMPLIANCE PA-NORM	CHANGE COMPLIANCE PA-NORM	OPINION ON INVESTMENTS	IMPACT OF INVESTMENTS
RESTRUCTURING	-2,147 (2,87)	-1,006 (1,09)	2,983 (2,84)	-8,758 (15,387)
CYCLE LANE HELMOND	2,604 (8,82)	5,068 (3,35)	9,149 (8,71)	27,238 (47,251)
URBAN SPOTS PARK	-0,494 (7,48)	-4,296 (2,84)	-2,307 (7,39)	-9,074 (40,095)
CRUYFF COURT	3,962 (3,46)	-1,443 (1,32)	-2,693 (3,42)	15,676 (18,554)
GENDER	1,843 (1,62)	0,553 (0,62)	1,536 (1,60)	11,302 (8,701)
INCOME	-0,071 (0,73)	-0,0387 (0,28)	1,385* (0,72)	0,642 (3,911)
CULTURAL BACKGROUND	-1,773 (1,40)	0,259 (0,53)	-1,959 (1,39)	-10,564 (7,525)
HOUSEHOLD COMPOSITION	0,574 (1,20)	0,741 (0,45)	-0,049 (1,18)	3,562 (6,406)
EDUCATION	-0,165 (0,94)	0,160 (0,36)	-0,813 (0,93)	-1,476 (5,061)
AGE	-0,473 (0,47)	-0,059 (0,18)	-0,981** (0,46)	-3,405 (2,495)
MOVEMENT FRIENDLINESS	-1,964 (7,54)	3,205 (2,86)	8,997 (7,45)	2,383 (40,403)
LEEFBAROMETER	-0,317 (3,32)	2,619** (1,26)	1,232 (3,28)	2,264 (17,790)
CONSTANT	7,434 (36,71)	-21,263 (13,94)	-29,349 (36,24)	-13,441 (196,684)
PROB>F	0,8247	0,1889	0,0878	0,6940
R2	0,1603	0,3133	0,3597	0,1917
ADJ_R2	-0,1049	0,0964	0,1575	-0,0635
DF_R	38	38	38	38

*P<0,1 ** P<0,05

Table 10 OLS regressions based on survey data, see raw Stata output tables in appendix 8.4 (created by Author)

The following statistical analysis is based on the regression output table 10 above, the raw tables can be found in appendix 8.4. The explanatory value of all models is very low, and the $\text{prob} > F$ value is not significant in any of the regression models, meaning that the independent variables do not show a statistically significant relationship with the dependent variables. The variance of the dependent variables Compliance to the PA-norm and Impact of Investments can only be explained by 16,03% and 19,17% (respectively) by the independent variables, which is not a strong association. The other two dependent variables, change in compliance with the PA-norm and Opinion on investments score better in this regard. 31,33% and 35,97%, respectively, of the variance in these variables is explained by the independent variables. However, when corrected for chance variation all models show little to no relation in variance between the dependent and independent variables. The model still explaining some variance in the dependent variable is the OLS regression regarding the Opinion on investments, at an explanatory level of 15,75%.

As can also be deduced from the output regression table (table 10), none of the regressions shows a significant correlation between the dependent variables and the main independent variables regarding the investments. The only significant relationships between variables at the 5% interval are Opinion on investments and age and change in compliance to PA-Norm and the leefbarometer. Therefore, the older the person the more negative their outlook toward investments made within their city district and the higher the score on the leefbarometer, the more positive the change in compliance with the PA-norm is. On the 10% interval level Opinion on investments and income become significant. Meaning that the higher the level of income, the better the opinion towards the investments in their city district. This is a logical correlation, due to higher incomes, the respondents could live in relatively better city districts compared to the lower-income respondents. However, the other independent variables remain non-significant. Due to this fact the coefficients of these variables are not significantly different from 0, meaning that a change in the independent variable by one unit, does not reliably lead to a change in the dependent variable by any unit at all. An explanation for these findings is the low number of respondents, as explained earlier, since the models only compare a small group of respondents who have not seen investments (7) to a relatively large group of respondents (44) that did, giving not enough respondents in each group to specify differences amongst them. Combined with the fact that there is also a bias in

respondents. Due to the mostly digital collection of data, most of the respondents are relatively young and, consequently, on average more physically active than older respondents (RIVM, 2016).

5.2.2.2 T-test

The t-tests show if there is a difference between the respondents living in an area who have seen investments in ALEs, versus respondents living in an area that have not seen these investments. The group that has seen no investments in their city district has only 7 observations, while the group that has seen investments in their neighbourhood have 44 observations (out of a total of 51). The degrees of freedom of all t-tests were 49 (see appendix 8.4 for raw Stata output tables). This table (table 11) shows two significant scores at a 10% interval level confirming the difference being smaller than 0 in the variable compliance to the PA-norm and Impact of Investments. Meaning that there is no significant difference between the group with and without investments in their city district. However, the other two variables do not have any significant score, meaning that it is non-discernible whether there is or is not a difference between both groups. This is again due to the small number of respondents making the sample size difference between groups very small.

	DIFFERENCE < 0	DIFFERENCE ≠ 0	DIFFERENCE > 0	T-VALUE
COMPLIANCE TO PA-NORM	0,0740	0,1479	0,9260	-1,4702
CHANGE COMPLIANCE PA-NORM	0,2064	0,4127	0,7936	-0,8262
OPINION ON INVESTMENTS	0,3381	0,6762	0,6619	-0,4201
IMPACT OF INVESTMENTS	0,0699	0,1398	0,9301	-1,5008

Table 11 T-test table, based on Stata output, see raw data appendix 8.4 (Created by Author)

6. Conclusion & Discussion

Within this chapter, the main conclusions of this thesis are drawn. First, the sub-questions will be answered, after which the main research question will be answered. Then the recommendations based on these answers will be given. After this the discussion and limitations regarding the research will be stated.

6.1 Sub-questions

6.1.1 Sub-question 1

“Why is physical activity important, what role do active living environments play in improving physical activity?”

The benefits of physical activity and the risk of physical inactivity have a significant impact on public health as stated by (Blair, 2009; Cunningham, et al., 2020; Hall, et al., 2021; Janssen & Le Blanc, 2010; Kannel & Sorlie, 1979; Kohl 3rd, et al., 2012; Martinez-Gonzalez, et al., 2001; Penedo & Dahn, 2005; Reiner, et al., 2013; Rütten & Abu-Omar, 2004; Van Lenthe, et al., 2005; Warburton, et al., 2006; Warburton & Bredin, 2017, WHO, 2022) Physical inactivity has a significant negative effect on health, and causes several chronic illnesses, as stated by all abovementioned authors. Certain qualities in the living environment can attribute to physical activity, meaning a higher quality living environment led to more physical activity amongst inhabitants of this environment (Frank, et al., 2001; Handy et al., 2002; Craig et al., 2002; Yang, et al., 2003; Lopez, 2004; Sallis and Glanz, 2006; Jongenmeel-Grimmen et. al., 2014). However, certain side nodes have to be considered. The first side note is the self-selection bias in the results; it can never be conclusively proven that people are being physically active in a park, because the park is close by, or they want to be physically active and, therefore, live near the park (Sallis and Glanz, 2006; Cerin et. al., 2008 & Kaczynski & Mowen, 2011; as cited in Calogiuri & Chroni, 2014). The second side note is the fact that the living environment can also be a barrier to being physically active, no space to take a physical mode of transportation leads to car use and thus being less active (Franken, et al., 2001; Bodde and Seo, 2009, Martin et al., 2013, Hansen, et al., 2015, Cleland et al., 2015, Joseph et al., 2015).

When this relation was stated, researchers focused on active living environments (ALEs) (Slinger, et al., 2014; Mah, et al., 2020; Mah, 2021; Hajna, et al., 2018; Calogiuri and Chroni, 2014; Creatore, et al., 2016; Wasfi, et al., 2018; RIVM, 2016). The definition taken into account

within this thesis, as derived from Engbers et al., (2010) is *“an active living environment is an environment in which informal facilities, like sidewalks and bicycle lanes, are easily accessible, clean, safe, and green and in which formal facilities, like playgrounds and (multifunctional) sports facilities, are safely accessible and offer accommodations for different age and societal groups.”* According to the above-mentioned authors, ALEs have many health benefits on both physical and mental health, but the positive effect is mostly related to the increased physical activity in high-quality ALEs which counteract obesity rates and consequent cardiovascular diseases.

6.1.2 Sub-question 2

“How are ALEs created/improved and which neighbourhood and personal characteristics influence the PA behaviour and perceptions of inhabitants to experience active living environments?”

ALEs are, as stated before, a mix of formal and informal facilities, this is further split into three categories based on the studies of Yang et al., (2003) and Sallis and Glanz (2006). The informal facilities in the definition are equal to the category of active mobility, meaning the stimulation of bike use and walking towards everyday destinations. The formal facilities are split up into two categories; public organized, and public unorganized facilities. Public organized spaces are facilities belonging to sports clubs and other organizations which lend access to activity spaces, while public unorganized spaces are all facilities with non-restricted accessibility (Yang et al., 2003; Sallis and Glanz, 2006). However, only investing in creating a mix of the three categories is not sufficient, for an environment to be made into an ALE investment should be made based on the principles of Camelbeeck, et al., (2014)

1. The investment should be based on a coherent vision in policy and design,
2. The investments should be made in collaboration with policymakers from different sectors and private stakeholders
3. Physical investments (the hardware of ALEs) should be combined with efforts to keep the people living within the active living environment engaged with the facilities, to promote sustainable usage of the active living environment.

Thus, in short, to create/improve ALEs investments should be made in a mix of the facilities in the three categories (public organized facilities, public unorganized facilities, and physical mobility,) which fit the specific wishes of the inhabitants of these environments.

However, personal characteristics (Lewin, 1935; Carp, 1979; Cauley et al., 1991; Giles-Corti & Donovan, 2002; Yang et al., 2003; Bengeoechea et al., 2010; Killgore & Schwab, 2012; Bhurosy et al., 2014 & Hajna et al., 2018), and city district qualities (Caligiuri & Chroni, 2014; Mah et al., 2020; Mah et al., 2021; Tobin et al., 2022, Herrmann et al., 2019; Wendel-Vos, 2005 & De Vries, 2011, as cited in Slinger, et al., 2014; Carp, 1979; Slinger, et al., 2014; Engbergs et al., 2010; Hansen, et al., 2015; Cleland, et al., 2015; Joseph, et al., 2015) do influence the impact of these investments on inhabitants living in the specific living environments in which are invested. According to the above-mentioned authors, the following characteristics are positively correlated with ALEs, meaning when the variables rise, the effects of ALEs are heightened as well: prior levels of fitness, educational level, social economic status, the amount and quality of greenery previously accessible within the environment, satisfaction rate with the environment, safety of inhabitants within the environment, neighbourhood quality, accessibility to PA activities within the environment. The other variables are negatively correlated with ALEs, meaning when the variable rises, the effect of ALEs is lessened, according to the abovementioned authors: age, and level of environmental barriers. Gender and ethnicity are separate in the sense that there is no rank amongst the variables themselves. In literature general conclusions often drawn is: that certain cultures do not participate in physical activity when in a public space and gender affects physical activity differently based on other variables; when combined with a lower educational level, males oftentimes are more physically active than females, while the opposite is true when higher educated (Lewin, 1935; Carp, 1979; Cauley et al., 1991; Giles-Corti & Donovan, 2002; Yang et al., 2003; Bengeoechea et al., 2010; Killgore & Schwab, 2012; Bhurosy et al., 2014 & Hajna et al., 2018).

6.1.3 Sub-question 3

What was the general policy regarding ALEs and which interventions were implemented by the municipality of Eindhoven to improve/create ALEs?

The municipality of Eindhoven has over the years become more active at the policy level regarding healthy and active living environments (Interviews, Gemeente Eindhoven, 2014, 2018 & 2020). However, as stated there are limitations to the execution of certain policies, especially when they collide with other public challenges. In policy documents specific to facilities, it can be concluded that before 2014 sports and the spatial domain were two different policy fields and the sports domain was mostly only focussed on supporting

organized sports facilities. Since the reorganization in 2014 the municipality started working more integral with regard to public space. This resulted in additional policies promoting sports and physical activity within the public space, especially by investing in public unorganized facilities. Public organized facilities, however, have seen some budget cuts during the past 10 years, and due to the fact that these investments are mostly subsidies, they are not considered. When looking at physical mobility, the change from a car-oriented city towards a city with a preference for physical mobility started in 2013. Since then, policy has been focussed on gaining a car-free city centre by rerouting car traffic to the ring road surrounding the city, resulting in more space and priority for cyclists and pedestrians. Consequently, the physical mobility aspect of ALEs is already very ingrained in the policy of the municipality of Eindhoven.

During the interviews, it became clear that investments in public organized facilities are mostly subsidies and the organisations using the space are often responsible for the build of the facilities they use. The municipality does not have much say in these developments, other than everything surrounding the zoning plans. Consequently, most of these investments are not listed on the municipal website or to be released as plans before realisation. Therefore, within this thesis, the choice was made to exclude investments in these facilities. However, the has heavily invested in public unorganized spaces, namely the Cruyff courts and the urban sports park and physical mobility, most car traffic is redirected to the ring-road surrounding Eindhoven leading to the restructuring of four main roads; de Geldropseweg, de Leenderweg, de Aalsterweg and de Vestedijk, and due to the rise in electric bikes and speed pedelacs the municipality has invested in a “fietssnelweg” (literal translation; bicycle highway) between Helmond and Eindhoven, which is at the current time already partially finished and in use and will thus be taken into account in the survey.

Thus, policy over the past years is reflected in the specific investments made regarding the three categories. Due to cuts in spending towards organized facilities, and the fact that these projects are subsidies no investments could be considered regarding this category. The focus towards public unorganized facilities resulted in investments in the Cruyff Courts and the Urban Sports Park. The ingrained policy geared towards physical mobility led to the restructuring of four roads to allow more space and priority for cyclists and pedestrians, and the (partially) completed bicycle highway between Helmond and Eindhoven.

6.1.4 Sub-question 4

What do the inhabitants of Eindhoven think about these ins and did the investments in ALEs increase their levels of physical activity?

As can be deduced from the descriptive variables use of investments and opinion per investment most of the respondents do think these investments are a positive contribution to their living environment, 32 of the 51. The investments are also in use, with all of them seeing sustainable use by 18 respondents out of 51, and sporadic use by 11 of the respondents, a total of 29 out of 51 respondents, which is 56,87% of the respondents making use of the investments and 43,14% making no use at all of these investments. The Cruyff Courts are geared towards children up until the age of 18, which is an explanation for the fact that no respondents make use of these courts.

However, the OLS regressions show no significant relationship between the dependent and main independent variables, combined with the fact that the regression models are not showing a statistical significance between the dependent, independent and control variables. The variance as controlled for chance variation shows no explanatory value of the independent and control variables towards the dependent variable, the only model still showing some explanatory variance in the dependent variable is the OLR regression regarding the Opinion on Investments, at an explanatory level of 15,75%. None of the OLS regressions showed a significant correlation between the dependent variables and the main independent variables regarding investments. The only significant relationships between variables at the 5% interval are Opinion on investments and age and change in compliance to PA-Norm and the leefbarometer; the older the person the more negative their outlook toward investments made within their city district and the higher the score on the leefbarometer, the more positive the change in compliance to the PA-norm is. On the 10% interval level Opinion on investments and income become significant. Meaning that the higher the level of income, the better the opinion towards the investments in their city district. However, the other independent variables remain non-significant.

An explanation for these findings is the low number of respondents, as explained earlier, since the models only compare a small group of respondents who have not seen investments (7) to a relatively large group of respondents (44) that did, giving not enough respondents in each group to specify differences between them. This is confirmed with a non-significant t-test in the variables Change compliance PA-Norm and Opinion on Investments

and two variables: compliance to the PA-Norm and Impact of Investments, with significant scores at the 10% interval level stating the differences between the group who have seen investments versus the group who have not seen investments in their district to be less than zero. Another bias in respondents regarding age might have affected the results. Due to the mostly digital collection of data, most of the respondents are relatively young and, consequently, on average more physically active than older respondents (RIVM, 2016). Thus, with this research no specification can be made with regard to the impact of these investments, while the descriptive variables show a positive impact, this is not confirmed by the OLS regressions.

6.2 Research question

“What is the impact of investments made by the municipality of Eindhoven to create/improve active living environments on the inhabitants of the municipality of Eindhoven?”

From literature and policy reviews a positive impact of investment in active living environments (ALEs) was to be expected, both in physical activity levels and with regard to the opinion regarding general investments in the city districts. While the descriptive variables show that ~56% of the respondents use the investments made by the municipality of Eindhoven and ~74,5% of the respondents have positive opinions regarding these specific investments, the OLS regressions do not show a significant relationship between the dependent variables, compliance to the PA-Norm, Change in compliance to the PA-Norm and Opinion on investments and the combined variable Impact of investments and the main independent dummy investment variables. Therefore, the coefficients of these variables are not reliable to make any assumption on existing positive or negative relations between these variables. As stated before in the answer to the sub-question explanation can be given for the results of these regressions, these will be further discussed in the discussion and limitation of this chapter. As for the answer to this question, more research is needed to be able to give an exclusive answer to this research question.

6.3 Limitations and research recommendations

The internal validity of this thesis is high with regard to the specific policy analysis chapter. The combination of the in-depth interviews and policy content analysis gave a clear overview of policy trends over the past 10 years which could be checked against each other, making sure the research measured and showed what it was supposed to. However, the analysis of the survey data does have internal validity issues. The explanatory value of all models is very low, the prob>F value is not significant in any of the regression models, meaning that the independent variables do not show a statistically significant relationship with the dependent variables. The variance of the dependent variables when corrected for chance variation in all OLS regressions show little to no relation in variance between the dependent and independent variables. The model still explaining some variance in the dependent variable is the OLS regression regarding the Opinion on investments, at an explanatory level of 15,75%. Consequently, it could be argued that these regressions did not accurately measure the relationship between the dependent, independent and control variables as expected based on the literature review. This can be caused by several reasons. The first one is the small sample size

An explanation for these findings is the low number of respondents, as explained earlier, since the models only compare a small group of respondents who have not seen investments (7) to a relatively large group of respondents (44) that did, giving not enough respondents in each group to specify differences amongst them. This is confirmed by the fact that change in compliance to the PA-norm and opinion on investments did not show any significance in the t-tests as well as the fact that the other two variables, compliance to the PA-norm and opinion on investments, did show a significant score at the differences being smaller than 0, stating no difference is found between the two groups. Another reason for the fact no real differences are found within the data groups is the fact that there is also a bias in respondents. Due to the mostly digital collection of data, most of the respondents are relatively young and, consequently, on average more physically active than older respondents leading to more young adults complying with the PA-norm more often than older respondents (RIVM, 2016). External validity describes the extent to which a study can be generalized (Winter, 2000; Van Thiel, 2014; Bryman, 2016). While it is an in-depth look at the municipality of Eindhoven, it is still only one municipality or one unit of observation. As well as the low number of

respondents with regard to the survey within the municipality of Eindhoven means that the results of this thesis are not generalizable to more municipalities.

Based on these limitations some research recommendations can be made. The first is to recreate this research but make sure a higher number of respondents answer the survey, giving a more reliable image of this research. The second recommendation is based on a statement made before; the impact of investments is best measured over time. To give a complete overview of the impact of investments in ALEs the situation before investments, during the build of the investments and after the investment can be measured and compared, giving a more reliable image of the impact of these investments. Another research recommendation is based on a surprise finding and coincidence in the research data; 56% of the respondents made occasional or systematic use of the investments made by the municipality, which is close to the Dutch average of 50% in compliance with the Dutch PA-norm. Maybe there is a limit to the effect of ALEs and improvements to these living environments. A statement in this regard is made by dr. Sanne de Vries who is quoted in the book of Rosendal (2019): "An active living environment facilitates physical activity, but the influence is not infinite or blissful, (dr. Sanne de Vries as quoted in Rosendal, 2019, pp. 23).

6.4 Policy recommendations

Based on the research it is hard to form specific policy recommendations based on the impact of these investments. However, based on the policy review and combined with insights from the literature review some general recommendations can still be made.

When implementing investments to create active living environments all three aspects together should be considered. During the policy review, it became clear that investments were made in public unorganized facilities and physical mobility aspects of ALEs. Due to information constraints as well as the limited possibility of steering with regards to public organized facilities they were not represented within the sample. Based on the policy review it also became clear that spending towards these facilities has been cut for some time during the past 10 years. To create effective ALEs a mix of all three aspects have to be implemented in the living environment.

Another general recommendation is to check whether or not the principles of Camelbeeck, et al., (2014), have been met before investing with regard to ALEs:

1. The investment should be based on a coherent vision in policy and design,
2. The investments should be made in collaboration with policymakers from different sectors and private stakeholders
3. Physical investments (the hardware of ALEs) should be combined with efforts to keep the people living within the active living environment engaged with the facilities, to promote sustainable usage of the active living environment.

Since these principles ensure the use of these facilities and thus a longer and more positive effect of investments.

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8. Appendix

8.1 Survey

Radboud Universiteit



Introductie. De gemeente Eindhoven heeft in de afgelopen jaren meer focus gehad op het creëren van een gezonde en daarbij dus ook een beweegvriendelijke leefomgeving. Dus investeert de gemeente ook op diverse manieren om dit tot een realiteit te maken. Met deze enquête wordt geprobeerd om beter inzicht te krijgen in de impact van deze investeringen op jullie, de Eindhovenaren.

De Masterthesis (planologie, Radboud Universiteit) van Jonell Pierik, waarvoor deze enquête is uitgezet, heeft als doel om adviezen te kunnen geven aan de gemeente Eindhoven over de investeringen die zijn gedaan; Zijn deze goed ontvangen, zijn ze nuttig en dragen ze bij aan het doel wat de gemeente voor ogen had. De gemeente Eindhoven is zeer geïnteresseerd en zijn gedurende het onderzoek aangehaakt. Dus deze enquête is dan ook uitgezet in samenwerking met de Gemeente Eindhoven.

Deze enquête is volledig anoniem, uw antwoorden kunnen niet naar u teruggeleid worden. U bent ongeveer 10 tot 15 minuten bezig met het invullen van de vragenlijst.

Alvast hartelijk dank voor uw tijd!

1. Woont u in Eindhoven?

- ☐ JA ☐ Nee

2. Hoe lang woont u al in Eindhoven?

- ☐ Korter dan 5 jaar ☐ 11 – 15 jaar ☐ Langer dan 20 jaar
☐ 5 – 10 jaar ☐ 16 – 20 jaar

3. In welk stadsdeel van Eindhoven woont u?

- ☐ Centrum ☐ Woensel Noord ☐ Gestel
☐ Stratum ☐ Woensel Zuid
☐ Tongelre ☐ Strijp

4. Werkt u de afgelopen 5 jaar in dezelfde gemeente?

- ☐ Ja ☐ Nee

4.1 Indien u nee heeft ingevuld in de vorige vraag; In welke gemeente werkte u voordat u in een andere gemeente bent gaan werken?

- ☐ Gemeente Eindhoven ☐ Buiten bovengenoemde opties
☐ Omliggende gemeenten van Eindhoven

5. Werkt u momenteel in Eindhoven, een omliggende gemeente, of verder weg?

- ☐ Gemeente Eindhoven ☐ Buiten bovengenoemde opties
- ☐ Omliggende gemeenten van Eindhoven

Vanaf hier focussen de vragen zich op uw eigen beweegpatroon en veranderingen daarin

6. Heeft u voornamelijk zitten werk?

- ☐ Ja ☐ Nee

7. Indien u zittend werk heeft: Hoeveel uur zit u gemiddeld per dag vanwege uw werk?

- ☐ Tot 2 uur ☐ 4 tot 6 uur ☐ Langer dan 8 uur
- ☐ 2 tot 4 uur ☐ 6 tot 8 uur

8. Indien u geen zittend werk heeft: Hoeveel uur per dag bent u in beweging tijdens uw werk?

- ☐ Tot 2 uur ☐ 4 tot 6 uur ☐ Langer dan 8 uur
- ☐ 2 tot 4 uur ☐ 6 tot 8 uur

9. Hoeveel uur bent u gemiddeld per dag aan het bewegen, met uitzondering van sport?

(Denk hierbij aan fietsen naar uw werk of naar school om de kinderen weg te brengen, een rondje wandelen tijdens de lunchpauze of na het avondeten etc.)

- ☐ Minder dan 1 uur ☐ 2 tot 3 uur ☐ 4 tot 5 uur
- ☐ 1 tot 2 uur ☐ 3 tot 4 uur ☐ Langer dan 5 uur

10. Hoeveel uur per week sport u gemiddeld?

(Dit gaan om intensieve inspanning, denk aan hardlopen, voetballen, fitnessen, volleyballen, gymnastiek, paardrijden, tennissen etc.)

- ☐ Ik sport niet ☐ 3 uur ☐ 6 uur
- ☐ 1 uur ☐ 4 uur ☐ 7 uur
- ☐ 2 uur ☐ 5 uur ☐ Langer dan 7 uur

11. Hoeveel stappen zet u gemiddeld per dag?

- ☐ Tot 1.000 ☐ 4.001 tot 5.000 ☐ 8.001 tot 9.000
- ☐ 1.001 tot 2.000 ☐ 5.001 tot 6.000 ☐ 9.001 tot 10.000
- ☐ 2.001 tot 3.000 ☐ 6.001 tot 7.000 ☐ Meer dan 10.000
- ☐ 3.001 tot 4.000 ☐ 7.001 tot 8.000

12. Hoe gaat u naar uw werk?

- ☐ De auto ☐ De fiets ☐ Anders
- ☐ Het OV ☐ Lopend

13 Bent u in de afgelopen 5 jaar veranderd in de manier waarop u naar uw werk gaat?

- ☐ Ja ☐ Nee

13.1 Indien u op de vorige vraag ja antwoorde: Hoe ging u hiervoor naar uw werk?

☐ De auto

☐ De fiets

☐ Anders

☐ Het OV

☐ Lopend

De volgende vragen zijn stellingen over een verandering in uw beweegpatroon

14. Over de afgelopen 5 jaar ben ik:

(Helemaal eens betekend dat de statement klopt en dat u dus meer bent gaan bewegen, Helemaal oneens betekend dat de statement niet klopt en dat u dus minder bent gaan bewegen)

	Helemaal oneens	Oneens	Geen verandering	Eens	Helemaal eens
Meer gaan bewegen (Fietsen, wandelen etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meer gaan sporten (dus intensief bewegen)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Minder zittend gaan werken	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ben ik vaker lopend of fietsend boodschappen gaan doen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ga ik vaker recreatief wandelen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ga ik vaker recreatief fietsen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sport ik vaker buiten in eigen buurt (park/beweegplein/basketbalveldje/skatepark)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ga ik vaker met mijn kinderen naar de speeltuin/gaan mijn kinderen vaker naar de speeltuin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gaan mijn kinderen vaker naar buiten (skatepark/kruifcourt/trapveldje)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

De volgende stellingen gaan over uw mening over gemeentelijke investeringen

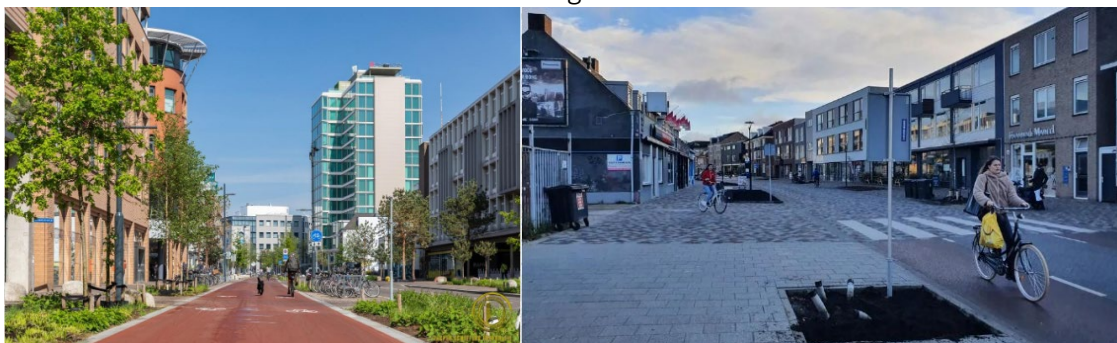
15. De gemeente Eindhoven heeft de afgelopen 5 jaar veel geïnvesteerd in:

	Helemaal Oneens	Oneens	Neutraal	Eens	Helemaal Eens
mijn buurt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
(snel-) fietspaden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De aanleg en/of verbetering van (brede) stoepen en wandelpaden	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
een leenfiets-systeem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Het openbaar vervoersnetwerk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
het autoluw maken van het centrum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
het vergroenen van mijn buurt (plantsoenen, bomen etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De aanleg en/of verbetering van Speeltuinen in mijn buurt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De aanleg en/of verbetering van Buitensport locaties in mijn buurt (publieke beweegpleinen, Cruyff Courts)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
De aanleg en/of verbetering van Park(en) in mijn buurt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Vanaf dit punt gaan we verder de diepte in over de investeringen van Eindhoven. Dit zullen in eerste instantie de bredere investeringen zijn aangaande de herinrichting van de toegangswegen van Eindhoven, waarbij de fietser en de wandelaar voorrang hebben gekregen. Daarna wordt er ingezoomd per stadsdeel en krijgt u, indien er in uw stadsdeel investeringen zijn gedaan, nog een aantal vragen over de wat kleinere investeringen, zoals cruyff courts, beweegpleinen en speeltuintjes van de gemeente Eindhoven in uw stadsdeel.

Informatie:

De gemeente Eindhoven heeft de laatste jaren veel geïnvesteerd om de fysieke vormen van mobiliteit te stimuleren. Het centrum van de Binnenstad is hiervoor autoluw(er) gemaakt, de Vestdijk, Aalsterweg, Leenderweg en Geldropse weg zijn heringericht met de belangen van fietsers en voetgangers voorop. Zo zijn brede stoepen en duidelijk gemarkeerde fietspaden met voldoende oversteekplaatsen gecreëerd en is de auto op deze wegen te gast geworden. Ook in de fietsverbindingen met de omliggende gemeenten van Eindhoven is in de afgelopen jaren stapje voor stapje versterkt, bijvoorbeeld met de doorfietsroute tussen Eindhoven en Helmond en de Fietsroute Den Bosch-Eindhoven. De volgende stellingen gaan over dit verbeterde fiets- en wandelnetwerk van de gemeente.



16. Het is me opgevallen dat in de afgelopen jaren het fietsnetwerk in Eindhoven is veranderd:

☐ Ja

☐ Nee

17. Stelling: Ik vind deze verandering in het fietsnetwerk

☐ Positief

☐ Negatief

☐ Geen Mening

18. Stelling: Stelling. Ik merk dat ik overtijd de auto vaker heb laten staan en meer ben gaan fietsen naar bestemmingen in (en rondom) Eindhoven

☐ Ja

☐ Af en toe

☐ Nee

19. Stelling. Ik heb gemerkt dat de stoepen en wandelpaden in Eindhoven zijn veranderd over de afgelopen jaren

☐ Ja

☐ Nee

20. Stelling: Ik vind deze veranderingen rondom de stoepen en wandelpaden

☐ Positief

☐ Negatief

☐ Geen Mening

21. Stelling: Ik merk dat ik de afgelopen jaren makkelijker besluit om lopend om ergens heen te gaan

☐ Ja

☐ Af en toe

☐ Nee

22. Stelling: De afgelopen jaren maak ik vaker, in mijn vrije tijd een wandeling of een fietstochtje door Eindhoven

☐ Ja

☐ Af en toe

☐ Nee

Informatie:

Het Urban sport park op het voormalige terrein van Sport park 't Schoot biedt ruimte aan allerlei vormen van Urban Sports. Zo is er ruimte voor sporten als Calisthenics, Survival- en Freerunnen, is er een pumptrack, BMX baan, een voetbal kooi, een speeltuin voor kinderen en beweegtoestellen voor individuele sporters.



23. Stelling: Ik wist dat dit Urban sport park bestond

☐ Ja

☐ Nee

24 Stelling: Ik vind de investering in dit Urban Sport park

☐ Positief

☐ Negatief

☐ Geen Mening

25. Ik maak gebruik van dit sportpark

☐ Ja

☐ Af en toe

☐ Nee

!! Volgende vragen, a t/m c alleen invullen indien u uit: Stratum / Strijp / Woensel-Noord / Woensel-Zuid of Tongelre komt

In uw buurt geïnvesteerd in een Cruyff Court, dit is een klein voetbalveldje bij u in de buurt. De volgende vragen gaan over dit voetbalveldje:

a. Stelling: Ik wist van het bestaan van dit Cruyff Court:

☐ Ja

☐ Nee

b. Stelling Ik vind de investering in dit Cruyff Court:

☐ Positief

☐ Negatief

☐ Geen Mening

c. Ik maak gebruik van dit Cruyff Court:

☐ Ja

☐ Af en toe

☐ Nee

Algemene vragen

26. Wat is uw geslacht?

☐ Man

☐ Vrouw

☐ Anders

27. Wat is uw Leeftijd?

28. Wat is uw hoogst behaalde opleidingsniveau?

☐ Basisonderwijs

☐ Havo/VWO, MBO 2-4

☐ VMBO, Havo-onderbouw, VWO-onderbouw, MBO 1

☐ HBO/WO Bachelor

☐ HBO/WO Master

29. Wat is uw culturele achtergrond?

30. Hoe ziet uw huishouden eruit?

☐ Eenpersoonshuishouden

☐ Meerpersoonshuishouden zonder kinderen

☐ Meerpersoonshuishouden met kinderen

31. Wat is het bruto jaar inkomen van uw huishouden?

☐ Tot €25.000,-

☐ Meer dan €34.000,-

☐ €25.000,- t/m €34.000,-

☐ Zeg ik liever niet.

8.2 Interview guides

8.2.1 Interview Guide, 1ste interview

Interview Guide gemeente Eindhoven

Interview programmaleider milieu en gezonde verstedelijking

Tijd: 60 minuten

Inleiding <ul style="list-style-type: none">- Aanleiding contact- Even persoonlijk voorstellen- Korte uitleg thesis- Vragen of het oke is als ik het gesprek opneem, zodat ik het verder in mijn thesis kan gebruiken	
Interview vragen → Beleidsvragen <ul style="list-style-type: none">- Trends beleid- Autogebruik, Eindhoven autostad- Beleid om trend ALEs (beweegvriendelijke leefomgeving)- Doorkijkje nieuwe raad uitkijk op ALEs	Specificaties <ul style="list-style-type: none">- Integraliteit van beleid- Algemene trends zichtbaar binnen de gemeente in RO
Interviewvragen → Investeringsvragen in ALEs <ul style="list-style-type: none">- Algemeen overzicht- Waar verdere informatie te vinden- Eventuele documenten toesturen	<ul style="list-style-type: none">- Denk hierbij aan HOV knooppunten, fiets snelwegen, voetpaden, speeltuintjes, sportparken, beweegpleinen etc.
Afsluiting <ul style="list-style-type: none">- Korte samenvatting- Uitleg hoe het onderzoek verder zal gaan- Indien interesse: op de hoogte houden.	

8.2.2 Interview Guide, 2de interview

Interview Beleidsontwikkelaar/-adviseur Sport & Bewegen

Tijd: 30 minuten

Inleiding <ul style="list-style-type: none">- Aanleiding contact- Even persoonlijk voorstellen- Korte uitleg thesis- Vragen of het oke is als ik het gesprek opneem, zodat ik het verder in mijn thesis kan gebruiken	
Interview vragen → Beleidsvragen <ul style="list-style-type: none">- Sport beleid hoe komt het tot stand- Beleid om trend ALEs (beweegvriendelijke leefomgeving)	
Interviewvragen → Investerings Focus: <ul style="list-style-type: none">- Klopt deze lijst met investeringen- Gedachtegang achter de investering en hoe zijn ze tot stand gekomen	<u>Fietspaden/ uit actieplan fiets</u> <ul style="list-style-type: none">- FIETSRROUTE DEN BOSCH-EINDHOVEN- De groene Corridor- Fietsroute De Run en High tech campus Eindhoven- FIETSRROUTE DEN BOSCH-EINDHOVEN- Alle projecten onder OpenEindhoven?- Herinrichting Vestdijk- Herinrichting Geldropseweg:- Clausplein;- Eindhoven Noord-West- LUCIFERPLEIN: VAN STEEN NAAR GROEN Wandelpaden?? <u>Sport en speelparken</u> <ul style="list-style-type: none">- Urban Sport Park Eindhoven- Geluidsboog sportcomplex Eindhoven noord- Krajicek playground van Gentplei- Binnenspeeltuin Play in Town in Eindhoven
Afsluiting <ul style="list-style-type: none">- Korte samenvatting- Uitleg hoe het onderzoek verder zal gaan	

- Indien interesse: op de hoogte houden.	
--	--

8.3 Table relation age, educational level and income

Rowlable	Number of respondents	Income
< 18	1	
Higher level high school	1	
keep private	1	
18-25	17	
Bachelor degree college level	5	
< €25.000	1	
> €34.000,-	2	
keep private	2	
Higher level high school	5	
< €25.000	1	
> €34.000,-	1	
keep private	3	
Master degree college level	7	
< €25.000; €34.000 >	2	
> €34.000,-	1	
keep private	4	
26-30	8	
Bachelor degree college level	2	
keep private	2	
Higher level high school	2	
< €25.000; €34.000 >	1	
keep private	1	
Master degree college level	4	
< €25.000; €34.000 >	1	
> €34.000,-	2	
keep private	1	
31-35	2	
Bachelor degree college level	2	
> €34.000,-	2	
41-45	7	
Bachelor degree college level	1	
keep private	1	
Lower level high school	2	
< €25.000	1	
< €25.000; €34.000 >	1	
Master degree college level	4	
> €34.000,-	4	
46-50	4	
Bachelor degree college level	1	
< €25.000; €34.000 >	1	
Master degree college level	3	
> €34.000,-	2	
keep private	1	
51-55	7	

Bachelor degree college level	3
> €34.000,-	2
keep private	1
Higher level high school	1
keep private	1
Lower level high school	2
< €25.000; €34.000 >	1
keep private	1
Master degree college level	1
> €34.000,-	1
56-60	3
Bachelor degree college level	2
> €34.000,-	2
Master degree college level	1
> €34.000,-	1
61-65	2
Bachelor degree college level	1
> €34.000,-	1
Higher level high school	1
< €25.000	1
total	51

8.4 Raw STATA output

8.4.1 Summary Personal characteristics

Variable	Obs	Mean	Std. dev.	Min	Max
leeftijd	51	4.254902	2.305152	1	9
opleidings~u	51	4.039216	.9583483	2	5
huishouden	51	2.294118	.729222	1	3
inkomen	51	1.588235	1.359065	0	3
geslacht2	51	1.509804	.5048782	1	2
cultuur	51	1.882353	.5881176	1	4

8.4.2 Summary City district control variables

Variable	Obs	Mean	Std. dev.	Min	Max
perc_openb~n	51	.3018511	.0629631	.1939163	.4255544
veiligheid~e	51	2.202857	.6630418	1	2.923077
scorewoono~g	51	1.555326	.6367088	0	2.117647
leefbaarhe~e	51	2.090268	.3961538	1.214286	2.538462
beweegvrie~d	51	3.803922	.4009792	3	4
leefbarome~r	51	3.372549	1.280012	2	5

8.4.3 Summary Main dependent variables

Variable	Obs	Mean	Std. dev.	Min	Max
gh3	51	-3.431373	24.0726	-50	45
vg3	51	.5882353	2.021648	-5	5
mi10	51	1.666667	5.443038	-10	18
impact	51	-1.176471	26.28894	-54	47

8.4.4 OLS Regression Compliance to the Dutch PA-Norm

Source	SS	df	MS	Number of obs	=	51
Model	4644.19963	12	387.016636	F(12, 38)	=	0.60
Residual	24330.3102	38	640.27132	Prob > F	=	0.8247
				R-squared	=	0.1603
				Adj R-squared	=	-0.1049
Total	28974.5098	50	579.490196	Root MSE	=	25.304

gh3	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
herinrichtingen	-10.7349	14.36146	-0.75	0.459	-39.80816	18.33837
doorfietsroute_helmond	13.02003	44.10041	0.30	0.769	-76.25658	102.2966
cruijfcourt_aanwezig	19.81187	17.31711	1.14	0.260	-15.24478	54.86853
urbansportpark_aanwezig	-2.470733	37.42187	-0.07	0.948	-78.22735	73.28588
perc_openbaargroen	0	(omitted)				
beweegvriendelijkheid	-9.819187	37.70961	-0.26	0.796	-86.15831	66.51993
leefbarometer	-1.587296	16.60429	-0.10	0.924	-35.20093	32.02634
geslacht2	9.213221	8.120751	1.13	0.264	-7.22638	25.65282
inkomen	-.3568675	3.650488	-0.10	0.923	-7.746894	7.033159
cultuur	-8.86442	7.023706	-1.26	0.215	-23.08317	5.354329
huishouden	2.869755	5.978836	0.48	0.634	-9.233764	14.97328
opleidingsniveau	-.8225109	4.723753	-0.17	0.863	-10.38525	8.740228
leeftijd	-2.365389	2.329228	-1.02	0.316	-7.080664	2.349885
_cons	37.17162	183.571	0.20	0.841	-334.4485	408.7917

8.4.5 OLS Regression Change in compliance to the PA-Norm

Source	SS	df	MS	Number of obs	=	51
Model	64.023782	12	5.33531517	F(12, 38)	=	1.44
Residual	140.329159	38	3.69287261	Prob > F	=	0.1889
				R-squared	=	0.3133
				Adj R-squared	=	0.0964
Total	204.352941	50	4.08705882	Root MSE	=	1.9217

vg3	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
herinrichtingen	-1.005743	1.090684	-0.92	0.362	-3.213717	1.202231
doorfietsroute_helmond	5.06842	3.349213	1.51	0.138	-1.711707	11.84855
cruijfcourt_aanwezig	-1.442702	1.315151	-1.10	0.280	-4.105085	1.219681
urbansportpark_aanwezig	-4.297347	2.84201	-1.51	0.139	-10.0507	1.456002
perc_openbaargroen	0 (omitted)					
beweegvriendelijkheid	3.204539	2.863863	1.12	0.270	-2.593048	9.002126
leefbarometer	2.618591	1.261016	2.08	0.045	.0657984	5.171385
geslacht2	.5531901	.6167318	0.90	0.375	-.6953182	1.801698
inkomen	-.3869729	.2772369	-1.40	0.171	-.9482097	.1742639
cultuur	.2588574	.5334165	0.49	0.630	-.8209879	1.338703
huishouden	.7409555	.4540637	1.63	0.111	-.1782484	1.660159
opleidingsniveau	.1599668	.3587462	0.45	0.658	-.566277	.8862106
leeftijd	-.0586145	.1768936	-0.33	0.742	-.4167169	.2994878
_cons	-21.26349	13.94133	-1.53	0.135	-49.48624	6.959257

8.4.6 OLS Regression Opinion on Investments

Source	SS	df	MS	Number of obs	=	51
Model	532.870896	12	44.405908	F(12, 38)	=	1.78
Residual	948.462438	38	24.9595378	Prob > F	=	0.0878
				R-squared	=	0.3597
				Adj R-squared	=	0.1575
Total	1481.33333	50	29.6266667	Root MSE	=	4.996

mi10	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
herinrichtingen	2.983137	2.835535	1.05	0.299	-2.757103	8.723376
doorfietsroute_helmond	9.149342	8.707207	1.05	0.300	-8.477476	26.77616
cruijfcourt_aanwezig	-2.692691	3.419099	-0.79	0.436	-9.614294	4.228912
urbansportpark_aanwezig	-2.307406	7.388593	-0.31	0.757	-17.26483	12.65002
perc_openbaargroen	0 (omitted)					
beweegvriendelijkheid	8.997181	7.445405	1.21	0.234	-6.075253	24.06962
leefbarometer	1.232243	3.27836	0.38	0.709	-5.40445	7.868936
geslacht2	1.535767	1.603365	0.96	0.344	-1.710076	4.78161
inkomen	1.385343	.7207542	1.92	0.062	-.0737474	2.844434
cultuur	-1.958702	1.386764	-1.41	0.166	-4.766059	.8486547
huishouden	-.0487367	1.180464	-0.04	0.967	-2.438462	2.340988
opleidingsniveau	-.8134795	.9326602	-0.87	0.389	-2.701551	1.074592
leeftijd	-.9805133	.4598839	-2.13	0.040	-1.9115	-.0495271
_cons	-29.34863	36.24435	-0.81	0.423	-102.7215	44.02422

8.4.7 OLS Regression Impact of Investments

Source	SS	df	MS	Number of obs	=	51
Model	6625.01476	12	552.084563	F(12, 38)	=	0.75
Residual	27930.397	38	735.010447	Prob > F	=	0.6940
				R-squared	=	0.1917
				Adj R-squared	=	-0.0635
Total	34555.4118	50	691.108235	Root MSE	=	27.111

impact	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
herinrichtingen	-8.757503	15.38734	-0.57	0.573	-39.90754	22.39253
doorfietsroute_helmond	27.23779	47.2506	0.58	0.568	-68.41605	122.8916
cruifcourt_aanwezig	15.67648	18.55411	0.84	0.403	-21.88435	53.23731
urbansportpark_aanwezig	-9.075485	40.095	-0.23	0.822	-90.24357	72.0926
perc_openbaargroen	0 (omitted)					
beweegvriendelijkheid	2.382533	40.4033	0.06	0.953	-79.40967	84.17473
leefbarometer	2.263538	17.79038	0.13	0.899	-33.7512	38.27827
geslacht2	11.30218	8.700835	1.30	0.202	-6.311742	28.9161
inkomen	.6415028	3.911251	0.16	0.871	-7.276411	8.559416
cultuur	-10.56426	7.525425	-1.40	0.168	-25.79869	4.670162
huishouden	3.561974	6.405917	0.56	0.581	-9.406128	16.53008
opleidingsniveau	-1.476024	5.061182	-0.29	0.772	-11.72185	8.769804
leeftijd	-3.404517	2.49561	-1.36	0.181	-8.456615	1.64758
_cons	-13.44051	196.6839	-0.07	0.946	-411.6063	384.7252

8.4.8 T-test Compliance to the Dutch PA-Norm, divided by Investments

Two-sample t test with equal variances

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
0	7	-15.71429	12.60331	33.34524	-46.55349	15.12491
1	44	-1.477273	3.33783	22.14066	-8.208648	5.254103
Combined	51	-3.431373	3.370839	24.0726	-10.2019	3.339156
diff		-14.23701	9.683812		-33.69736	5.223336

diff = mean(0) - mean(1) t = -1.4702
H0: diff = 0 Degrees of freedom = 49

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = 0.0740 Pr(|T| > |t|) = 0.1479 Pr(T > t) = 0.9260

8.4.9 T-test Change in Compliance to the Dutch PA-Norm, divided by Investments

Two-sample t test with equal variances

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
0	7	0	.4364358	1.154701	-1.06792	1.06792
1	44	.6818182	.3198386	2.121569	.0368021	1.326834
Combined	51	.5882353	.2830873	2.021648	.0196378	1.156833
diff		-.6818182	.8252741		-2.340268	.9766321

diff = mean(0) - mean(1)

t = -0.8262

H0: diff = 0

Degrees of freedom = 49

Ha: diff < 0

Ha: diff != 0

Ha: diff > 0

Pr(T < t) = 0.2064

Pr(|T| > |t|) = 0.4127

Pr(T > t) = 0.7936

8.4.10 T-test Opinion on Investments divided by Investments

Two-sample t test with equal variances

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
0	7	.8571429	2.939295	7.776644	-6.335053	8.049339
1	44	1.795455	.7670401	5.087968	.2485708	3.342338
Combined	51	1.666667	.7621778	5.443038	.1357875	3.197546
diff		-.9383117	2.233352		-5.426401	3.549778

diff = mean(0) - mean(1)

t = -0.4201

H0: diff = 0

Degrees of freedom = 49

Ha: diff < 0

Ha: diff != 0

Ha: diff > 0

Pr(T < t) = 0.3381

Pr(|T| > |t|) = 0.6762

Pr(T > t) = 0.6619

8.4.11 T-test Impact of Investments, divided by Investments

Two-sample t test with equal variances

Group	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
0	7	-14.85714	14.1277	37.37837	-49.42637	19.71209
1	44	1	3.6098	23.9447	-6.279855	8.279855
Combined	51	-1.176471	3.681188	26.28894	-8.570353	6.217412
diff		-15.85714	10.56601		-37.09034	5.376051

diff = mean(0) - mean(1)

t = -1.5008

H0: diff = 0

Degrees of freedom = 49

Ha: diff < 0

Ha: diff != 0

Ha: diff > 0

Pr(T < t) = 0.0699

Pr(|T| > |t|) = 0.1398

Pr(T > t) = 0.9301