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Associations between social norms and active commuting among adult Norwegians

Assosiasjoner mellom sosiale normer og
aktiv transport blant voksne nordmenn

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Acknowledgement

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Abstract

Background: Active commuting involves physical metabolic work and can lead to accumulation of physical activity throughout the day, which may prevent lifestyle related diseases. Lifestyle related diseases such as cancer, diabetes, heart diseases, and chronic lung diseases are the main causes of early death on a worldwide basis. While a sedentary lifestyle has become common in modern time. In Norway only 30% of the adult population satisfy the health government's recommendation for physical activity and only 25% use active commuting (bicycle/walking) as transport mode in their daily trips. Political efforts to increase active commuting are mostly directed to economic, environmental, and infrastructural factors. However, humans live in societies and are social beings who tend to be influenced by other people. Consequently, social norms can affect travel behaviour which may be an important area for guiding policy interventions.

Objective: The aim of this study was to examine associations between social norms (descriptive/injunctive) and active commuting (walking/cycling).

Method: The data material used in this study was cross-sectional based on a survey about factors that may influence transport mode choice, which was originally conducted by the Norwegian Centre for Transport Research in 2023. The sample in this study consisted of 448 participants (62.7% men /37.3% women) with average age 44 years. Logistic regression was used to investigate associations between descriptive and injunctive norms and active commuting (walking/cycling). It was adjusted for the possible confounders including gender, age, urban/rural areas, country of birth, education level, employment status, children in household, and the possible mediator attitude towards active transport. The statistical software Jamovi (version 2.3) was used for the analyses.

Results: The findings of this study showed that there was a weak association between social norms (descriptive and injunctive) and cycling, with attitude accounting for a part of this association. No association was found between social norms and walking.

Conclusion: The current study found that social norms were not decisive for participants' choice of active transport. However, social norms were more influential for participants' choice of commuting by bicycle, compared to with walking. Due to results from this study, it may be beneficial to do political effort in people's social environment to affect people to cycle more in their daily commute. To increase walking, it may seem like the social environment and social norms are not decisive, and attention to other areas may be more profitable.

Sammendrag

Bakgrunn: Aktiv pendling kan føre til akkumulering av fysisk aktivitet gjennom dagen. En stillesittende livsstil har blitt vanlig i moderne tid, samtidig er forekomsten av livsstilsrelaterte sykdommer fremdeles høy på verdensbasis. I Norge tilfredsstiller bare 30% av den voksne befolkningen helsedirektoratets anbefaling om fysisk aktivitet. Av daglige reiser i Norge gjøres bare 25% til fots/syklende. Den politiske innsatsen for å øke den aktive transporten er i stor grad rettet mot økonomiske, miljømessige og infrastrukturelle faktorer. Mennesker er derimot sosiale vesener som har tendens til å bli påvirket av andre. Sosiale normer kan videre påvirke reiseatferd og kan dermed være et viktig område for politiske tiltak.

Formål: Hensikten med denne studien var å undersøke sammenhenger mellom sosiale normer (deskriptive/injuktive) og aktiv pendling (gange/sykling).

Metode: Datamaterialet som ble brukt i denne studien var basert på tverrsnittsdata fra en undersøkelse om hva som påvirker transportmiddelvalg, gjennomført av Transportøkonomisk institutt i 2023. Utvalget i denne studien bestod av 448 deltakere med gjennomsnittsalder på 53 år, og 62.7% menn og 37.3% kvinner. Logistisk regresjon ble brukt for å undersøke sammenhenger mellom deskriptive og injuktive normer og aktiv transport (gange/sykling). Det ble kontrollert for mulige konfundere kjønn, alder, by/land, landbakgrunn, utdanningsnivå, yrkesstatus, barn i husholdningen og mulig mediator holdning til aktiv transport. Statistikk programmet Jamovi (versjon 2.3) ble brukt for analysene.

Resultater: Funnene i denne masteroppgaven viste en svak sammenheng mellom sosiale normer (deskriptive og injuktive) og sykling. Holdning kunne forklare noe av denne relasjonen. Det ble ikke funnet sammenheng mellom sosiale normer og det å gå.

Konklusjon: Det kan virke som om sosiale normer ikke var en avgjørende faktor for valg av aktiv transport for dette utvalget. For sykling hadde sosiale normer mer innflytelse enn for gåing. På bakgrunn av denne studien kan det være gunstig å gjøre en politisk innsats i folks sosiale miljø for å påvirke folk til å sykle mer i sin daglige pendling. For å øke gange kan det virke som om det sosiale miljøet og sosiale normer ikke er avgjørende for dette utvalget, og oppmerksomhet til andre områder kan være mer lønnsomt.

List of tables

Table 1: Description of the sample with sociodemographic variables

Table 2: Distribution in the sample of exposure variables social norms and outcome variables transport mode choice in daily trips

Table 3: Associations between social norms and active transport (walking/cycling) in daily trips

Table 4: Associations between social norms and active transport (walking/cycling) in daily trips. Odds Ratios from logistic regressions

List of figures

Figure 1: The process for the final sample of the exposure and outcome variables

List of appendices

Appendix 1: Selected questions from questionnaire

Contents

Acknowledgement.....	i
Abstract	ii
List of tables	iv
List of figures	iv
List of appendices.....	iv
1.0 Introduction	1
2.0 Aim and research question	3
3.0 Background	4
3.1 General physical activity and public health.....	4
3.2 Active commuting and public health	6
3.3 Travel behaviour as a health behaviour	7
3.4 Social influence on health behaviour.....	9
3.4.1 Social norms.....	10
3.4.2 Social norms and active commuting	11
3.5 Cultural norms	13
3.6 Habits in relation to social norms in predicting behaviour.....	13
3.7 Personal norms (attitude) in relation to social norms in predicting behaviour.....	14
4.0 Method	16
4.1 Study design	16
4.2 Data collection.....	16
4.3 Sample and study population.....	16
4.4 Questionnaire.....	17
4.5 Variables	18
4.5.1 Outcome variables	18
4.5.2 Exposure variables	18
4.5.3 Confounding variables	19
4.6 Analysis	19
4.6.1 Software program.....	19
4.6.2 Analyses	20
4.7 Ethical considerations.....	20
4.7.1 Privacy security and data saving.....	20
4.7.2 Consent and possibility to quit the participation.....	21
5.0 Results	22
5.1 Descriptive statistics	22

5.2 Bivariate correlations between social norms and active transport (walking/cycling)	24
5.3 Bivariate correlations between socio-demographic factors and social norms and active commuting behaviours	25
5.4 Logistic regression.....	26
6.0 Discussion	27
6.1 Discussion of the results	27
6.1.1 Summary of the results	27
6.1.2 The association between social norms and cycling	27
6.1.3 The association between social norms and walking	29
6.1.4 The role of sociodemographic factors in the association between social norms and active transport.....	30
6.1.5 The influence of attitude on active transportation choice	33
6.2 Discussion of the method	35
6.2.1 Study design.....	35
6.2.2 Recruitment, selection bias and generalizability	35
6.2.3 Measuring exposure and outcome variables and measurement error	37
6.2.4 Confounding factors and possible mediator	39
6.3 Implications for public health.....	40
6.4 Implications for further research	41
7.0 Conclusion.....	41
References	42
Appendix material	a
Appendix 1: Selected questions from questionnaire	a

1.0 Introduction

Active commuting involves physical metabolic work and may lead to accumulation of physical activity throughout the day (Sahlqvist et al., 2012), which is associated with lower risk of all-cause mortality, cardiovascular diseases, and diabetes (Dinu et al., 2019). Positive effects of active commuting also include psychological well-being (Martin et al., 2014) and greater levels of community participation (Stroope, 2021). Furthermore, public transportation may also contribute to increased physical activity throughout the day, due to the need of walking to and from public transportation sites (Besser & Dannenberg, 2005).

The Norwegian Directorate of Health recommends 150-300 minutes of activity on a moderate intensity level or 75 minutes of activity on a high intensity level on a weekly basis for the adult population (The Norwegian Directorate of Health, 2024). However, in Norway only 30% of the adult population fulfil this recommendation (Nystad & Ekelund, 2023). Further, only 25% of the daily commuting in Norway is done by active commute modes, including bicycle (counting for 20%) and walking (counting for 5%) (Grue, 2021).

The transport system is an important part of the local environment and of the spatial planning of a country's infrastructure. Governmental planning guidelines for coordinated housing, land-use and transport planning from 2014 of Norway says that spatial planning should strengthen cycling and walking as modal choice as one intervention among others, and as a part of a national policy that supports sustainable development and public health (Government, 2014). The positive effects of getting more people to choose active and collective transport modes of commuting is significant, both for the individual and for the society (Rabl & De Nazelle, 2012). On an individual level this includes more activity on a daily basis and the opportunity to be part of other activities, which may in turn contribute to better physical and psychological health (Nigg & Nigg, 2021). On the societal level, increased non-motorized transport modes may decrease air pollution and noise in the environment (Rodrigues et al., 2020).

A range of different factors may impact people's mode choices. These may include economic, environmental, infrastructure, subjective, psychological, and social factors (Rahul & Verma, 2013; Mandic et al., 2015). Political efforts and interventions to increase active and public transport modes are mostly directed to economic, environmental, and infrastructural factors. Numerous of empirical studies have investigated associations between environmental and infrastructural factors and transport mode choice (Van Acker et al., 2010). However, changes

in the infrastructure alone may not be enough to make a real change in individuals' mode choices (Duponta et al., 2018).

People live in society structures ranging from overall national political structure to the micro-structure of the family, which includes interaction with other people on different levels (Keyes & Ryff, 1998). Social networks and relationships are essential in people's lives (Ebstein et al., 2010), and hence, humans tend to be influenced by other individuals (Maness et al., 2015). Social norms exist through social networks and refers to the rules and standards in social groups (Friedkin, 2001). Social norms may affect general behaviour and may also have an influence on travel behaviours. Consequently, social norms may be a target area for policy interventions together with other interventions to increase desired behaviours (Mundaca et al., 2022).

Several studies (Nordfjærn & Rundmo, 2015; Bjørkelund et al., 2016; Silvestri et al., 2022; Wolday, 2023) that have been done in or included Norway as study area have investigated environmental factors, socio-demographic factors, and personal norms as correlates of transport mode choices. No studies in Norway have investigated specific the association of social norms and active commuting. This study will go further with the subjective and psychological factors, with a focus on the role of the social environment, more specific social norms in individuals' social environment, in the choice of active transportation in Norway.

2.0 Aim and research question

This present thesis is part of a bigger project owned and run by the Norwegian Centre for Transport Research, called Aplanet-Acceptable Policies for the optimal balance between driving and active transport. The aim of the bigger project was to investigate how policy instruments aimed at reducing car driving and stimulating sustainable transport could be improved in terms of public acceptability.

Half of the population in Norway use car in daily commuting (Grue, 2021), and only 30% fulfil the recommendations by The Norwegian Directorate of Health for physical activity on a weekly basis (Nystad & Ekelund, 2023). Hence, there is a great potential to increase the activity level in the population through everyday activities such as commuting. Through political endorsement there is expectation to the county authorities to facilitate the use of public transport, cyclists, and walking, according to a sustainable development and public health (Government, 2023). The knowledge about the role of social norms in modal choice may be important additional knowledge that can be helpful in local political work to increase the effect of structural interventions of active transport (Mundaca et al., 2022).

The purpose of the current thesis was to investigate associations between social norms and active commuting. Active commuting is in this project refers to walking and cycling.

The following research questions were investigated:

- *Are there associations between social norms and active commuting in daily trips?*
- *Are there differences between descriptive and injunctive norms in their association to active commuting?*

3.0 Background

3.1 General physical activity and public health

Physical activity is beneficial for the physical, mental health and well-being (Pedersen & Saltin, 2015). The organ systems in the body are dependent on aerobic metabolism to stay in healthy function, which may be increased through physical activity. Physical activity may therefor through improvement in the blood suppling function of the cardiovascular system improve the blood supply to other organs, and consequently lead to better functions in the organs of the body (Heinonen et al., 2014). Regular physical activity can also lead to better life-quality during the aging process (Fusco et al., 2012) through the improvement of the functions of the body such as strength, mobility, coordination, and endurance (Morey et al., 2008). The mental health can also be improved through physical activity, both when it comes to managing mild to moderate mental health symptoms (Heinonen et al., 2014), and when it comes to lifting the life-quality through better self-efficacy and self-confidence, reduced stress, and increased quality of sleep (Fox, 1999).

In modern time, people are less physical active than a few decades ago and have a more sedentary lifestyle, which may involve activities with low metabolic work, which often is present in sitting or lying posture (Tremblay et al., 2017). Sedentary time is associated with an increased risk of cardiovascular diseases and all-cause mortality (Wilmot et al., 2012). The modern lifestyle has also led to an increase in lifestyle related diseases such as cardiovascular diseases, obesity, hypertension, type 2 diabetes, cancer, autoimmune diseases, and osteoporosis (Carrera-Bastos et al., 2011). The distribution of the lifestyle related diseases in Norway follows a social inequality, and people with low socioeconomic status have a higher prevalence of the lifestyle related diseases compared to those with high socioeconomic status (Dahl et al., 2014).

The recommendation for physical activity according to The Norwegian Directorate of Health (2024) is a minimum of 150 minutes of moderate-intensity activity or 75 minutes of vigorous intensity activity over the course of a week. This recommendation is increased to double quantity for those who have more than eight hours of sedentary time during a day (Hansen et al., 2023). Only 30% of the population in Norway satisfy the recommendation for physical activity by The Norwegian Directorate of Health (Nystad & Ekelund, 2023), despite of the positive effects of physical activity. People who are physical active in 25 minutes per day with moderate intensity have 60% less risk of early death compared with people with no physical

activity (Ekelund et al., 2019). Adults in Norway have on average 9,2 hours of sedentary time (Nystad & Ekelund, 2023), and have more sedentary time than for example Sweden, England, and Portugal (Loyen et al., 2016). At the same time, Norwegians also use more time on physical activity with moderate/high level (Nystad & Ekelund, 2023). However, the distribution of physical activity in the population in Norway is also unevenly distributed and follows a social inequality like the lifestyle related diseases. In general, physical activity decreases with increased age, women are less physical active than men, people with lower education are in general in lower physical activity, but more in moderate physical activity than highly educated people and higher educated people are in more high intensity physical activity (Nystad & Ekelund, 2023). Political efforts to reduce social inequality in physical activity may be an important intervention area in the policy to reduce the social differences in lifestyle related diseases (Méjean et al., 2013).

Factors that may affect physical activity behaviours may be related to the individual, such as psychosocial factors (e.g motivation, self-efficacy, goals, perceived consequences of the physical activity) and sociodemographic factors (e.g education) (Amireault et al., 2013), and they may be related to the environment such as recreation and walking facilities in the local environment, and aesthetic attributes of the recreational areas and the nature (Humpel et al., 2002).

Traditionally, it has been a focus on individual-oriented interventions in the health sector such as motivation, information and counselling, in order to affect a health-friendly lifestyle in individuals. The individual-oriented interventions have not led to a significant change in health behaviours at a population level when seen in a long-term perspective (Anderssen et al., 2008). Throughout international political endorsement initiated by World Health Organization and United Nations, the policy in promoting health has changed to a cross-sectoral and a population and community-oriented policy (WHO, 1986; UN, 2015). Political interventions that are population based and related to the local environment such as improving the public realm, park, playground, the transport system such as cycle lines and walking routes can have positive effects on increased physical activity and health outcomes on a population level (McGowan et al., 2021). The cross-sectoral and population and community-oriented policy in improving the public health is also rooted in Norwegian national and local policy throughout The Public Health Act by year 2012 (The Public Health Act, 2012, §1) and The Planning and Building Act by year 2008 (The Planning and Building Act, 2008, §3-1).

For more specific policy to increase physical activity on a population level in Norway, The Norwegian Directorate of Health published in year 2020 a guidance, with name “National Action Plan for Physical Activity for the years 2020–29”. The main goals written in the National Action Plan for Physical Activity for year 2020–29 were to improve activity-friendly community to increase the proportion of the population fulfilling the recommendations for physical activity with 15 % by year 2030. The main strategy to reach these goals is to influence people’s opportunities to be physically active by universal population-oriented interventions. One of the focus arenas to improve peoples’ opportunities to be physically active is to facilitate walking and cycling friendly environments throughout holistic spatial planning that facilitate active transport, and to develop and disseminate knowledge about factors that gets more people to walk or cycle (The Norwegian Directorate of Health, 2022). Consequently, active commuting is a target area to integrate physical activity into everyday routines and may affect more people than through organised physical activities (Guell et al., 2012).

3.2 Active commuting and public health

Active commuting can be defined as a travel method which involves physical metabolic work from the body, such as walking and cycling (Chillón et al., 2011). The total amount of physical activity during a day can be increased by active commuting, without compromising for the recreational physical activity (Foley et al., 2015). The positive health effects of active transport may be explained through the increase in daily physical activity (Martin et al., 2014; Dinu et al., 2019). Active commuting behaviours in childhood and adolescence may also establish habits which track into adulthood and increase the chances of continuing active commuting throughout life (Yang et al., 2014).

Mobility is fundamental to being able to participate in daily activities (Stanley & Stanley, 2017) such as work, school, sports, and cultural activities (Van Acker et al., 2010).

Participation in activities may contribute to better physical and mental health through participation and positive social factors and physical activity (Wright & Stickley, 2013). Data from the National Travel Survey from the year 2018-2019 showed that daily trips in Norway were distributed as the following: car drivers were responsible for 53% of daily trips, the public transport 11%, walking 20% and bicycling 5% (Grue, 2021). The data showed potential for increasing active and public transport. Efficient transportation systems are an important part of functional local communities. At the same time, transport modes (such as car use) may entail negative health effects in the form of air pollution (Johansson et al., 2017),

noise (Lauper et al., 2016) and the risk of accidents (Elvik, 2009). On the other hand, active transportation is associated with greater levels of community participation (Stroope, 2021), increased physical activity and reduced air pollution (Rabl & De Nazelle, 2012). These positive effects of active commuting are further associated with improved physical and mental health and reduced health inequality in the population (Dinu et al., 2019; Manisalidis et al., 2020; Morales-Garzón et al., 2023). Hence, there is a great potential for promoting good health by facilitating active transportation modes such as walking and cycling and the use of public transport (The Norwegian Directorate of Health, 2021).

The choice of modal transport for daily commuting can differ across sociodemographic groups by for example age, gender, and employment status (Bernetti et al., 2008). In Norway, The National Travel Survey from the year 2018-2019 showed that car use increased with higher socioeconomic status, being employed, having children in the household, being a male, being in the age interval from 35-66 years and living in areas with lower access to collective transportation. Increased walking and cycling behaviours were associated with being in a lower age group (13-17 years), having lower socioeconomic status, not being employed, and having no driving licence or no access to a car (Grue, 2021). A study (Bernetti et al., 2008) suggested that different policy interventions designed to influence people's transportation behaviours may affect sociodemographic groups differently. Further, sociodemographic factors may be important variables to consider in planning interventions designed to influence people's transportation behaviours.

3.3 Travel behaviour as a health behaviour

Health behaviour can be understood as all the actions that people do, and that may influence physical or mental health (DiClemente, 2019). Consequently, travel behaviour is a health behaviour because it can affect health through the accumulation of physical activity (Sahlqvist et al., 2012). Dahlgren & Whiteheads (1991) socioecological model shows in an organized way all the determinants that can affect health. They are grouped in different policy levels with five main layers, one on top of the other. From the inner layer to the outer layer in order there are; individual factors (e.g age, sex and genetics), individual lifestyle factors (e.g nutrition, physical activity, sleep) social and community networks (e.g social relationships, social networks, social capital), living and working conditions (e.g work, school, leisure-activities) and overall general socio-economic and cultural and environmental conditions (e.g national policy, democracy, empowerment) (Whitehead & Dahlgren, 1991). The choice of mode of transport is an individual lifestyle factor that may be influenced by individual factors

(Clark & Scott, 2013) in the inner layer of Whitehead & Dahlgren (1991) socioecological model (e.g. gender, age), which cannot be changed. Further, the choice of transport may also be influenced by the outer layers in Whitehead & Dahlgren (1991) socioecological model such as social networks (Arentze & Timmermans, 2008), living and working conditions (e.g. employment) (Bopp et al., 2016) and also general socio-economic factors (Lucas et al., 2016), cultural and environmental factors (e.g. legislation and policy on building walkways) (Lucas et al., 2016; Wang & Wen, 2017). Political intervention especially in the outer layers including social, living, and working conditions and general socio-economic factors, cultural and environmental factors are important to affect transport behaviours on a population level (Evans et al., 2022).

Environmental factors that may affect travel behaviours have been investigated in several existing studies (Wang & Wen, 2017; Evans et al., 2022), where sociodemographic factors often have been adjusted for. Findings showed that environmental factors including density, street connectivity, neighbourhood walkability, distance to destinations and neighbourhood aesthetics such as greenspace had a significant impact on active commuting. The importance of the sociodemographic factors (age, gender, ethnicity, and socio-economic factors) showed different findings in individual studies collected in a review (Evan et al., 2022). The study (Evan et al., 2022) further concluded that only socio-economic status of the socio-demographic factors was consistently associated with active commuting but recommended anyway to consider all factors included in the review in further studies. A cross-sectional study from Norway (Bjørkelund et al., 2016) showed that there were no differences in transport choice by gender or education level, where ethnicity was not investigated due to most of the respondents were Norwegians.

Several studies (Scott et al., 2007; De Bruijn et al., 2009; Lo et al., 2016; Bird et al., 2018) included personal norms as attitude and intention in investigating factors that affect transport mode, and further explained the significance of personal factors in the choice of active transport in the framework of Theory of Planned Behaviour (TPB). TPB is a behavioural theory that is used to understand and predict human behaviour based on cost-benefit expectancy (Ajzen, 1991). The theory is one of the most used behavioural theories to understand the predictors of travel behaviours in travel behaviour research (Faber et al., 2023). The Theory of Planned Behaviour suggests that behaviour can be predicted from intentions to perform a behaviour, which in turn can be predicted with high accuracy from attitudes to the behaviour, subjective norms (perceived injunctive norms) and perceived

behavioural control (Ajzen, 1991). The studies who investigated correlates of active commuting in the framework of Theory of Planned Behaviour, that was read in relation to this current study, found that attitude, perceived behavioural control and habits had significant influence on active transportation choice (Scott et al., 2007; De Bruijn et al., 2009; Lo et al., 2016; Bird et al., 2018). Further, a limited number of these studies (Scott et al., 2007) found subjective norms to affect active transportation choice. However, a limitation with TPB may be that the constructs of the model are being understood as independent determinants that affect behaviour (Megens & Weerman, 2010). Consequently, a limitation with studies that used TPB as a framework could be that the complexity and interaction of correlates of active commuting were not understood properly (Panter & Jones, 2010).

The focus of this thesis is the social environment's influence on active commuting behaviours. To understand the role of the social environment in active commuting, individual factors such as attitudes, habits and sociodemographic factors, and environmental factors such as rural/urban areas will also be described throughout the thesis and discussed in relation to the social environment. The Theory of Planned Behaviour will not be used as a framework due to the model's limitation in explaining a complex behaviour such as transport behaviour. However, the model will be used as an addition to understand some of the possible relations of correlates of active commuting.

3.4 Social influence on health behaviour

People live in societies, and social networks and social relationships are essential parts of people's lives (Keyes & Ryff, 1998). On the basis that people live in societies and are dependent on social relationships in their everyday life, it is important for people to feel that they fit in their social environment (Deci & Ryan, 2000). Consequently, humans are social beings who tend to be influenced by other people (Maness et al., 2015). Social influence can be defined as influence of other individuals or groups that lead to a change in an individual's attitude, behaviour or feeling (Walker, 2007). According to social psychology, social influence can happen through two mechanisms; one is through information, as people see others as a source of information about the reality. The other is through a normative mechanism in order to be accepted by their social reference group. These two mechanisms may be related to social norms, descriptive social norms about what most of other people do, and normative social norms about what most people think is right to do (Maness et al., 2015).

3.4.1 Social norms

Social norms have been studied in various disciplines, for example in economics, sociology, psychology and from a public health perspective (Legros & Cislighi, 2020). Social norms can from a collective level be understood as a group's common understanding of unwritten rules and standards of performed and accepted behaviours (Cialdini & Trost, 1998). In other words, and from an individual perspective, social norms are about what an individual in a group believes to be typical and appropriate behaviour (Mackie et al., 2015). People in general are sensitive and responsive to social norms, which can be explained from a biologically perspective that the brain is adapted to social learning and social imitation (Tomasello, 2014).

Social norms are the foundation of culture, daily and social life, and social interactions (McDonald & Crandall, 2015). Social norms exist through social networks, where individuals conform to the behaviour of the people they are socially connected to (Maness et al., 2015). The conformity to a behaviour may happen both conscious and unconscious (McDonald & Crandall, 2015). Further, people are especially motivated to follow social norms in groups that they feel connected to, a reference group (Kruglanski & Higgins, 2013). This may be anyone in someone's social network, for example household, family, friends, or coworkers (Cialdini & Trost, 1998). A group's social norms are important for the identity and actions of the group (Hogg & Reid, 2006), and deviation from these expectations can lead to loss of social status or exclusion from the group (Schachter, 1951). Consequently, social norms may contribute to maintain an action or behaviour in a group by reciprocal expectations of the other ones in a reference group (Mackie et al., 2015). A group's maintain of an action may be related to both positive and harmful behaviours (Legros & Cislighi, 2020). Social norms can then through affecting the behaviour of individuals affect people's health and wellbeing (Legros & Cislighi, 2020). Hence, social norms may be an important area in health promoting work, with interventions designed to affect people's health behaviours (Cislighi & Berkowitz, 2021).

Theories from social psychology distinguishes between two types of social norms, descriptive and injunctive norms (Lapinski & Rimal, 2005). Descriptive norms describe which behaviour is most performed in a group, while injunctive norms refer to which behaviour a group normally prefer (Mundaca et al., 2022). Descriptive norms are often associated to which behaviour is common, while injunctive norms to which behaviour is moral (Eriksson et al., 2015). Descriptive norms can affect behaviour through providing information about which behaviour is most common (Cialdini, 1990; Cialdini 1991). Further, people tend to associate

commonness and morality automatically, and descriptive and injunctive norms often follow each other. If the descriptive and injunctive norms related to a behaviour are different, the impact of the descriptive norms may be stronger (Cialdini, 1990; Cialdini 1991).

3.4.2 Social norms and active commuting

A various of factors can affect active transport behaviours (Van Acker et al., 2010), and they can be related to all the levels in an ecological model (Larouche & Trudeau, 2010), such as Dahlgren & Whitehead (1981) socioecological model. The factors that influence active transport behaviours may include personal, social, economic, environmental, and transportation system characteristics (Rahul & Verma, 2013). Social norms are one possible factor that may affect active commuting in a diversity of the mentioned different factors (Mandic et al., 2015), and can act like a nudge towards active transport and encourage active transport behaviours (Riggs, 2016; Greener et al., 2022).

To which extent individuals respond to social influence may depend on different factors, including personal factors (Kalish, 2012), factors related to the properties of the social network (Sajadi et al., 2018) and contextual factors (Pike & Lubell, 2018). One significant personal factor is life-stage or age (Pike & Lubell, 2018). For older adults other factors than the social ones are more dominant in predicting active commuting. For younger adults normative beliefs and community variables may be predictors of active travel (Bopp et al., 2014). Other significant individual factors may be related to the individual's personality, for example people with non-conforming personalities may be less affected by social influence (McDonald & Crandall, 2015). Conformity is often studied from social psychology and is a common human behaviour about changing own behaviour in order to fit in a social environment (Zollman, 2010). Factors that can contribute to non-conforming personalities can be cognitive rigidity, low education, traditional religiosity, and authoritarianism (McDonald & Crandall, 2015). Attributes of the social network that may influence an individual's behaviour could be strength of the ties in the individual's social network, where closer relationships are expected to have more influence than distanced relationships. Contextual factors such as travel distance, travel costs, schedules, and household composition can affect to which extent people are influenced by their social network. For example, many people with longer commute distances be less responsive to social influences, and people with shorter commute distances may be more responsive to influence by their social network (Pike & Lubell, 2018). An example of how changes in the contextual and social environment have led to an increase in active commuting can be drawn to the time of the Covid-19 Pandemic (Cusack, 2021). Where

political regulation and advices of the authorities followed by the social norms changed to be more favourable of other transportation modes than public transport, for example active commuting transportation (Cusack, 2021).

Some differences in the influence of social norms (descriptive and/or injunctive) are also found related to the context of different active travel behaviours; walking and bicycling (Giles-Corti & Donovan, 2003; Willis et al., 2015). Hence, the walking and bicycling behaviours were investigated separately in the current study.

3.4.2.1 Bicycling

Social norms, both descriptive and injunctive, can affect bicycling as a transportation mode (Heinen & Handy, 2012; Passafaro et al., 2014; Willis et al., 2015). Several important environmental factors may affect to which extent social norms affect bicycling behaviours in commuting and are related to the available bicycle facilities in the local environment. First when bicycle facilities are in place, the social norms may have a significant influence on people's bicycle behaviours (De Geus et al., 2008; Heinen et al., 2013). One mechanism in which social norms can affect bicycle behaviours in daily commuting, is throughout affecting an individual's emotions towards active transport, that then may predict the performed behaviour (Passafaro et al., 2014). Social norms in individuals' family, friends, and the workplace may be significant influencing factors for choosing bicycle as a transportation mode. More concrete, having a partner, relatives, or friends who bicycle may increase the likelihood of being a bicyclist by themselves (Willis et al., 2015). Also, social norms on the workplace, especially injunctive norms, play an important role in choosing bicycle as a transportation mode to work (Willis et al., 2015).

3.4.2.2 Walking

The social environment can be an important influencing factor on walking as a transportation mode, together with individual factors, perceived behavioural control and environmental factors (Owen et al., 2004). Being in relation to people who are physically active, especially the partner, may have positive effects for achieving recommended levels of walking both leisure and commute walking (Giles-Corti & Donovan, 2003). Also seeing friends participate in physical activity and walking activity can through role modelling and social comparison encourage walking both as leisure walking and transport walking (Clark & Scott, 2013; Chapman et al., 2016). Social support on work can also influence walking in daily commuting behaviours (Adams et al., 2017).

3.5 Cultural norms

Different cultures both at a macro (ethnicity) and micro level (sub-cultures) (Saracevic & Schlegelmilch, 2021) may provide a standard for the social norms for those who belong to the same macro or sub-culture. Culture can be understood as a system with common norms, beliefs and ways to behave and interact with each other (Bates & Plog, 1991). Cultural perceptions on gender roles may influence active commuting behaviours (Steinbach et al., 2011). One example is the culture in Iraq, where the cultural norms are different for men and women. In a cross-sectional study (Hasan et al., 2019) results showed that for women social norms, related to how society views them while walking or cycling and social embarrassment were significant factors that affected their active commuting in negative direction. For males, the association in their culture of walking and cycling with lower socioeconomic status influenced their mode choice to not choose active transport (Hasan et al., 2019). Cultural norms and associations such as linking the use of active transportation to lacking the means to buy a motor vehicle may be a barrier to active transport (Macassa, 2023). Consequently, health behaviour in immigrants uphold by cultural social norms may affect the health outcome of physical and mental health (Alidu & Grunfeld, 2018).

Ethnic minority and immigrant groups living in North America and Europe have generally lower engagement in physical activity compared to the general population but are more likely to have an active commute behaviour compared to the general population (Dogra et al., 2010). A study from Canada (Yu & Teschke, 2018) found that new immigrants had a higher level of active transportation methods compared to foreign-born individuals, but with time of immigration the activity level related to active commuting among the immigrants decreased. Immigrants with a long duration of residence were less likely to be active commuters than more recently arrived immigrants, and the authors concluded that the healthy immigrant effect are applicable also for transport mode as for other health behaviours (Yu & Teschke, 2018). Hence, a policy that motivate immigrants to stay in activity during they duration of residence may be a part of a general health promoting policy to increase the physical activity on population level (Elshahat et al., 2023)

3.6 Habits in relation to social norms in predicting behaviour

Habits can create behavioural resistance to the influence of social norms (Mazar et al., 2023). Habits permeate much of our daily behaviour (Mazar et al., 2023) and can be understood as automatically unconscious behaviour, where cues in the performance context triggers a habitual behaviour (Verplanken & Roy, 2016). Consequently, they can ensure that people

continue to act in a certain way without mental struggling. Habitual formation can happen through frequent repetition of a behaviour (Lally et al., 2010). When a habit is formed, it tends to guide behaviour even when people intent to do something else (Wood & Neal, 2016). A change in habits is most likely to happen when the environment that include cues for the old habit or the context the habit is performed in is destabilised. An example of a possible way for an old travel habit to be destabilised, is if an individual move to a new place, where the environment and possible cues of the old habit may be different (Verplanken & Roy, 2016). An example of a change in a contextual factor that may lead to habitual change in travel behaviours is for example to become a parent, that in according to statistic (Grue, 2021) is not favourable to active commuting due to practical factors (Guell et al., 2012). Further, the highest possibility to establish a new habit is during three months after destabilisation of an old habit (Verplanken & Roy, 2016).

Role of the habits in active commuting have in several studies (De Bruijn et al., 2009; Bird et al., 2018) been investigated together with the other constructs (attitude, subjective norms, perceived behavioural control, intention) of Theory of Planned Behaviour (TPB). Findings (De Bruijn et al., 2009; Bird et al., 2018) showed that habits played a significant role in the intention to practice active commuting, and possibly to be a stronger predictor of the intention to practice active commuting than the other constructs of TPB (De Bruijn et al., 2009). In the current study the performed habits of respondents' transportation mode have been investigated as outcome variables, and the relevance of habits in relation to responsiveness to social norms will be discussed.

3.7 Personal norms (attitude) in relation to social norms in predicting behaviour

Attitudes may be influenced by norms and can have an impact on health behaviours. Specific attitudes towards a health behaviour can affect the performed behaviour (Ajzen & Timko, 1986). An attitude is a psychological mechanism that comes to expression by evaluating and adding together the positive and negative values related to the attitude object (Eagly & Chaiken, 1993). In other words, attitudes are the summary of a person's beliefs about the attitude object with the value the person give to every belief (Fishbein, 1963).

Attitudes may be formed by people's values (Paulssen et al., 2014), earlier behavioural experience (Regan & Fazio, 1977) and through the social norms of individuals' social networks (Kelman, 1961). Descriptive social norms may lead to the influence of attitudes and behaviours through interactions with others by conversation and inspiration, while the process

of conforming injunctive norms has been related to the desire to fit in a group an individual feel connected to (Kelman, 1961). Further, social norms can influence personal attitudes through three different mechanisms: compliance, identification, or internalization behaviour of others (Kelman, 1961). Compliance is about changing a behaviour due to external influence and can happen because of the desire for social approval of other people. From an identity perspective a person will in greater likelihood follow a group's behaviour or social norm if the behaviour/norm is in line with the person's identity. Internalization is about in which external motivation for behaviour are reconstructed as internal motivation for behaviour processes (Bagozzi & Lee, 2002). Consequently, attitudes in addition to a direct effect on transportation behaviours (Ortiz-Sánchez et al., 2022), may also have a mediation role on the choice of transportation modes (Vahedi et al., 2021).

4.0 Method

4.1 Study design

The current study design utilized a cross-sectional design using quantitative data from a survey about what influence transport mode choice, conducted by Norwegian Centre for Transport Research in 2023.

4.2 Data collection

Participants were recruited through a social media platform (Facebook) due to limited economic resources. Researchers from Norwegian Centre for Transport research (TØI) made a Facebook post they shared through their own Facebook page. The Facebook post was sponsored with 5000 NOK to increase the post's visibility on Facebook. The survey was made available for two weeks. To increase motivation for participation in the study, respondents had an opportunity to win 1000 NOK by responding to the questionnaire.

4.3 Sample and study population

A total of 461 participants responded to the questionnaire. Some background variables (gender, born in Norway and education level) had one answer option which was "don't want to state". In this study, individuals who had answered "don't want to state" at least on one of the mentioned variables were excluded from the study (n=13). The final sample included in the current study consisted of 448 participants. An unequal number of missing values on the different exposure variables were present on the completed questionnaires. Consequently, the sample size (n) was different for the different exposure variables in the descriptive data (table 2) and in the analytic tests (table 3).

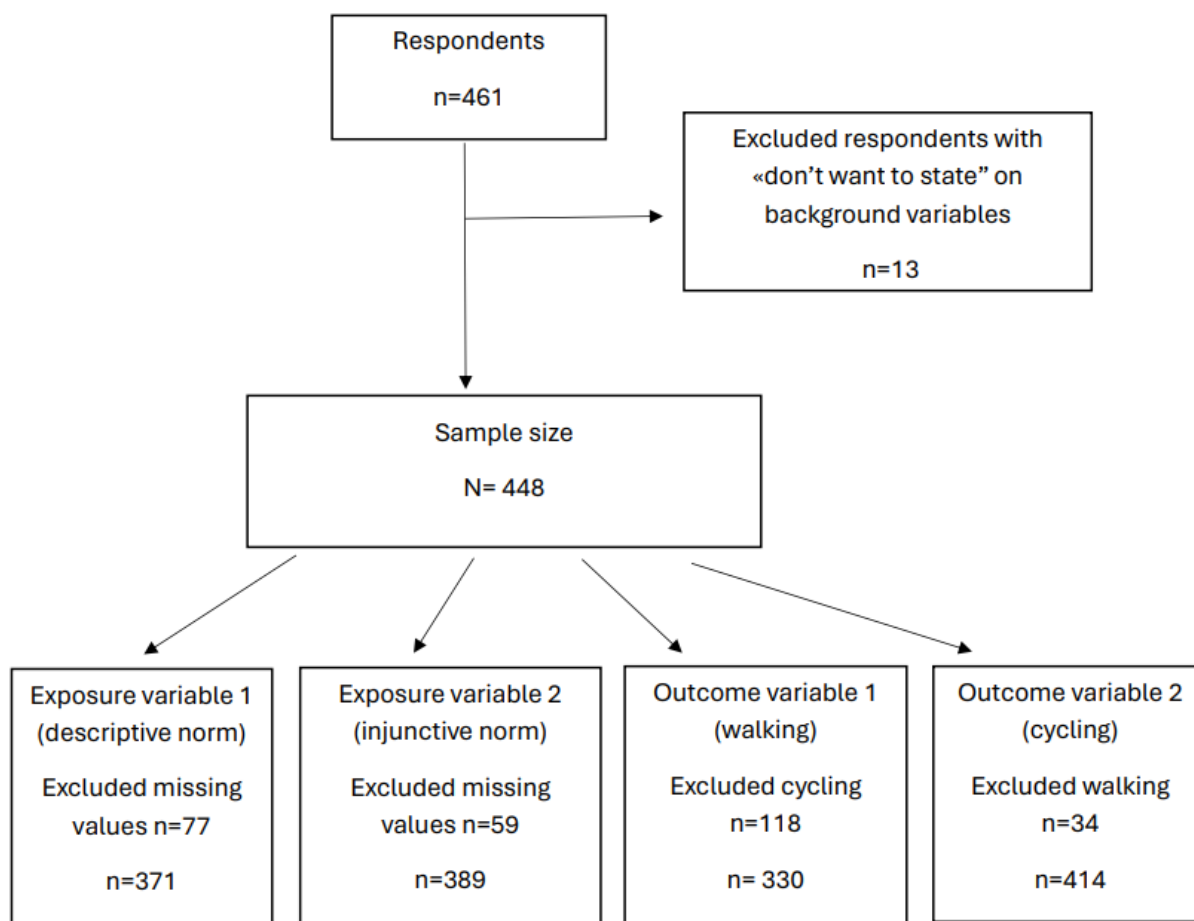


Figure 1: Shows the process for the final sample of the exposure and outcome variables

4.4 Questionnaire

The used Questionnaire from Norwegian Centre for Transport research (TØI) about people's travel habits can be found in appendix 1. A similar questionnaire has been used in Spain in a pilot project by researchers at University Carlos III of Madrid who TØI collaborate with. The questionnaire TØI used in the survey had four different sections. For the purpose of this thesis, only questions and variables from the two first sections were used.

The first section of the questionnaire included TØI's standardized package for background variables, including: living area (municipality), age, education level, income level, employment status, number of people in the house, number of children living in the household, access to public transport, driving license, access to car and access to bicycle. For the purpose of this thesis, the following variables were added as background variables; born in

Norway (yes/no) and living in urban or rural area (urban areas/smaller village/outside built-up area).

The second section of the questionnaire was about mapping respondents' daily trip and about personal and social norms. This section started with making the participants think of a trip they take daily or regularly to a place away from home. For this trip the following questions were asked; destination of the trip, what time of they travel, what mode of transportation they use during this trip, conditions of their trip, approximate duration of their trip, perceived behaviour control of the trip, personal norms (attitude), descriptive, and injunctive norms.

4.5 Variables

For the relevance of the research in this thesis the following variables were relevant to use.

4.5.1 Outcome variables

The variables chosen as outcome measures in this thesis were which transport mode participants used in their daily trips. For the outcome measure data one question were used. Respondents were asked "*Think about the trip from home to your destination. How do you usually travel on this trip?*". The following response alternatives were: car driver, car passenger, subway/tram, walking, bicycle, motorcycle, boat, scooter/e-scooter, or open field. Two respondents chose the open field. One respondent wrote 'walk' and another 'plane'. Walk was placed in the walking category and plane was placed in the collective category. This transport mode variable was divided into two new variables, one for walking and one for cycling. For the cycling variable all individuals from the walking category were excluded (n=34). And the variable was divided into two categories, one for cycling and one for no cycling. The same procedure was done for the new created walking variable, where individuals from the cycling category was excluded (n=118).

4.5.2 Exposure variables

Social norms were measured using data from two individual questions, one regarding to descriptive norms and one regarding to injunctive norms. For the descriptive norm, participants were asked "*How many of these do you think usually bike or walk in their daily travels?*". For the injunctive norm the question was "*If they were to answer the question. How many people should walk or cycle in their daily travels, " what do you think they would answer?*" 'These' and 'they' in the questions referred to people respondents found important. Respondents could read information about this above the questions, before answering the question. On both questions the answer option was on a scale from one-ten, where

respondents could choose one value. Value one was referring to none, value ten was referring to all. For the descriptive statistic these values were merged into three categories: low (1-3), moderate (4-6), and high (7-10). For the analysis these values were merged into two categories low (1-6) and high (7-10).

4.5.3 Confounding variables

The regression analyses were adjusted for several possible confounders, including gender, age, urban/rural areas, country of birth, education level, employment status, children in household, and the possible mediator attitudes towards active transport.

Gender had three categories that could be answered “men”, “women” and “other”. Age was a continuous variable, where respondents wrote which year they were born in. The question about living urban/rural areas had three answer options: “urban areas”, “smaller village”, and “outside built-up area”. Smaller village and outside built-up area were merged to rural areas. Educational level had categorical answering options: “elementary school”, “high school”, “college/university”, “undergraduate degree”, “college/university higher degree”, “don’t want to state”. The categories were merged into three categories “elementary school/high school”, “college/university undergraduate degree”, and “college/university higher degree”.

Employment status had six answer categories: “economically active full-time”, “economically active part-time”, “student”, “old-age pensioner”, “unemployed”, and “other”. These were merged into three categories “job”, “student” and “other”. Children in household had five answer categories: “no children”, “one children”, “two children”, “three children” and “four or more children”. These were merged into two categories “no children” or “yes children”. Access had three categories: “I own”, “I don't own, but I have access” and, “I don't have access to”. These were merged into two categories “yes access to” and “no access to”. For the possible mediator attitude the question was “*In your opinion, how many people should ideally walk or cycle on their daily trips?*”. The answer option was on a scale from one-ten, where respondents could choose one value. Value one was referring to none, value ten was referring to all. These values were merged into three categories: low (1-3), moderate (4-6), and high (7-10).

4.6 Analysis

4.6.1 Software program

For the data analysis the statistical software Jamovi (version 2.3) was used. Anonymized excel.dta files were acquired from TØI.

4.6.2 Analyses

Descriptive statistics were done for the background variables, exposure variables and outcome variables in the total sample and divided by urban/rural areas. The number of individuals (n) in each analysis is shown in the tables under the results. Pearson chi-square differences were done in exposure and outcome variables, as well as in selected background variables between urban and rural areas, and associations between outcome and exposure variables in the full sample and split by urban/rural location. Pearsons chi-square was also used to test differences in exposure and outcome variables by test sociodemographic factors (included gender, age, employment status, education level, and having children in household).

Logistic binominal regression analysis was used to investigate the relationship between the outcome and the exposure variables for the total sample. Logistic regression was considered a suitable analytical method since this analytical method allows the outcome variable to be dichotomous while the independent variables can be both categorical and continuous (Baldi & Moore, 2018). Each of the exposure variables was individually examined against the each of the outcome variables. Logistic regressions were carried out both unadjusted and adjusted for the included confounding variables in two models. It was first adjusted for rural/urban areas, gender, age, education level, employment status, and country of birth. Then in a new model it was adjusted for attitude towards active transport in addition to the mentioned confounding variables. Logistic regression analyses were not done for urban/rural areas because of few respondents in the rural area.

4.7 Ethical considerations

4.7.1 Privacy security and data saving

TØI sent an application to Norwegian Agency for Shared Services in Education and Research (SIKT) with name of the author of this thesis (reference number 217186). The application was approved before study commencement.

TØI used the software program Walr for administrating the questionnaires, receiving, and saving the data. The participants were asked for e-mail addresses only if they wanted to participate in the competition for the receiving price, in which they could write their e-mail in the questionnaire. The e-mail addresses were deleted once the winner received the prize. The author of this thesis received the data material from the questionnaire without direct personal data. TØI have stored anonymized data for further research and will delete other information after the end of the total project, which is scheduled for 2025.

4.7.2 Consent and possibility to quit the participation

Consent was documented electronically. Before the potential participants opened the questionnaire, they came to an information page about the purpose of the study and about the private security. The participants could after reading the information chose to participate or not. If they wanted to participate, they were proceeded to the questionnaire. Participants could reach out by email or telephone to withdraw their participation or to ask to get access or delete their data.

5.0 Results

5.1 Descriptive statistics

The final sample consisted of 448 participants. Almost three quarters of the participants were men (table 1). The average age was 44 years. Around one in four (28%) had children in their household (table 1). A majority of the participants had a higher education level and were in fulltime or part time employment. A larger proportion of the sample lived in urban areas compared to rural areas (68.1% and 31.9%). See table 1.

The proportion of male respondents was higher in rural than in urban areas. A higher proportion of urban residents compared to rural residents had higher education. A larger proportion had access to car in rural areas than in urban areas. A positive attitude toward active transport (walking and cycling) were more common in urban areas.

Variable	Total	Urban areas	Rural areas	p-value ¹
Gender	n= 448	n= 305	n= 143	0.003
Men	281 (62.7)	177 (58.0)	104 (72.7)	
Women	167 (37.3)	128 (42.0)	39 (27.3)	
Age (years)				0.055
Mean	53	52	54	
Education level				<0.001
Elementary school/ high School	65 (14.5)	28 (9.2)	37 (25.0)	
College/university, undergraduate	134 (29.9)	80 (26.2)	54 (37.8)	
College/university, higher degree	249 (55.6)	197 (64.6)	52 (36.4)	
Employment status				0.005
Job	382 (85.3)	271 (88.9)	111 (77.6)	
Student	11 (2.5)	7 (2.3)	4 (2.8)	
Other	55 (12.3)	27 (8.9)	28 (19.6)	
Living in urban/rural areas				
Urban area	305 (68.1)			
Rural area	143 (31.9)			
Children in household				0.052
Yes	124 (27.7)	93 (30.5)	31 (21.7)	
No	324 (72.3)	212 (69.5)	112 (78.3)	

Born in Norway				0.603
Yes	409 (91.3)	277 (90.8)	132 (92.3)	
No	39 (8.7)	28 (9.2)	11 (7.7)	
Access to car				0.010
Yes	406 (90.6)	269 (88.2)	137 (95.8)	
No	42 (9.4)	36 (11.8)	6 (4.2)	
Access to bicycle				0.654
Yes	390 (87.1)	267 (87.5)	123 (86.0)	
No	58 (12.9)	38 (12.5)	20 (14.0)	
Attitude	n=389	n=274	n= 115	<0.001
Low	86 (22.1)	37 (13.5)	49 (42.6)	
Moderate	29 (7.5)	24 (8.8)	5 (4.3)	
High	274 (70.4)	213 (77.7)	61 (53.0)	
'P-value from Chi-Square tests and from t-test on age years (mean)				

Table 2 describes the distribution of the exposure and outcome variables in the total sample, and in urban and rural areas separately. In the total sample, 44% had high and 44% had low descriptive social norms. The proportion with high scores on descriptive social norms were higher in urban than in rural areas (51% vs. 24%, respectively). In the total sample 62.5% had high scores to injunctive norms, and 27.2% had low scores to injunctive norms. The proportion with high scores on injunctive norms was higher in urban areas than in rural (57.2% vs 51.3%). The majority of the sample had high injunctive norms towards active transport, about half of the rural participants and two in three in the urban areas. It was still a significant difference between urban/rural areas, with higher scores for norms in urban areas. A minority of the total sample used walking as transport mode in daily trips. More people walked in daily trips in urban areas than in rural areas. More people used bicycle as transport mode than walking in the total sample. When comparing urban and rural areas a bigger proportion used bicycle in daily trips in urban areas. Majority of the sample used other transport methods than active transport.

Table 2: Distribution in the sample of exposure variables social norms and outcome variables transport mode choice in daily trips. N (%)				
Exposure variables	Total	Urban	Rural	p-value ¹
Descriptive norm	n= 371	n=273	n= 98	<0.001
Low	162 (43.7)	101 (37.0)	61 (62.2)	
Moderate	47 (12.7)	33 (12.1)	14 (14.3)	
High	162 (43.7)	139 (50.9)	23 (23.5)	
Injunctive norm	n= 389	n= 274	n=115	0.001
Low	106 (27.2)	60 (21.9)	46 (40.0)	
Moderate	40 (10.3)	30 (10.9)	10 (8.7)	
High	243 (62.5)	184 (67.2)	59 (51.3)	
Outcome variables				
Walking	n= 330	n=204	n=126	<0.001
Yes	34 (10.3)	30 (14.7)	4 (3.2)	
No	296 (89.7)	174 (85.3)	122 (96.8)	
Cycling	n=414	n=275	n=139	<0.001
Yes	118 (28.5)	101 (36.7)	17 (12.2)	
No	296 (71.5)	174 (63.3)	122 (87.8)	
¹ P-value from Chi-Square tests				

5.2 Bivariate correlations between social norms and active transport (walking/cycling)

Higher scores on social norms, both descriptive and injunctive, were associated with choosing walking or cycling as transport mode (table 3). In urban areas, an association was found between descriptive norms and cycling, and between injunctive norms and walking (table 3). However, no association was found between injunctive norms and active transport (cycling) and between descriptive norms and active transport (walking) in urban areas. For the rural areas the conditions for doing a Chi-Square test were not fulfilled, because of few respondents. P-value is therefore not stated in table 3.

Table 3: Associations between social norms and active transport (walking/cycling) in daily trips. N (%).						
	Walking			Cycling		
ALL	Yes	No	p-value ¹	Yes	No	p-value ¹
Descriptive norm			=0.036			<0.001
Low	15 (9.1)	150 (90.9)		44 (22.7)	150 (77.3)	
High	18 (17.8)	83 (82.2)		61 (42.0)	83 (58.0)	
Injunctive norm			=0.004			<0.001
Low	6 (5.2)	110 (94.8)		30 (21.4)	110 (78.6)	
High	26 (16.4)	133 (83.6)		84 (38.7)	133 (61.3)	
URBAN						
Descriptive norm			=0.056			0.006
Low	11 (11.2)	87 (88.8)		36 (29.3)	87 (70.7)	
High	18 (21.7)	65 (78.3)		56 (46.3)	65 (53.7)	
Injunctive norm			=0.012			0.106
Low	4 (6.5)	58 (93.5)		28 (32.6)	58 (67.4)	
High	24 (20.9)	91 (79.1)		69 (43.1)	91 (56.9)	
RURAL						
Descriptive norm						
Low	4 (6.0)	63 (94.0)		8 (11.3)	63 (88.7)	
High	0 (0.0)	18 (100)		5 (21.7)	18 (78.3)	
Injunctive norm						
Low	2 (3.7)	52 (96.3)		2 (3.7)	52 (96.3)	
High	2 (4.5)	42 (95.5)		15 (26.3)	42 (73.7)	

¹ P-value from Chi-Square tests

5.3 Bivariate correlations between socio-demographic factors and social norms and active commuting behaviours

There were no differences by age in social norms (descriptive or injunctive) or in proportions cycling in daily trips, but older participants chose walking less often than younger participants ($p=0.043$). Further, there were differences by gender in descriptive norms for active commuting (walking/cycling) ($p<0.001$), and for the injunctive norms ($p=0.036$). However, there were no difference in gender in the final decision for the actual choice of transport mode, cycling ($p= 0.262$) and walking ($p=0.158$). Participants that had children in household chose cycling in daily commuting less than participants that did not have children in

household ($p < 0.001$). Participants that had a job (fulltime/parttime) chose cycling in daily commuting more compared to those that did not have a job ($p = 0.002$). The higher educated participants had higher scores on social norms, both descriptive ($p < 0.001$) and injunctive ($p = 0.029$) compared to those with lower education. However, there were no differences in the actual walking behaviour in daily commuting by education level ($p = 0.132$).

5.4 Logistic regression

Table 4 shows the results of logistic regression analyses for the relationship between social norms and active transport (walking/cycling). Overall, respondents who reported high social norms had higher OR to use active transport (walking/cycling) in their daily trips in the unadjusted model. When adjusted for sociodemographic variables in model 2 the ORs decreased, and associations between social norms and active transport were only significant for descriptive norms and cycling (OR 2,51(1.56, 4.01)) and injunctive norms and cycling (OR 2.32 (1.42, 3.78)). When adjusted for attitude towards active transport in model 3 no significant association between social norms and active transport were found.

Table 4: Associations between social norms and active transport (walking/cycling) in daily trips. Odds Ratios (95% confidence interval (CI) from logistic regressions.						
	Model 1		Model 2		Model 3	
	OR	(95 % CI)	OR	(95 % CI)	OR	(95 % CI)
WALKING						
Descriptive norms						
Low	1.00		1.00		1.00	
High	2.17	(1.10, 4.53)	1.33	(0.59-3.00)	1.13	(0.46-2.75)
Injunctive norm						
Low	1.00		1.00		1.00	
High	3.58	(1.42, 9.02)	2.32	(0.87-6.19)	1.38	(0.46-4.13)
CYCLING						
Descriptive norms						
Low	1.00		1.00		1.00	
High	2.51	(1.56, 4.01)	2.14	(1.28-3.59)	1.15	(0.86-2.59)
Injunctive norm						
Low	1.00		1.00		1.00	
High	2.32	(1.42, 3.78)	2.08	(1.24-3.48)	1.05	(0.58-1.90)
Model 1 unadjusted. Model 2 adjusted for age, gender, education level, country of birth, employment status, and rural/urban. Model 3 adjusted for same variables as in model 2 + attitude towards active transport (walking/cycling).						

6.0 Discussion

6.1 Discussion of the results

6.1.1 Summary of the results

The research question of this thesis set out to investigate associations between social norms (descriptive/injunctive) and active transport (walking/cycling). In the unadjusted model, associations were found between descriptive/injunctive norms and active transport (walking/cycling). When adjusting for the possible confounders gender, age, urban/rural areas, born in Norway, education level, employment status and children in household, significant associations remained only for both type of social norms (descriptive and injunctive) and cycling. After adjusting for attitude in addition to the mentioned confounding variables, no significant associations were found between social norms and active commuting.

6.1.2 The association between social norms and cycling

A weak but significant association was found between high social norms and cycling. Another similar study (Campbell & Bopp, 2013) with similar socio-demographic factors among the sample as the socio-demographic factors in the sample of the current study, had some different results from this study. Campbell and Bopp (2013) found that interpersonal influences (both descriptive and injunctive) were significantly, and much stronger (compared to the current study) associated to active commuting to work. Especially, influences of working colleagues and spouse had an influence on active commuting behaviours. Campbell's study did not distinguish between walking and cycling, which could be an explanation of why the findings differed from the findings of this study.

In the current study, the strength of the association between both descriptive and injunctive norms and cycling was similar. Other studies have shown similar findings (Passafaro et al., 2014; Sherwin et al., 2014; Willis et al., 2015) with associations between social norms (descriptive and injunctive) and cycling. In particular, Passafaro et al. (2014) found that social norms (both descriptive and injunctive) predicted active transport indirectly by affecting the anticipated emotions towards active transport. Sherwin et al. (2014) further investigated in which situations social norms affected cycling. Specifically, Sherwin et al. (2014) found social norms to be the most influencing factor when the participants started bicycling regularly, which refers to a phase of a change of the transport behaviour or habit. Other findings about changing habits indicated that the highest possibility to change a habit is during the first three months after destabilisation of an old habit (Verplanken & Roy, 2016). It

is conceivable that social norms that is favourable of active transport in “the open window for influence” may help people to repeat the behaviour of cycling, which further through frequent repetition of the behaviour (Lally et al., 2010) may help to establish cycling behaviour as a habit.

An individual’s perceived social norms and the influence of them are related to a reference group of the individual’s important others (Cialdini & Trost, 1998). In the present study, it was not investigated who the important others of the respondents were. A literature review (Willis et al., 2015) found that the influence of family (especially the partner), friends, and the workplace were important factors for choosing bicycle as transport mode, with work-environment being the most influential. Having colleagues and a work-environment characterized by positive bicycling attitudes positively influenced decisions to bicycle to work (Willis et al., 2015). When implementing interventions to increase bicycling as transport mode in daily commuting it can be useful to work with a change in the social norms of transportation behaviours in people’s workplace.

In this study, the findings revealed no difference in the association between descriptive and injunctive norms and cycling in the total sample. However, a stronger association was expected between descriptive norms and cycling, based on existing literature (Cialdini et al., 1990; Cialdini et al., 1991), which implied that descriptive norms might have a stronger impact on behaviour than injunctive norms. Other studies have found differences in the influence of descriptive and injunctive norms on bicycling behaviours. For example, Bourke et al. (2019) found that only descriptive social norms had a significant association in choosing bicycling as a transport mode. In the present study, the same results as in Bourke’s study were found in urban areas. There were similarities between the environmental factors both in the current study and in Bourke’s study, where a larger proportion of participants were from urban areas. Descriptive social norms towards bicycling in daily commuting may be higher in urban areas compared to rural areas, because of more people that use bicycle as transport mode due to access to bicycle facilities in the environment in urban areas compared to rural areas (Seguin et al., 2014). It is also conceivable that a specific descriptive norm will affect the injunctive norm in the same direction. Eriksson et al. (2015) found that a change in a descriptive norm led to a new injunctive norm, because participants tended to associate what was common to morality (Eriksson et al., 2015). Other studies have found a positive association only between injunctive norms at for example the workplace and bicycling (Heinen et al., 2013; Bourke et al., 2018). It thus may appear the injunctive norms are an

important influencing factor in the social environment of people's workplace. Furthermore, different findings (Heinen et al., 2010; Heinen et al., 2013; Bourke et al., 2018) of the influence of descriptive and injunctive norms towards bicycling may indicate that the influence of the different norms may differ related to the context of the social and the structural environment. What practical significance the possible differences of the influence of descriptive and injunctive norms towards bicycling in daily commuting have in for example developing interventions to influence more people to cycle, may be discussed. It is conceivable that the injunctive and descriptive norms will follow each other in according to Eriksson et al. (2015). It may be more convenient to do interventions that will affect descriptive norms, and further suggests that the injunctive norms will change according to the descriptive norms.

6.1.3 The association between social norms and walking

Before adjusting for possible confounders (gender, age, urban/rural areas, country of birth, education level, employment status, children in household), and possible mediator attitude towards active transport an association was found between social norms (descriptive and injunctive) and the active transport walking. After adjusting for the same confounders, the association between social norms and walking decreased to a non-significant level. In this study it may seem like the association between social norms and walking can be partly explained by the sociodemographic background variables and further also by attitude. Several studies also found no significant association between social norms and walking in daily commuting (Scott et al., 2007; De Bruijn et al., 2009; Bird et al., 2018; Kim et al., 2023), they found personal norms (attitude) to be a significant predictor of the choice of walking in daily commuting. All the mentioned studies (Scott et al., 2007; De Bruijn et al., 2009; Bird et al., 2018; Kim et al., 2023) used Theory of Planned Behaviour (TPB) as a framework to investigate factors that affect walking as transport behaviour. It is conceivable that limitations with the theory, that will be discussed later in this chapter, may have affected the association between social norms and walking in daily commuting in negative direction. Other studies, which did not use TPB as a framework, found that social relations and influence had a significant association with general physical activity and walking as daily commuting (Giles-Corti & Donovan, 2003; Clark & Scott, 2013). However, due to the current study's findings of no association between social norms and walking, it is difficult to state something about possible differences between the influence of descriptive and injunctive norms and walking.

Neither previous literature (Ogilvie et al., 2007) provided no findings about possible difference of injunctive and descriptive social norms and walking behaviours.

Who the relevant others of the respondents were, were not investigated in the current study. According to existing studies (Panter et al., 2013; Procter et al., 2014; Adams et al., 2017), it may seem like the working environment could influence walking behaviours to work. Both social norms and the knowledge about positive effects of walking provided through a brief advice at the workplace led to an increased self-reported walking behaviour, at least in a short-term perspective of six weeks (Ogilvie et al., 2007). Other important areas for social influence towards walking as transportation behaviours may be social cohesion in the neighbourhood, companionship, and encouragement from family (Clark & Scott, 2013). It may seem like the similar social arenas (family, workplace, and friends) are influential in both walking and cycling behaviours.

6.1.4 The role of sociodemographic factors in the association between social norms and active transport

In the association between social norms and active transport, it was adjusted for sociodemographic factors including gender, age, urban/rural areas, born in Norway, education level, employment status, and children in household. Of the sociodemographic factors the most important factors were included in the current study compared to what other studies with similar topic have done (Lemieux & Godin, 2009; Bird et al., 2018). The association between social norms and active transport decreased significantly in the sample of the current study after adjusting for sociodemographic factors, but remained statistically significant for cycling. The sample in the current study had a predominance of middle-aged respondents, respondents with high socio-economic status, and participants living in urban areas.

Existing literature implied that people have different responses to social norms due to personal factors (Kalish, 2012), properties of the social network (Sajadi et al., 2018), and contextual factors (Pike & Lubell, 2018). One central personal factor is life-stage, where older adults seem to be less responsive to social norms (Bopp et al., 2014; Pike & Lubell, 2018) and children (Davison et al., 2008) and students (Chaney et al., 2014) more influenced by social norms when it comes to active commuting behaviours to school/college. Most of the respondents in the current study were from middle-aged and older adults, which may be one reason for not finding strong associations between social norms and active transport (Bopp et al., 2014; Pike & Lubell, 2018). The results from the current study showed no differences in social norms by age. It is not known whether the association between social norms and active

transport varied with age, but adjusting for socioeconomic variables including age explained a substantial part of the association. Presumably would a younger average age in the sample of the current study have provided a stronger association between social norms and active commuting.

Gender was an assumed confounder that was adjusted for in the analyses. Adjusting for socioeconomic variables including gender explained a substantial part of the association. However, results from the current study showed that women had more social norms than men, but there were no differences by gender in the actual choice of transport mode. Further, this may indicate that gender was not a strong confounder in the association between social norms and active commuting in the sample of the current study. A possible assumption of why there were no differences between gender in the choice of active commuting despite of the difference in social norms in the current study, may be that the cultural social norms in Norway is not characterized by strong differences in gendered social norms. A study (Bourke et al., 2019) with a sample from Australia, which may be a country with no strong differences in gendered social norms like Norway, had similar findings with no significant differences in cycling as active commuting by gender. While studies from other cultures with more strict rules for women than men showed a significant gender difference in the influence of social norms and active commuting, with a stronger impact from the social norms to the women population (Hasan et al., 2019; Haustein et al., 2020).

In the current study, it was adjusted for urban and rural areas in the analyses, based on an assumption that the variable urban/rural areas to some extent may control for possible confounding environmental factors. Based on literature (Seguin et al., 2014; Pike & Lubell, 2018), it was assumed that urban and rural areas could be an important influencing factor in the association between social norms and active transport. This was assumed on the basis that environmental factors and social factors (social norms) in urban areas were facilitating active commuting to a greater extent compared to rural areas (Seguin et al., 2014). Further, also on the basis that social norms only influenced active transport when the environmental factors were stable and facilitated active transport (Pike & Lubell, 2018). Due to few people from rural areas, it was not possible to investigate rural/urban areas impact on the association between social norms and active commuting in detail in the present study. However, a review (Hansen et al., 2015) found that living in rural areas increased the risk for a sedentary lifestyle, obesity and lifestyle related diseases compared to urban areas. Further, political effort to build an environment that facilitates physical activity and active commuting in rural

areas may be a health promoting strategy to increase general physical activity included active commuting on a population level.

Socioeconomic status measured as education level and employment status was also adjusted for in the analyses of the current study. Further, it was investigated if social norms or active commuting behaviours differed by education and employment status. Results showed that employed participants often chose bicycle in their daily commuting compared to non-employed participants. A conceivable assumption of that may be that having a daily commitment such as a work to commute to, and a possible workplace that stimulates the use of bicycle in daily commuting influenced bicycle behaviour in positive direction. However, results for bicycling behaviours related to socio-economic status in the current study was not compliant with national statistics in Norway from 2019 (Grue, 2019), which showed that active transport decreased with higher socioeconomic status and full-time job. A possible explanation of that may be that most of the participants in the current study were from Oslo and the surrounding areas. For walking behaviours in the current study, there were no differences by education level or employment status. Several other studies (Beenackers et al., 2012; Rachele et al., 2015) had other findings, and indicated that lower socio-economic status was associated with higher use of active transport, especially walking. It is also possible that socio-economic status can affect active transport directly through the life-stage and time-schedule, and that people with higher socio-economic status have a tighter time-schedule. This could affect social norms in this sub-group where the majority use a car and may further through social norms maintain the pattern of car travel behaviour instead of active commuting.

Children living in households was also a variable adjusted for in the analyses. Further, it was investigated if it was differences in the social norms and active commuting in participants of the current study by having or not having children in the household. Results showed that people who had children in household chose bicycle for daily commuting less than people who did not have children in household. These results of decreased use of bicycle use in daily commuting with children in household were compliant with national statistics from 2019 (Grue, 2021). Other studies (Strazdins et al., 2011) found that a strong barrier to active commuting was lack of time in everyday life (Strazdins et al., 2011), which may be related to children in household and may therefor support the findings in the current study. Another study (Pike & Lubell, 2018) also found that household responsibilities was expected to influence individual responses to social influence. Moreover, it is conceivable that children

living in households may affect adults' mode choice and the response to social norms due to a stricter time schedule of the everyday.

Country of birth was included in the sociodemographic factors, as a possible confounder that could affect both the exposure and outcome variables. Since most of the respondents were born in Norway, this was not considered in detail. Other studies have found that cultural norms played an important role for active transport. Haustein et al. (2020) found that a much higher percentage of native Danes had a cycling trip than immigrants of non-Western origin, both for men and women, but especially for women. Further, Haustein et al. (2020) stated that these differences cannot be explained by other background variables, as these factors were controlled for in the analyses, and suggested that experiences and cultural norms played a relevant role in behaviour. Other studies have showed that immigrants in the first period of immigration practice active commuting more than the general population, and that late immigrants compared to recent immigrants were less likely to be active commuters, in compliance with the healthy immigrant effect (Yu & Teschke, 2018). Hence, in the policy to promote active commuting as a public health intervention with goals to affect the whole population, political effort to maintain immigrants' high level of active commuting may be a target area.

6.1.5 The influence of attitude on active transportation choice

When adjusting for attitude in the logistic regression the association between social norms (descriptive/injunctive) and active commuting (walking/cycling) decreased under a significant level. Attitude could explain some of the relationship between social norms and people's action. Existing studies on attitude and active commuting have found that attitude was a significant predictor for active transport (Passafaro et al., 2014; Willis et al., 2015; Hatamzadeh, 2019; Kim et al., 2023). An interesting finding in the study by Heinen et al. (2011) showed that personal attitude was crucial for longer distances, while perceived opinion of others (injunctive norms) only affected the mode choice over short distances (Heinen et al., 2011).

Attitude may affect active commuting through the mediation of the association between social norms and active transport (Vahedi et al., 2021). According to biology and psychology perspectives that indicates that humans are social beings who tend to be influenced by others (Maness et al., 2015), it may be conceivable that people will seek to adapt to the behaviours of other people in their social group with the intent to fit into the group. Through this intent

and desire to fit in a social network, it may be conceivable that social norms can affect the individual's attitude and next the behaviour.

Theory of Planned Behaviour (TPB) (Ajzen, 1985) have been widely used for investigating the relationship between attitude, perceived behavioural control, subjective norms, and intention to behaviour (Megens & Weerman, 2010), especially in transport behaviour (Bird et al., 2018). Where findings (Scott et al., 2007; De Bruijn et al., 2009; Lo et al., 2016; Bird et al., 2018) showed that attitude together with perceived behavioural control were significant factors that affected the intention to practice active commuting, while perceived injunctive norms did not had an influence. A limitation with TPB may be that the constructs of the model are being understood as independent determinants affecting behaviour (Megens & Weerman, 2010). Accordingly, TPB will not have the attribute to take into account the possible mediation role of attitude in between social norms and behaviour. Furthermore, this may have led to the results that showed no association between social norms and behaviour in travel behaviour research in the framework of TPB (De Bruijn et al., 2009; Lemieux & Godin, 2009; Bird et al., 2018). From a social identity perspective that explains how identification can happen through a social process (Hogg & Smith, 2007), the effect of attitude on behaviour can be influenced by social norms (Miller et al., 1999). Based on this view personal norms and social norms are not seen as independent determinants affecting behaviour, like in TPB. Attitude is rather understood as an intermedator between social norms and behaviour, and findings have showed that normative environment can reinforce or inhibit the influence of attitude on behaviour (Terry & Hogg, 1996). Another important finding about an attitude's function as an intermedator factor between social norms and behaviour is that it is only applicable when a person is strongly tied with the reference group and the reference group is important for the persons self-identification (Terry & Hogg, 1996). However, an understanding of attitudes' possible function as a mediator between social norms and active commuting may lift the understanding of how personal and social factors affect active commuting and how the personal and social norms interact with each other.

In contrast, some studies directly aimed at social norms' effect on travel behaviour attitude found no association or different association for social norms and attitude towards walking and cycling. A study (Ortiz-Sánchez et al., 2022) found no association between social norms' influence on attitude in the direction of active transport. Another study (Arroyo et al., 2020) found only an association between the social norms in close social network and attitudes towards walking. It may seem like the intermedation role of attitude in between social norms

and active commuting also may depend on contextual and sociodemographic factors, as it was discussed for the general association between social norms and active commuting.

In sum, it may seem like existing literature showed mixed results for the association between social norms and active commuting. Consequently, the results of this study are both in accordance with and divergent to existing literature discussed in this chapter of the current thesis. It could seem like the association between social norms (descriptive and injunctive) and active commuting (bicycling/walking) varied depending on other variables, that is both environmental/physical factors and social factors as culture and sub-cultures and individual factors as life-stage, household composite, socioeconomic status, and attitude.

6.2 Discussion of the method

6.2.1 Study design

This thesis used cross-sectional data from a survey done by TØI in 2023 about what factors are influencing transport mode choice. Most of previous transport research have also used cross-sectional data in their studies of transport behaviours (Evans et al., 2022). While the use of a cross-sectional design provides a snapshot of a population, this type of design cannot be used for indicating establishing causal relationships (Webb, 2020). As such, the results of this thesis cannot say anything about causal relationships between social norms and active transport, but it may indicate associations between social norms and active transport.

6.2.2 Recruitment, selection bias and generalizability

A majority of the respondents were people over 40 years with high socioeconomic status and a full-time job. The respondents were both men and women, with a higher proportion of men than women. Most of the respondents were also from the counties of Viken and Oslo.

Consequently, the results of this study cannot be generalized for the total population of Norway. However, it may say something about the impact of social norms on active transport on adults in a middle-age of life in Oslo and the surrounding areas.

The sample in this study was recruited through an open survey administered on Facebook, which may have led to selection bias and a skewed distribution of the sociodemographic characteristics. Selection bias can be defined as a systematic error during the selection process, which lead to a sample that do not represent the target population (Webb, 2020).

The recruitment method through Facebook was done due to limitations in economic resources for the current study. However, two reviews (Thornton et al., 2016; Whitaker et al., 2017) about recruiting participants for health studies through Facebook have showed that Facebook, this particular social media platform can be an effective and cost-efficient recruitment method. Both reviews have also found that recruitment through Facebook have resulted in similarly representative samples as in traditional recruitment, although traditional surveys are neither representative for the whole population. They often have a higher proportion of women, a higher proportion with a high education and a high proportion with Norwegian background (Webb, 2020). Recruitment done by using Facebook compared to traditional recruitment may include lower costs and more time effectiveness (Thornton et al., 2016; Whitaker et al., 2017).

However, the literature reviews by Thornton et al. and Whitaker et al. were completed in 2016 and 2017. The use of social media since this time have changed, and the population using Facebook as an active platform may also have changed, with a lower number of younger people in Norway that use Facebook compared to the past several years. Other social platforms, TikTok and Snapchat are more used by the younger generation (Norwegian Media Authority, 2022). Consequently, the recruitment method through Facebook in the current study may be an explanation of a higher average age in the sample of this study. Another point that could have led to selection bias is the fact that TØI shared a post on Facebook about the survey. This was necessary to get enough respondents, but it is likely that sharing a post on Facebook about the survey led to a major part of the respondents being people that followed TØI's Facebook page. It is conceivable that people who followed TØI's Facebook page also were people with a special interest for transportation, and that people with interest for transportation politics also could be people with higher age and socio-economic status. Higher age and socio-economic status, which reflected the sample of this study, were according to literature (Bopp et al., 2014; Pike & Lubell, 2018; Grue, 2021) associated with more car use and less responsiveness for social norms. It is therefore conceivable that the sociodemographic characteristics of the sample in the current study may have led to a lower association between social norms and active commuting than for example a younger sample may have provided.

In studies where the relationships between variables have been investigated in samples and not the whole population, there will always be a risk for random sampling errors, which refers to a difference in the true values and the measured values due to coincidences (Webb, 2020).

The probability of random sampling error increases with smaller samples. Random sampling error can lead to Type I error or Type II error. A type I error can occur if the results show a relationship between exposure and outcome when, in fact, relationship is not present in the population. Type II errors may occur if results in a study show no associations between the exposure and the outcome, when it truly is an association in the population (Webb, 2020). In the current study the possibility of type II errors may be present due to selection bias, and it may be an association between social norms and active commuting even if this study did not find that. In general, an increase in the sample size may reduce the chance of random sampling error (Webb, 2020). However, in the current study an increase in the sample size through the same recruitment method through Facebook, would probably have provide more respondents with the same socio-demographic variables as already present. To state something about the probability of correctness of the estimates, or if the estimates are due to random error, p-values or confidence intervals are given on each estimate. The size of the total sample and the sample in urban areas was considered as large enough to do the chi-square tests because the conditions (Baldi & Moore, 2018) were met for the chi-square test. However, it is unknown what strength the sample had to detect associations if they were present. For the rural areas, the sample size was not big enough for meeting the conditions of performing a chi-square test. Therefore, the p-value is not stated in table 1 for rural areas, and the logistic regression was not performed for urban/rural areas separately.

6.2.3 Measuring exposure and outcome variables and measurement error

Measurement error is an important error to consider in quantitative analyses. Measurement error is about error in the information from respondents and can affect the internal validity of a study (Webb, 2020). According to literature (Mackie et al., 2015) on measuring social norms, the best way to measure social norms is by investigating individuals' actual behaviours through observations or questioning, and not by for example asking for the intention to behave. In addition to the behaviour, it is important to clarify individuals' beliefs about who their reference group is, individuals' beliefs about other people's behaviour (descriptive norms), and beliefs about what others think is right behaviour (perceived injunctive norms) (Mackie et al., 2015). In this study, the respondents were asked in an information text in the questionnaire to think about who influence them while they answered the questions about the perceived descriptive and injunctive norms. The exposure questions asked for individuals' subjective beliefs about both the descriptive norms and the injunctive norms. The advice for

asking for perceived descriptive and injunctive norms and to include respondents' reference group when measuring social norms (Mackie et. al., 2015) were followed in the current study.

The answer categories were scaled from one (none) to-ten (all). It is conceivable that it is difficult to choose a number on a scale with 10 categories, and that the respondents answer could be approximate. Respondents' answers on the mentioned number scale could also be due to subjective evaluation of each numbers value. For example, a low value of one or two of descriptive norms could be a different value for two different people. Respondents' subjective perception of the social norms may not necessarily reflect the actual presence of social norms in their environment, but due to this study's interest in individuals' subjective perceptions, the used scale to measure the perceived social norms and reported behaviours was still considered as appropriate.

The outcome variable in the current study asked about respondents' general usual travel method and reflects respondents' stated travel behaviours. Varieties of respondents' travel behaviours, for example due to different seasons have not been detected in the current study. It is possible that respondents' stated behaviour may not necessarily reflect the actual behaviour both due to possible recall bias, and due to the general design of the question about travel behaviours. However, the measurement method of the outcome variable has probably not biased the results to a significant extent, because of the interest of the current study in respondents' overall travel habits. Further, recall bias is not expected to have biased the results to any significant extent, because the questions were mostly related to present time.

Another limitation of the current study that could have led to less accuracy in the measurement of social norms, could be that some participants found the questions difficult and complicated to answer. This is supported by some of the participants' own comments in the end of the questionnaire, which could be an indication of the possibility that they did not understand the questions accurately. A high number of missing values could also support the claim that the respondents perceived the questions as difficult to answer, and possible chose not to answer. Respondents' comments also indicated that they felt offended about the questions asking about influences of others. Based on this, it is possible that some respondents may have understated answers to prove that they were not influenced by others. Further, the possible understated answers may have affected the association of social norms and active commuting in negative direction. Participants' different experiences of the questions could indicate a limitation that could have led the internal validity and reliability of the current study in negative direction.

The used questionnaire in the present study was inspired by a similar questionnaire that was used in Spain like a pilot project by researchers at University Carlos III of Madrid whom TØI collaborate. The questionnaire used in Spain was administered on a sample with students in the same university. The pilot project in Spain went out well, and it was considered as appropriate to conduct a similar project in Norway. Some possible causes of why this study had more limitations than the pilot study in Spain, could be explained by different samples in the two studies and thus different experiences for the respondents with the questionnaire. The questionnaire was translated relatively verbatim from English to Norwegian language, which also could have led to a different experience with the questions for the respondents in the current study. As further, could be a reason for why some respondents did not answer several questions and why they experienced the questions to be difficult or offensive.

Misclassification of the answers could be present in the current study, due to coding of original continuous exposure variables in the questionnaire to categorical variables for the analyses. The coding implied a choice of which values on the answering scale for norms were classified as low and high occurrence of descriptive and injunctive norms. Perhaps the subjective choice of these values may have affected the results to some extent. However, since the questions were related to persons perceived occurrence of different types of social norms, and the fact that it is not a clear objective line when it is low or high norms, it is not conceivable that this could have biased the information to a significant extent in the current study.

6.2.4 Confounding factors and possible mediator

In the analysis it was first adjusted for possible confounders (including gender, age, urban/rural areas, country of birth, education level, employment status, children in household) and possible mediator attitude towards active transport to investigate the total effect of social norms on active commuting. There could also be other variables that could have affected the results, but these have not been investigated in the current study. These may include more specific environmental factors in the local and travel environment, such as transportation distance, access to walking and bicycle facilities and weather conditions, which other studies found were significant correlates of active commuting (Evans et al., 2022). Another cognitive factor perceived behavioural control that is a construct of the Theory of Planned Behaviour, and that have shown as a significant correlate of active commuting in other studies (Bird et al., 2018) was not included in the current study. It was assumed that perceived behavioural control may be dependent on environmental factors such as travel distance and access to

walking and bicycle facilities. Since the environmental factors were not considered in detail in the current study, perceived behavioural control was also omitted.

In this thesis, the urban/rural areas constitute a confounding variable that was adjusted for. It was envisaged that the variable urban/rural areas to some extent may function as a confounder for environmental factors that may influence transport behaviours. Further, it was desirable to do separately analysis for urban and rural areas, to investigate in more detail the different groups of rural and urban areas association between social norms and active commuting. Due to few respondents on rural areas, regression analysis was not done separately for urban/rural areas. Other studies have found increased general physical activity (Moreno-Llamas et al., 2021) and active commuting (Tao et al., 2019) in urban areas compared to rural areas.

The possible mediating factor attitude was included in the logistic regression analysis in addition to the other confounders. According to existing literature (Kelman, 1961; Vahedi et al., 2021), it may be conceivable that attitude might have an intermediating effect between social norms and active transport. It was decided to investigate the effect of attitude on the association between social norms and active commuting, that decreased considerably after the adjustment. It is believed that attitudes can act as a mediator between social norms and active commuting.

6.3 Implications for public health

The findings of this thesis add new knowledge about the influence of social norms on active transport on adults in a middle and stable stage of life. This thesis supports the claim that social norms may not be decisive for the choice of active transport/not active transport in this sample. However, for cycling it has more influence than walking. Adults in a stable stage of life probably use car as a transportation mode to a greater extent during daily trips compared to people in other stages of life (Grue, 2021), and also constitute an age-group with more general sedentary behaviour (Loyen et al., 2016). Perhaps adults in a stable stage of life also constitute a group where few are in a phase of change and where it therefore may be more challenging to change behaviours. It may be beneficial for the general physical and psychological health of this group to increase daily activity, in which active commuting may be a key. Based on the results of this thesis, it may seem beneficial with political efforts to better stimulate people's social environment, to influence people's choices to cycle more in their daily commute. To increase walking behaviours, it may seem like the social environment

and social norms are not decisive factors, and that attention to other areas may be more profitable.

6.4 Implications for further research

This study adds information about the influence of social norms on active transport in a limited part of the population. Other factors that influence the population in a stable stage of life to choose active commuting could be interesting to investigate. It could also be interesting to investigate how social norms influence active transport in daily trips in other parts of the population and in other stages of life. Other study designs, such as cohort studies could be used to investigate causality between social norms and active commuting, or intervention studies to investigate how to change social norms related to travel behaviour. It could also be of interest to investigate more of the relationship between social norms, attitude, and active commuting.

7.0 Conclusion

The findings of the present thesis showed that there were weak associations between social norms (descriptive and injunctive) and bicycling, and that respondents' attitude could explain a part of this relation. Findings also showed that there was not an association between social norms and walking after adjusting for confounders. The influence of social norms to active commuting in the current study was depending on sociodemographic factors including gender, age, country of birth, education level, employment status, and children in household, environmental factors including urban/rural areas and personal cognitive factors including attitude. The current study did not find a significant overall difference in the association between descriptive and injunctive norms and active commuting (walking and cycling).

References

- Ababio-Donkor, A., Saleh, W., & Fonzone, A. (2020). The role of personal norms in the choice of mode for commuting. *Research in transportation economics*, 83, 100966. <https://doi.org/10.1016/j.retrec.2020.100966>
- Adams, E. J., Esliger, D. W., Taylor, I. M., & Sherar, L. B. (2017). Individual, employment and psychosocial factors influencing walking to work: Implications for intervention design. *PLoS One*, 12(2), e0171374. <https://doi.org/10.1371/journal.pone.0171374>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, 50(2), 179-211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Ajzen, I., & Timko, C. (1986). Correspondence between health attitudes and behavior. *Basic and Applied Social Psychology*, 7(4), 259-276. https://doi.org/10.1207/s15324834basp0704_2
- Alidu, L., & Grunfeld, E. (2018). A systematic review of acculturation, obesity and health behaviours among migrants to high-income countries. *Psychology & health*, 33(6), 724-745. <https://doi.org/10.1080/08870446.2017.1398327>
- Amireault, S., Godin, G., & Vezina-Im, L.-A. (2013). Determinants of physical activity maintenance: A systematic review and meta-analyses. *Health psychology review*, 7(1), 55-91. <https://doi.org/10.1080/17437199.2012.701060>
- Anderssen, S., Engeland, A., Sjøgaard, A., Nystad, W., Graff-Iversen, S., & Holme, I. (2008). Changes in physical activity behavior and the development of body mass index during the last 30 years in Norway. *Scandinavian Journal of Medicine & Science in Sports*, 18(3), 309-317. <https://doi.org/10.1111/j.1600-0838.2007.00645.x>
- Arentze, T., & Timmermans, H. (2008). Social networks, social interactions, and activity-travel behavior: a framework for microsimulation. *Environment and Planning B: Planning and Design*, 35(6), 1012-1027. <https://doi.org/10.1068/b3319t>
- Arroyo, R., Ruiz, T., Mars, L., Rasouli, S., & Timmermans, H. (2020). Influence of values, attitudes towards transport modes and companions on travel behavior. *Transportation research part F: traffic psychology and behaviour*, 71, 8-22. <https://doi.org/10.1016/j.trf.2020.04.002>
- Bagozzi, R. P., & Lee, K.-H. (2002). Multiple routes for social influence: The role of compliance, internalization, and social identity. *Social psychology quarterly*, 226-247. <https://doi.org/10.2307/3090121>

- Baldi, B., & Moore, D. S. (2018). *The practice of statistics in the life sciences* (Fourth Edition ed.). WH Freeman.
- Bates, D. G., & Plog, F. (1991). *Human adaptive strategies*. McGraw-Hill New York, NY.
- Beenackers, M. A., Kamphuis, C. B., Giskes, K., Brug, J., Kunst, A. E., Burdorf, A., & Van Lenthe, F. J. (2012). Socioeconomic inequalities in occupational, leisure-time, and transport related physical activity among European adults: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 9, 1-23.
<https://doi.org/10.1186/1479-5868-9-116>
- Bernetti, G., Longo, G., Tomasella, L., & Violin, A. (2008). Sociodemographic groups and mode choice in a middle-sized European city. *Transportation research record*, 2067(1), 17-25.
<https://doi.org/10.3141/2067-03>
- Besser, L. M., & Dannenberg, A. L. (2005). Walking to public transit: steps to help meet physical activity recommendations. *American journal of preventive medicine*, 29(4), 273-280.
<https://doi.org/10.1016/j.amepre.2005.06.010>
- Bird, E. L., Panter, J., Baker, G., Jones, T., Ogilvie, D., & Consortium, i. (2018). Predicting walking and cycling behaviour change using an extended Theory of Planned Behaviour. *Journal of Transport & Health*, 10, 11-27.
<https://doi.org/10.1016/j.jth.2018.05.014>
- Bjørkelund, O. A., Degerud, H., & Bere, E. (2016). Socio-demographic, personal, environmental and behavioral correlates of different modes of transportation to work among Norwegian parents. *Archives of public health*, 74, 1-9.
<https://doi.org/10.1186/s13690-016-0155-7>
- Bopp, M., Der Ananian, C., & Campbell, M. E. (2014). Differences in active commuting among younger and older adults. *Journal of Aging and Physical Activity*, 22(2), 199-211.
<https://doi.org/10.1123/japa.2012-0236>
- Bopp, M., Sims, D., Colgan, J., Rovniak, L., Matthews, S. A., & Poole, E. (2016). An examination of workplace influences on active commuting in a sample of university employees. *Journal of Public Health Management and Practice*, 22(4), 387-391.
<https://doi.org/10.1097/PHH.0000000000000337>
- Bourke, M., Craike, M., & Hilland, T. A. (2019). Moderating effect of gender on the associations of perceived attributes of the neighbourhood environment and social norms on transport cycling behaviours. *Journal of Transport & Health*, 13, 63-71.
<https://doi.org/10.1016/j.jth.2019.03.010>
- Bourke, M., Hilland, T. A., & Craike, M. (2018). An exploratory analysis of the interactions between social norms and the built environment on cycling for recreation and transport. *BMC public health*, 18, 1-9.

<https://doi.org/10.1186/s12889-018-6075-4>

- Campbell, M. E., & Bopp, M. (2013). An examination of the relationship of interpersonal influences with walking and biking to work. *Journal of Public Health Management and Practice*, 19(6), 521-524.
<https://doi.org/10.1097/PHH.0b013e31828a83e6>
- Carrera-Bastos, P., Fontes-Villalba, M., O'Keefe, J. H., Lindeberg, S., & Cordain, L. (2011). The western diet and lifestyle and diseases of civilization. *Research Reports in Clinical Cardiology*, 15-35.
<https://doi.org/10.2147/RRCC.S16919>
- Chaney, R. A., Bernard, A. L., & Wilson, B. R. (2014). Characterizing active transportation behavior among college students using the theory of planned behavior. *International quarterly of community health education*, 34(3), 283-294.
<https://doi.org/10.2190/IQ.34.3.f>
- Chapman, G. B., Colby, H., Convery, K., & Coups, E. J. (2016). Goals and social comparisons promote walking behavior. *Medical Decision Making*, 36(4), 472-478.
<https://doi.org/10.1177/0272989X15592156>
- Chillón, P., Evenson, K. R., Vaughn, A., & Ward, D. S. (2011). A systematic review of interventions for promoting active transportation to school. *International Journal of Behavioral Nutrition and Physical Activity*, 8, 1-17.
<https://doi.org/10.1186/1479-5868-8-10>
- Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. In *Advances in experimental social psychology* (Vol. 24, pp. 201-234). Elsevier.
[https://doi.org/10.1016/S0065-2601\(08\)60330-5](https://doi.org/10.1016/S0065-2601(08)60330-5)
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, 58(6), 1015.
<https://doi.org/10.1037/0022-3514.58.6.1015>
- Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance.
- Cislaghi, B., & Berkowitz, A. D. (2021). The evolution of social norms interventions for health promotion: Distinguishing norms correction and norms transformation. *Journal of global health*, 11.
<https://doi.org/10.7189/jogh.11.03065>
- Clark, A. F., & Scott, D. M. (2013). Does the social environment influence active travel? An investigation of walking in Hamilton, Canada. *Journal of Transport Geography*, 31, 278-285.
<https://doi.org/10.1016/j.jtrangeo.2013.06.005>

- Cusack, M. (2021). Individual, social, and environmental factors associated with active transportation commuting during the COVID-19 pandemic. *Journal of Transport & Health*, 22, 101089.
<https://doi.org/10.1016/j.jth.2021.101089>
- Dahl, E., Bergsli, H., & van der Wel, K. (2014). Social inequality in health: A Norwegian knowledge review (Main report). University in Oslo. Retrived 03.04.24 from
<https://oda.oslomet.no/oda-xmlui/bitstream/handle/20.500.12199/738/Sosial%20ulikhet%20i%20helse%20En%20norsk%20kunnskapsoversikt.%20Hovedrapport.pdf?sequence=6&isAllowed=y>
- Davison, K. K., Werder, J. L., & Lawson, C. T. (2008). Peer reviewed: Children's active commuting to school: Current knowledge and future directions. *Preventing chronic disease*, 5(3).
- De Bruijn, G.-J., Kremers, S. P., Singh, A., Van den Putte, B., & Van Mechelen, W. (2009). Adult active transportation: adding habit strength to the theory of planned behavior. *American journal of preventive medicine*, 36(3), 189-194.
<https://doi.org/10.1016/j.amepre.2008.10.019>
- Deci, E. L., & Ryan, R. M. (2000). The " what" and " why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268.
https://doi.org/10.1207/S15327965PLI1104_01
- De Geus, B., De Bourdeaudhuij, I., Jannes, C., & Meeusen, R. (2008). Psychosocial and environmental factors associated with cycling for transport among a working population. *Health Education Research*, 23(4), 697-708.
<https://doi.org/10.1093/her/cym055>
- DiClemente, R. F., Salazar, L. F. & Crosby, R.A. (2019). *Health Behaviour Theory for Public Health. Principles, Foundations, and Applications* (fourth edition ed.). Library of Congress Cataloging-in-Publication Data.
- Dinu, M., Pagliai, G., Macchi, C., & Sofi, F. (2019). Active commuting and multiple health outcomes: a systematic review and meta-analysis. *Sports medicine*, 49, 437-452.
<https://doi.org/10.1007/s40279-018-1023-0>
- Dogra, S., Meisner, B. A., & Arden, C. I. (2010). Variation in mode of physical activity by ethnicity and time since immigration: a cross-sectional analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 1-11.
<https://doi.org/10.1186/1479-5868-7-75>
- Duponta, E., De Ceunyncka, T., & Wijlhuizenb, G. J. (2018). An integrated behavioural model for active transport mode choices.
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt brace Jovanovich college publishers.

- Ebstein, R. P., Israel, S., Chew, S. H., Zhong, S., & Knafo, A. (2010). Genetics of human social behavior. *Neuron*, 65(6), 831-844.
DOI 10.1016/j.neuron.2010.02.020
- Elshahat, S., Moffat, T., Morshed, M., Alkhaldeh, H., Madani, K., Mohamed, A., Nadeem, N., Emira, S., Newbold, K. B., & Donnelly, M. (2023). A Scoping Review of the Relationship Between Physical Activity and Mental Health Among Immigrants in Western Countries: An Integrated Bio-Psycho-Socio-Cultural Lens. *Journal of Immigrant and Minority Health*, 25(5), 1137-1151.
<https://doi.org/10.1007/s10903-023-01518-w>
- Elvik, R. (2009). The non-linearity of risk and the promotion of environmentally sustainable transport. *Accident Analysis & Prevention*, 41(4), 849-855.
<https://doi.org/10.1016/j.aap.2009.04.009>
- Eriksson, K., Strimling, P., & Coultas, J. C. (2015). Bidirectional associations between descriptive and injunctive norms. *Organizational behavior and human decision processes*, 129, 59-69.
<https://doi.org/10.1016/j.obhdp.2014.09.011>
- Evans, J. T., Phan, H., Buscot, M.-J., Gall, S., & Cleland, V. (2022). Correlates and determinants of transport-related physical activity among adults: an interdisciplinary systematic review. *BMC public health*, 22(1), 1519.
<https://doi.org/10.1186/s12889-022-13937-9>
- Faber, K., Kingham, S., Conrow, L., & van Lierop, D. (2023). Differences in Active Travel Between Immigrants in an Active and Less Active Mobility Culture [Article]. *Urban Planning*, 8(4), 366-379.
<https://doi.org/10.17645/up.v8i4.6977>
- Fishbein, M. (1963). An investigation of the relationships between beliefs about an object and the attitude toward that object. *Human relations*, 16(3), 233-239.
<https://doi.org/10.1177/001872676301600302>
- Foley, L., Panter, J., Heinen, E., Prins, R., & Ogilvie, D. (2015). Changes in active commuting and changes in physical activity in adults: a cohort study. *International Journal of Behavioral Nutrition and Physical Activity*, 12, 1-12.
<https://doi.org/10.1186/s12966-015-0323-0>
- Fox, K. R. (1999). The influence of physical activity on mental well-being. *Public health nutrition*, 2(3a), 411-418.
<https://doi.org/10.1017/S1368980099000567>
- Friedkin, N. E. (2001). Norm formation in social influence networks. *Social networks*, 23(3), 167-189.
[https://doi.org/10.1016/S0378-8733\(01\)00036-3](https://doi.org/10.1016/S0378-8733(01)00036-3)
- Fusco, O., Ferrini, A., Santoro, M., Lo Monaco, M. R., Gambassi, G., & Cesari, M. (2012). Physical function and perceived quality of life in older persons. *Aging clinical and experimental research*, 24, 68-73.

<https://doi.org/10.1007/BF03325356>

- Gibbs, B. B., Hergenroeder, A. L., Katzmarzyk, P. T., Lee, I.-M., & Jakicic, J. M. (2015). Definition, Measurement, and Health Risks Associated with Sedentary Behavior. *Medicine & Science in Sports & Exercise*, 47(6), 1295-1300.
<https://doi.org/10.1249/mss.0000000000000517>
- Giles-Corti, B., & Donovan, R. J. (2003). Relative influences of individual, social environmental, and physical environmental correlates of walking. *American journal of public health*, 93(9), 1583-1589.
<https://doi.org/10.2105/AJPH.93.9.1583>
- Government. (2014). *Governmental planning guidelines for coordinated housing, land-use and transport planning*. Retrieved 03.01.2024 from
<https://www.regjeringen.no/no/dokumenter/Statlige-planretningslinjer-for-samordnet-bolig--areal--og-transportplanlegging/id2001539/>
- Government. (2023). *National expectations for regional and municipal planning 2023–2027*. Retrieved 17.01.24 from
<https://www.regjeringen.no/no/dokumenter/nasjonale-forventninger-til-regional-og-kommunal-planlegging-20232027/id2985764/>
- Greener, R., Lewis, D., Reades, J., Miles, S., & Cummins, S. (2022). Incorporating social norms into a configurable agent-based model of the decision to perform commuting behaviour.
<https://doi.org/10.48550/arXiv.2202.11149>
- Grue, B., Landa-Mata, I., Bjørg Langset Flotve (2021). *The National Travel Survey 2018/19 Key report* (ITE report 1835/2021).
<https://www.toi.no/getfile.php?mmfileid=71405>
- Guell, C., Panter, J., Jones, N. R., & Ogilvie, D. (2012). Towards a differentiated understanding of active travel behaviour: Using social theory to explore everyday commuting. *Social science & medicine*, 75(1), 233-239.
<https://doi.org/10.1016/j.socscimed.2012.01.038>
- Hansen, A. Y., Umstattd Meyer, M. R., Lenardson, J. D., & Hartley, D. (2015). Built environments and active living in rural and remote areas: a review of the literature. *Current obesity reports*, 4, 484-493.
<https://doi.org/10.1007/s13679-015-0180-9>
- Hansen, B., Steene-Johannessen, J., Kolle, E., Udahl, K., Kaupang, O., Andersen, I., Teinung, E., Ekelund, U., Nystad, W., & Anderssen, S. (2023). National mapping system for physical activity and fitness. In: Norwegian School of Sport Sciences, Norwegian Institute of Public Health. Retrired 03.03.24 from
https://www.fhi.no/contentassets/9f69ed9faee94ae8bbe67d55d7ddc9a2/rapport-kan3_final_25.04.23.pdf

- Hasan, R. A., Abbas, A. H., Kwayu, K. M., & Oh, J.-S. (2019). Role of social dimensions on active transportation and environmental protection: A survey at the University of Samarra, Iraq. *Journal of Transport & Health*, *14*, 100564.
<https://doi.org/10.1016/j.jth.2019.05.003>
- Hatamzadeh, Y. (2019). Do people desire to walk more in commuting to work? Examining a conceptual model based on the role of perceived walking distance and positive attitudes. *Transportation research record*, *2673*(7), 351-361.
<https://doi.org/10.1177/0361198119849397>
- Haustein, S., Kroesen, M., & Mulalic, I. (2020). Cycling culture and socialisation: modelling the effect of immigrant origin on cycling in Denmark and the Netherlands. *Transportation*, *47*(4), 1689-1709.
<https://doi.org/10.1007/s11116-019-09978-6>
- Heinen, E., & Handy, S. (2012). Similarities in attitudes and norms and the effect on bicycle commuting: Evidence from the bicycle cities Davis and Delft. *International Journal of Sustainable Transportation*, *6*(5), 257-281.
<https://doi.org/10.1080/15568318.2011.593695>
- Heinen, E., Maat, K., & Van Wee, B. (2011). The role of attitudes toward characteristics of bicycle commuting on the choice to cycle to work over various distances. *Transportation research part D: transport and environment*, *16*(2), 102-109.
<https://doi.org/10.1016/j.trd.2010.08.010>
- Heinen, E., Maat, K., & Van Wee, B. (2013). The effect of work-related factors on the bicycle commute mode choice in the Netherlands. *Transportation*, *40*, 23-43.
<https://doi.org/10.1007/s11116-012-9399-4>
- Heinen, E., Van Wee, B., & Maat, K. (2010). Commuting by bicycle: an overview of the literature. *Transport Reviews*, *30*(1), 59-96.
<https://doi.org/10.1080/01441640903187001>
- Heinonen, I., Kalliokoski, K. K., Hannukainen, J. C., Duncker, D. J., Nuutila, P., & Knuuti, J. (2014). Organ-specific physiological responses to acute physical exercise and long-term training in humans. *Physiology*, *29*(6), 421-436.
<https://doi.org/10.1152/physiol.00067.2013>
- Hogg, M. A., & Reid, S. A. (2006). Social identity, self-categorization, and the communication of group norms. *Communication theory*, *16*(1), 7-30.
<https://doi.org/10.1111/j.1468-2885.2006.00003.x>
- Hogg, M. A., & Smith, J. R. (2007). Attitudes in social context: A social identity perspective. *European Review of Social Psychology*, *18*(1), 89-131.
<https://doi.org/10.1080/10463280701592070>
- Johansson, C., Lövenheim, B., Schantz, P., Wahlgren, L., Almström, P., Markstedt, A., Strömberg, M., Forsberg, B., & Sommar, J. N. (2017). Impacts on air pollution and health by changing commuting from car to bicycle. *Science of the total environment*, *584*, 55-63.

<https://doi.org/10.1016/j.scitotenv.2017.01.145>

- Kalish, C. W. (2012). Generalizing norms and preferences within social categories and individuals. *Developmental psychology*, 48(4), 1133.
<https://doi.org/10.1037/a0026344>
- Kelman, H. C. (1961). Processes of opinion change [Article]. *Public Opinion Quarterly*, 25(1), 57-78.
<https://doi.org/10.1086/266996>
- Keyes, C. L. M., & Ryff, C. D. (1998). Generativity in adult lives: Social structural contours and quality of life consequences.
<https://doi.org/10.1037/10288-007>
- Kim, M. J., Hall, C. M., & Kim, M. (2023). What is significant for engagement in cycling and walking in South Korea? Applying value-belief-norm theory. *Travel Behaviour and Society*, 32, 100571.
<https://doi.org/10.1016/j.tbs.2023.02.008>
- Kruglanski, A. W., & Higgins, E. T. (2013). *Social psychology: Handbook of basic principles*. Guilford Publications.
- Lally, P., Van Jaarsveld, C. H., Potts, H. W., & Wardle, J. (2010). How are habits formed: Modelling habit formation in the real world. *European journal of social psychology*, 40(6), 998-1009.
<https://doi.org/10.1002/ejsp.674>
- Lapinski, M. K., & Rimal, R. N. (2005). An explication of social norms. *Communication theory*, 15(2), 127-147.
<https://doi.org/10.1111/j.1468-2885.2005.tb00329.x>
- Larouche, R., & Trudeau, F. (2010). Active commuting: its impact on physical activity and health, and its main determinants. *Science & Sports*, 25(5), 227-237.
<https://doi.org/10.1016/j.scispo.2010.08.001>
- Lauper, E., Moser, S., Fischer, M., & Matthies, E. (2016). Explaining car drivers' intention to prevent road-traffic noise: An application of the norm activation model. *Environment and Behavior*, 48(6), 826-853.
<https://doi.org/10.1177/0013916515570476>
- Legros, S., & Cislighi, B. (2020). Mapping the social-norms literature: An overview of reviews. *Perspectives on Psychological Science*, 15(1), 62-80.
<https://doi.org/10.1177/1745691619866455>
- Lemieux, M., & Godin, G. (2009). How well do cognitive and environmental variables predict active commuting? *International Journal of Behavioral Nutrition and Physical Activity*, 6, 1-9.
<https://doi.org/10.1186/1479-5868-6-12>

- Lo, S. H., van Breukelen, G. J., Peters, G.-J. Y., & Kok, G. (2016). Commuting travel mode choice among office workers: Comparing an Extended Theory of Planned Behavior model between regions and organizational sectors. *Travel Behaviour and Society*, 4, 1-10. <https://doi.org/10.1016/j.tbs.2015.11.002>
- Loyen, A., Van Hecke, L., Verloigne, M., Hendriksen, I., Lakerveld, J., Steene-Johannessen, J., Vuillemin, A., Koster, A., Donnelly, A., & Ekelund, U. (2016). Variation in population levels of physical activity in European adults according to cross-European studies: a systematic literature review within DEDIPAC. *International Journal of Behavioral Nutrition and Physical Activity*, 13, 1-18. <https://doi.org/10.1186/s12966-016-0398-2>
- Lucas, K., Bates, J., Moore, J., & Carrasco, J. A. (2016). Modelling the relationship between travel behaviours and social disadvantage. *Transportation Research Part A: Policy and Practice*, 85, 157-173. <https://doi.org/10.1016/j.tra.2016.01.008>
- Macassa, G. (2023). Public Perceptions of Sustainable Physical Activity and Active Transportation: A Pilot Qualitative Study in Gävle and Maputo [Article]. *Sustainability*, 15(21), 10, Article 15354. <https://doi.org/10.3390/su152115354>
- Mackie, G., Moneti, F., Shakya, H., & Denny, E. (2015). What are social norms? How are they measured. *University of California at San Diego-UNICEF Working Paper, San Diego*.
- Mandic, S., de la Barra, S. L., Bengoechea, E. G., Stevens, E., Flaherty, C., Moore, A., Middlemiss, M., Williams, J., & Skidmore, P. (2015). Personal, social and environmental correlates of active transport to school among adolescents in Otago, New Zealand. *Journal of science and medicine in sport*, 18(4), 432-437. <https://doi.org/10.1016/j.jsams.2014.06.012>
- Maness, M., Cirillo, C., & Dugundji, E. R. (2015). Generalized behavioral framework for choice models of social influence: Behavioral and data concerns in travel behavior. *Journal of Transport Geography*, 46, 137-150. <https://doi.org/10.1016/j.jtrangeo.2015.06.005>
- Manisalidis, I., Stavropoulou, E., Stavropoulos, A., & Bezirtzoglou, E. (2020). Environmental and health impacts of air pollution: a review. *Frontiers in public health*, 8, 505570. <https://doi.org/10.3389/fpubh.2020.00014>
- Martin, A., Goryakin, Y., & Suhrcke, M. (2014). Does active commuting improve psychological wellbeing? Longitudinal evidence from eighteen waves of the British Household Panel Survey. *Preventive Medicine*, 69, 296-303. <https://doi.org/10.1016/j.ypmed.2014.08.023>
- Mazar, A., Itzchakov, G., Lieberman, A., & Wood, W. (2023). The unintentional nonconformist: Habits promote resistance to social influence. *Personality and social psychology bulletin*, 49(7), 1058-1070. <https://doi.org/10.1177/01461672221086177>

- McDonald, R. I., & Crandall, C. S. (2015). Social norms and social influence. *Current Opinion in Behavioral Sciences*, 3, 147-151.
<https://doi.org/10.1016/j.cobeha.2015.04.006>
- McGowan, V., Buckner, S., Mead, R., McGill, E., Ronzi, S., Beyer, F., & Bamba, C. (2021). Examining the effectiveness of place-based interventions to improve public health and reduce health inequalities: an umbrella review. *BMC public health*, 21, 1-17.
<https://doi.org/10.1186/s12889-021-11852-z>
- Megens, K. C., & Weerman, F. M. (2010). Attitudes, delinquency and peers: The role of social norms in attitude-behaviour inconsistency. *European Journal of Criminology*, 7(4), 299-316.
<https://doi.org/10.1177/1477370810365023>
- Méjean, C., Droomers, M., Van Der Schouw, Y. T., Sluijs, I., Czernichow, S., Grobbee, D. E., Bueno-de-Mesquita, H. B., & Beulens, J. W. (2013). The contribution of diet and lifestyle to socioeconomic inequalities in cardiovascular morbidity and mortality. *International journal of cardiology*, 168(6), 5190-5195.
<https://doi.org/10.1016/j.ijcard.2013.07.188>
- Miller, D. T., Monin, B., & Prentice, D. A. (1999). Pluralistic ignorance and inconsistency between private attitudes and public behaviors. In *Attitudes, behavior, and social context* (pp. 95-113). Psychology Press.
- Morales-Garzón, S., Parker, L. A., Hernández-Aguado, I., González-Moro Tolosana, M., Pastor-Valero, M., & Chilet-Rosell, E. (2023). Addressing Health Disparities through Community Participation: A Scoping Review of Co-Creation in Public Health Healthcare.
<https://doi.org/10.3390/healthcare11071034>
- Moreno-Llamas, A., García-Mayor, J., & De la Cruz-Sanchez, E. (2021). Urban-rural differences in trajectories of physical activity in Europe from 2002 to 2017. *Health & Place*, 69, 102570.
<https://doi.org/10.1016/j.healthplace.2021.102570>
- Morey, M. C., Sloane, R., Pieper, C. F., Peterson, M. J., Pearson, M. P., Ekelund, C. C., Crowley, G. M., Demark-Wahnefried, W., Snyder, D. C., & Clipp, E. C. (2008). Effect of physical activity guidelines on physical function in older adults. *Journal of the American Geriatrics Society*, 56(10), 1873-1878.
<https://doi.org/10.1111/j.1532-5415.2008.01937.x>
- Mundaca, L., Román-Collado, R., & Cansino, J. M. (2022). Assessing the impacts of social norms on low-carbon mobility options. *Energy Policy*, 162, 112814.
<https://doi.org/10.1016/j.enpol.2022.112814>
- Nigg, C., & Nigg, C. R. (2021). It's more than climate change and active transport—physical activity's role in sustainable behavior. *Translational behavioral medicine*, 11(4), 945-953.
<https://doi.org/10.1093/tbm/ibaa129>

- Nordfjærn, T., & Rundmo, T. (2015). Environmental norms, transport priorities and resistance to change associated with acceptance of push measures in transport. *Transport policy*, 44, 1-8.
<https://doi.org/10.1016/j.tranpol.2015.06.009>
- Norwegian Media Authority (2022). *Children and media 2022: Children and young people's use of social media*. Norwegian Media Authority. Retrieved 05.03.2024 from [https://www.medietilsynet.no/globalassets/publikasjoner/barn-og-medier-undersokelser/2022/Barn og unges bruk av sosiale medier.pdf](https://www.medietilsynet.no/globalassets/publikasjoner/barn-og-medier-undersokelser/2022/Barn_og_unges_bruk_av_sociale_medier.pdf)
- Nystad, W., & Ekelund, U. (2023). *Public Health Report. Physical activity in Norway*.
<https://www.fhi.no/he/folkehelse/rapporten/levevaner/fysisk-aktivitet/?term=>
- Ogilvie, D., Foster, C. E., Rothnie, H., Cavill, N., Hamilton, V., Fitzsimons, C. F., & Mutrie, N. (2007). Interventions to promote walking: systematic review. *Bmj*, 334(7605), 1204.
<https://doi.org/10.1136/bmj.39198.722720.BE>
- Ortiz-Sánchez, J. A., Ramírez-Hurtado, J. M., & Contreras, I. (2022). An integrated model of structural equations with cognitive and environmental factors for the study of active commuting. *Journal of Transport & Health*, 24, 101319.
<https://doi.org/10.1016/j.jth.2021.101319>
- Owen, N., Humpel, N., Leslie, E., Bauman, A., & Sallis, J. F. (2004). Understanding environmental influences on walking: review and research agenda. *American journal of preventive medicine*, 27(1), 67-76.
<https://doi.org/10.1016/j.amepre.2004.03.006>
- Panter, J., Desousa, C., & Ogilvie, D. (2013). Incorporating walking or cycling into car journeys to and from work: the role of individual, workplace and environmental characteristics. *Preventive Medicine*, 56(3-4), 211-217.
<https://doi.org/10.1016/j.ypmed.2013.01.014>
- Panter, J. R., & Jones, A. (2010). Attitudes and the environment as determinants of active travel in adults: what do and don't we know? *Journal of Physical Activity and Health*, 7(4), 551-561.
<https://doi.org/10.1123/jpah.7.4.551>
- Passafaro, P., Rimano, A., Piccini, M. P., Metastasio, R., Gambardella, V., Gullace, G., & Lettieri, C. (2014). The bicycle and the city: Desires and emotions versus attitudes, habits and norms [Article]. *Journal of Environmental Psychology*, 38, 76-83.
<https://doi.org/10.1016/j.jenvp.2013.12.011>
- Paulssen, M., Temme, D., Vij, A., & Walker, J. L. (2014). Values, attitudes and travel behavior: a hierarchical latent variable mixed logit model of travel mode choice. *Transportation*, 41, 873-888.
<https://doi.org/10.1007/s11116-013-9504-3>

- Pedersen, B. K., & Saltin, B. (2015). Exercise as medicine—evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine & Science in Sports*, 25, 1-72.
<https://doi.org/10.1111/sms.12581>
- Pike, S., & Lubell, M. (2018). The conditional effects of social influence in transportation mode choice. *Research in transportation economics*, 68, 2-10.
<https://doi.org/10.1016/j.retrec.2018.05.010>
- Procter, S., Mutrie, N., Davis, A., & Audrey, S. (2014). Views and experiences of behaviour change techniques to encourage walking to work: a qualitative study. *BMC public health*, 14, 1-13.
<https://doi.org/10.1186/1471-2458-14-868>
- Rabl, A., & De Nazelle, A. (2012). Benefits of shift from car to active transport. *Transport policy*, 19(1), 121-131.
<https://doi.org/10.1016/j.tranpol.2011.09.008>
- Rachele, J. N., Kavanagh, A. M., Badland, H., Giles-Corti, B., Washington, S., & Turrell, G. (2015). Associations between individual socioeconomic position, neighbourhood disadvantage and transport mode: baseline results from the HABITAT multilevel study. *J Epidemiol Community Health*.
<http://orcid.org/0000-0002-5101-4010>
- Rahul, T., & Verma, A. (2013). Study of impact of various influencing factors on NMT mode choice. *Procedia-Social and Behavioral Sciences*, 104, 1112-1119.
<https://doi.org/10.1016/j.sbspro.2013.11.207>
- Regan, D. T., & Fazio, R. (1977). On the consistency between attitudes and behavior: Look to the method of attitude formation. *Journal of experimental social psychology*, 13(1), 28-45.
[https://doi.org/10.1016/0022-1031\(77\)90011-7](https://doi.org/10.1016/0022-1031(77)90011-7)
- Riggs, W. (2016). Testing social norms as an incentive to active transportation behavior. *Available at SSRN 2804721*.
<http://dx.doi.org/10.2139/ssrn.2804721>
- Rodrigues, P. F., Alvim-Ferraz, M., Martins, F., Saldiva, P., Sá, T., & Sousa, S. (2020). Health economic assessment of a shift to active transport. *Environmental pollution*, 258, 113745.
<https://doi.org/10.1016/j.envpol.2019.113745>
- Sahlqvist, S., Song, Y., & Ogilvie, D. (2012). Is active travel associated with greater physical activity? The contribution of commuting and non-commuting active travel to total physical activity in adults. *Preventive Medicine*, 55(3), 206-211.
<https://doi.org/10.1016/j.ypmed.2012.06.028>
- Sajadi, S. H., Fazli, M., & Habibi, J. (2018). The affective evolution of social norms in social networks. *IEEE Transactions on Computational Social Systems*, 5(3), 727-735.
<https://doi.org/10.1109/TCSS.2018.2855417>

- Saracevic, S., & Schlegelmilch, B. B. (2021). The impact of social norms on pro-environmental behavior: A systematic literature review of the role of culture and self-construal. *Sustainability*, *13*(9), 5156.
<https://doi.org/10.3390/su13095156>
- Schachter, S. (1951). Deviation, rejection, and communication. *The Journal of Abnormal and Social Psychology*, *46*(2), 190.
<https://doi.org/10.1037/h0062326>
- Scott, E. J., Eves, F. F., French, D. P., & Hoppé, R. (2007). The theory of planned behaviour predicts self-reports of walking, but does not predict step count. *British journal of health psychology*, *12*(4), 601-620.
<https://doi.org/10.1348/135910706X160335>
- Seguin, R., Connor, L., Nelson, M., LaCroix, A., & Eldridge, G. (2014). Understanding barriers and facilitators to healthy eating and active living in rural communities. *Journal of nutrition and metabolism*, 2014.
<https://doi.org/10.1155/2014/146502>
- Sherwin, H., Chatterjee, K., & Jain, J. (2014). An exploration of the importance of social influence in the decision to start bicycling in England. *Transportation Research Part A: Policy and Practice*, *68*, 32-45.
<https://doi.org/10.1016/j.tra.2014.05.001>
- Silvestri, A., Foudi, S., & Galarraga, I. (2022). How to get commuters out of private cars? Exploring the role of perceived social impacts in mode choice in five European countries. *Energy Research & Social Science*, *92*, 102811.
<https://doi.org/10.1016/j.erss.2022.102811>
- Stanley, J., & Stanley, J. (2017). The importance of transport for social inclusion. *Social Inclusion*, *5*(4), 108-115.
<https://doi.org/10.1126/science.aax9553>
- Steinbach, R., Green, J., Datta, J., & Edwards, P. (2011). Cycling and the city: A case study of how gendered, ethnic and class identities can shape healthy transport choices. *Social science & medicine*, *72*(7), 1123-1130.
<https://doi.org/10.1016/j.socscimed.2011.01.033>
- Strazdins, L., Broom, D. H., Banwell, C., McDonald, T., & Skeat, H. (2011). Time limits? Reflecting and responding to time barriers for healthy, active living in Australia. *Health Promotion International*, *26*(1), 46-54.
<https://doi.org/10.1093/heapro/daq060>
- Stroope, J. (2021). Active transportation and social capital: The association between walking or biking for transportation and community participation. *Preventive Medicine*, *150*, Article 106666.
<https://doi.org/10.1016/j.ypped.2021.106666>

- Tao, X., Fu, Z., & Comber, A. J. (2019). An analysis of modes of commuting in urban and rural areas. *Applied Spatial Analysis and Policy*, 12, 831-845.
- Terry, D. J., & Hogg, M. A. (1996). Group norms and the attitude-behavior relationship: A role for group identification. *Personality and social psychology bulletin*, 22(8), 776-793.
<https://doi.org/10.1177/0146167296228002>
- The Norwegian Directorate of Health (2024). *Physical activity in prevention and treatment*. The Norwegian Directorate of Health. Retrieved 12.04.2024 from <https://www.helsedirektoratet.no/faglige-rad/fysisk-aktivitet-i-forebygging-og-behandling>
- The Norwegian Directorate of Health (2021). *Public Health Sector Report*. (2021). The Norwegian Directorate of Health. Retrived 12.04.2024 from <https://www.helsedirektoratet.no/rapporter/sektorrapport-om-folkehelse>
- The Planning and Building Act (2008). *Act about Planning and Building*, (LOV-2022-12-02-87). Act Data.
<https://lovdata.no/dokument/NL/lov/2008-06-27-71?q=pbl>
- The Public Health Act (2012). *Act about Public Health*, (LOV-2023-12-20-106). Act Data.
<https://lovdata.no/dokument/NL/lov/2011-06-24-29>
- Thornton, L., Batterham, P. J., Fassnacht, D. B., Kay-Lambkin, F., Calear, A. L., & Hunt, S. (2016). Recruiting for health, medical or psychosocial research using Facebook: Systematic review. *Internet interventions*, 4, 72-81.
<https://doi.org/10.1016/j.invent.2016.02.001>
- Tomasello, M. (2014). The ultra-social animal. *European journal of social psychology*, 44(3), 187-194.
<https://doi.org/10.1002/ejsp.2015>
- Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E., Chastin, S. F., Altenburg, T. M., & Chinapaw, M. J. (2017). Sedentary behavior research network (SBRN)–terminology consensus project process and outcome. *International Journal of Behavioral Nutrition and Physical Activity*, 14, 1-17.
<https://doi.org/10.1186/s12966-017-0525-8>
- United Nations Association of Norway (2015). *UN Sustainable Development Goals*. United Nations Association of Norway. Retrieved 15.01.2024 from <https://fn.no/om-fn/fns-baerekraftsmaal>
- Vahedi, J., Shams, Z., & Mehdizadeh, M. (2021). Direct and indirect effects of background variables on active commuting: mediating roles of satisfaction and attitudes. *Journal of Transport & Health*, 21, 101054.
<https://doi.org/10.1016/j.jth.2021.101054>

- Van Acker, V., Van Wee, B., & Witlox, F. (2010). When transport geography meets social psychology: toward a conceptual model of travel behaviour. *Transport Reviews*, 30(2), 219-240.
<https://doi.org/10.1080/01441640902943453>
- Verplanken, B., & Roy, D. (2016). Empowering interventions to promote sustainable lifestyles: Testing the habit discontinuity hypothesis in a field experiment. *Journal of Environmental Psychology*, 45, 127-134.
<https://doi.org/10.1016/j.jenvp.2015.11.008>
- Walker, L. S. (2007). Social influence. *The Blackwell encyclopedia of sociology*.
<https://doi.org/10.1002/9781405165518.wbeoss154.pub2>
- Wang, L., & Wen, C. (2017). The relationship between the neighborhood built environment and active transportation among adults: A systematic literature review. *Urban Science*, 1(3), 29.
<https://doi.org/10.3390/urbansci1030029>
- Webb, P., Bain, C. & Page, A. (2020). *Essential Epidemiology: An introduction for Students and Health Professionals* (fourth edition). Cambridge University Press.
- Whitaker, C., Stevelink, S., & Fear, N. (2017). The use of Facebook in recruiting participants for health research purposes: a systematic review. *Journal of medical Internet research*, 19(8), e290.
<https://doi.org/10.2196/jmir.7071>
- Whitehead, M., & Dahlgren, G. (1991). Policies and strategies to promote social equity in health. *Stockholm: Institute for Future Studies*.
- WHO. (1986). *The 1st International Conference on Health Promotion, Ottawa, 1986. Health Promotion*. World Health Organization. Retrieved 18.01.2024 from
<https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference>
- Willis, D. P., Manaugh, K., & El-Geneidy, A. (2015). Cycling under influence: summarizing the influence of perceptions, attitudes, habits, and social environments on cycling for transportation. *International Journal of Sustainable Transportation*, 9(8), 565-579.
<https://doi.org/10.1080/15568318.2013.827285>
- Wilmot, E. G., Edwardson, C. L., Achana, F. A., Davies, M. J., Gorely, T., Gray, L. J., Khunti, K., Yates, T., & Biddle, S. J. (2012). Sedentary time in adults and the association with diabetes, cardiovascular disease and death: systematic review and meta-analysis. *Diabetologia*, 55(11), 2895-2905.
<https://doi.org/10.1007/s00125-012-2677-z>
- Wolday, F. (2023). The effect of neighbourhood and urban center structures on active travel in small cities. *Cities*, 132, 104050.
<https://doi.org/10.1016/j.cities.2022.104050>

- Wood, W., & Neal, D. T. (2016). Healthy through habit: Interventions for initiating & maintaining health behavior change. *Behavioral Science & Policy*, 2(1), 71-83.
<https://doi.org/10.1177/237946151600200109>
- Wright, N., & Stickley, T. (2013). Concepts of social inclusion, exclusion and mental health: a review of the international literature. *Journal of psychiatric and mental health nursing*, 20(1), 71-81.
<https://doi.org/10.1111/j.1365-2850.2012.01889.x>
- Yang, X., Telama, R., Hirvensalo, M., Tammelin, T., Viikari, J. S., & Raitakari, O. T. (2014). Active commuting from youth to adulthood and as a predictor of physical activity in early midlife: the young Finns study. *Preventive Medicine*, 59, 5-11.
<https://doi.org/10.1016/j.ypmed.2013.10.019>
- Yu, J., & Teschke, K. (2018). The healthy immigrant effect and active commuting. *Journal of Transport & Health*, 10, 253-261.
<https://doi.org/10.1016/j.jth.2018.05.005>
- Zollman, K. J. S. (2010). Social structure and the effects of conformity. *Synthese*, 172, 317-340.
<https://doi.org/10.1007/s11229-008-9393-8>

Appendix material

Appendix 1: Selected questions from questionnaire

Fylke	Hvor bor du?
Agder	<input type="radio"/> 1
Innlandet	<input type="radio"/> 2
Møre og Romsdal	<input type="radio"/> 3
Nordland	<input type="radio"/> 4
Oslo	<input type="radio"/> 5
Rogaland	<input type="radio"/> 6
Troms og Finnmark	<input type="radio"/> 7
Trøndelag	<input type="radio"/> 8
Vestfold og Telemark	<input type="radio"/> 9
Vestland	<input type="radio"/> 10
Viken	<input type="radio"/> 11

bor	Bor du i...
Byområde	<input type="radio"/> 1
Mindre tettsted	<input type="radio"/> 2
Utenfor tettbygd område	<input type="radio"/> 3

tilgang	Eier du eller har du tilgang til...			
	Jeg eier	Jeg eier ikke, men har tilgang	Jeg har ikke tilgang til	
	1	2	3	
bil?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
sykkel (elektrisk eller vanlig)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2
motorsykkel?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3
el-sparkesykkel?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4

fodt	Hvilket år er du født?
♦ range:(1900:2020)	
Årstall:	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> 1

kjonn	Hva identifiserer du deg som	
Mann		<input type="radio"/> 1
Kvinne		<input type="radio"/> 2
Annet / ønsker ikke oppgi		<input type="radio"/> 3

utdanning	Hva er din høyeste fullførte utdanning?	
Grunnskole (inkl. ungdomsskole/realskole)		<input type="radio"/> 1
Videregående skole		<input type="radio"/> 2
Høgskole/universitet, lavere grad (4 år eller mindre)		<input type="radio"/> 3
Høgskole/universitet, høyere grad (5 år eller mer)		<input type="radio"/> 4
Ønsker ikke oppgi		<input type="radio"/> 5

husstand_barn	Hvor mange barn under 15 år bor det i husstanden din?	
Ingen barn		<input type="radio"/> 1
1 barn		<input type="radio"/> 2
2 barn		<input type="radio"/> 3
3 barn		<input type="radio"/> 4
4 eller flere barn		<input type="radio"/> 5

sysse	Hva er din hovedsysse?	
	Dersom du er både student og deltidsansatt, vil vi at du svarer student	
Yrkesaktiv, fulltid		<input type="radio"/> 1
Yrkesaktiv, deltid		<input type="radio"/> 2
Student		<input type="radio"/> 3
Alderspensjonist		<input type="radio"/> 4
Arbeidsledig		<input type="radio"/> 5
Annet		<input type="radio"/> 6
Ønsker ikke oppgi		<input type="radio"/> 7

norge	Er du født i Norge?	
Ja		<input type="radio"/> 1
Nei		<input type="radio"/> 2
Ønsker ikke oppgi		<input type="radio"/> 3

norm_2

♦ filter:\filterspm.a=2

Tenk på de personene som påvirker hva du synes om sykling eller gåing.

♦ filter:\filterspm.a=1

Tenk på din nærmeste familie eller venner

Trykk på skalaen eller dra i markøren for å svare.

Dersom de skulle svare på spørsmålet "Hvor mange burde gå eller sykle i sine daglige reiser", hva tror du de ville svart?

	Ingen									Alle	
	1	2	3	4	5	6	7	8	9	10	
Ingen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1

kommentar

Har du noen kommentarer til undersøkelsen?

Vennligst ikke oppgi helseopplysninger.

Skriv her:

Open



Norges miljø- og biovitenskapelige universitet
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