Changes in transportation habits to work in Norwegian parents between 2008 and 2018: a repeated cross-sectional study

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Summary

Background

Regular physical activity is associated with several health benefits. Active transportation to and from work can be an opportunity to make physical activity a part of everyday life, and reduced car traffic is beneficial for the environment, both locally and globally.

Objectives

The aim of this study is to assess changes in commuting habits in Norwegian parents between 2008 and 2018, in relation to age, sex, socioeconomic status, country of birth and distance to work.

Methods

This study has a repeated cross-sectional design. In 2008, 1012 parents of 6th and 7th grade pupils of 27 schools in the Norwegian counties Telemark and Hedmark, completed a questionnaire including questions regarding commuting habits. In 2018, 609 parents of 6th and 7th grade pupils of 25 schools in the same counties completed the same questionnaire. Data were analysed using binary logistic regressions.

Results

The adjusted results show no significant differences between 2008 and 2018 in odds ratios for being a cyclist, car driver or public commuter, however, parents living more than 3 km from work were less likely to be a walker in 2018 than 2008.

Conclusions

This study indicates that there have been small changes in commuting habits among parents in the counties of Telemark and Hedmark, and that actions should be taken to increase active transportation and reduce car driving, aiming at small towns and rural areas.

Keywords: Active commuting, active transportation, commuting habits, parents, time trends

Sammendrag

Bakgrunn

Regelmessig fysisk aktivitet er assosiert med flere helsefordeler. Aktiv transport til og fra jobb kan være en anledning til å innlemme fysisk aktivitet i hverdagslivet. Redusert bilkjøring er fordelaktig for miljøet, både lokalt og globalt.

Hensikt

Hensikten med denne studien er å undersøke mulige endringer i reisevaner til og fra arbeid hos norske foreldre fra 2008 til 2018, i relasjon til alder, kjønn, sosioøkonomisk status, fødeland og avstand til arbeidsplassen.

Metode

Denne studien er en repetert tverrsnittsundersøkelse. I 2008 besvarte 1012 foreldre til 6. og 7. klassinger ved 27 skoler i Telemark og Hedmark et spørreskjema som inkluderte spørsmål om reisevaner til og fra jobb. I 2018 besvarte 609 foreldre til 6. og 7. klassinger ved 25 skoler i de samme fylkene det samme spørreskjemaet. Data ble analysert ved bruk av logistisk regresjon.

Resultater

Foreldre som bodde 3 km eller mer fra jobb hadde lavere sannsynlighet for å være fotgjenger i 2018 enn i 2008. Ut over det var det ikke statistisk signifikante forskjeller mellom 2008 og 2018 i sannsynligheten for å være syklist, bilist eller kollektivbruker.

Konklusjon

Denne studien indikerer at det har vært små endringer i reisevaner til jobb blant foreldre i Telemark og Hedmark, og at sterkere tiltak bør settes inn for å øke andelen aktiv transport, og redusere bilkjøring, særlig rettet mot småbyer og rurale strøk.

Nøkkelord: Aktiv transport, transportvaner, foreldre, trender

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The research paper presented in this master's thesis will be submitted to The International Journal of Behavioural Nutrition and Physical Activity for publication.

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PARENT QUESTIONNAIRE FOR THE FVMM/ATN-STUDY 2018

THE ARTICLE MANUSCRIPT

List of abbreviations

PA: Physical activity

AT: Active transportation

AC: Active commuting

NEPA: Non-exercise physical activity

SES: Socioeconomic status

1.0 Introduction

The society has been through major changes over the last years. The car was introduced over a hundred years ago and has become increasingly available for private use. Even over the last five years in Norway, the private car park has increased with more than 10 % (Statistics Norway (SSB), 2018). This means that there is less need for us to use our legs to take us where we need to go. At the same time, more people work outside of home and we go to the store to buy our food while our ancestors hunted, gathered or harvested their food. The consequences of these changes are lower levels of physical activity (PA) (Hallal et al., 2012) and more greenhouse gas emissions (Karl & Trenberth, 2003). In addition to long-term changes, there has also been changes over the last decade. The electric car has become increasingly common (Norsk elbilforening, 2018) and the e-bike has made its entry (Fyhri & Sundfør, 2014).

Physical activity has a number of health benefits, including reduced risk of non-communicable diseases like cardiovascular diseases and several types of cancer (Lee et al., 2012). PA is associated with decreased all-cause mortality (Andersen, Schnohr, Schroll, & Hein, 2000) and better Health Related Quality of Life (Anokye, Trueman, Green, Pavey, & Taylor, 2012). Despite the benefits of PA, many people both in Norway and worldwide fail to meet the national and WHO recommendations of at least 150 minutes of moderate to vigorous PA (MVPA) per week (Hallal et al., 2012; Hansen et al., 2015). Increased level of active transportation (AT), like walking and cycling could lead to a general increase in peoples' PA levels (Foley, Panter, Heinen, Prins, & Ogilvie, 2015). Active commuting (AC) i.e. walking or cycling to work seems to be less stressful than other forms of commuting (Avila-Palencia et al., 2017; St-Louis, Manaugh, van Lierop, & El-Geneidy, 2014), and lead to lower risk of being overweight compared to driving to work (Laverty, Mindell, Webb, & Millett, 2013).

A change towards more AT is in the interest of both the individual and the society, and there are several policies for the promotion of active transport and the reduction of car driving. Research on the determinants of AT are to a large extent inconclusive and differ between countries and communities (Heinen, Van Wee, & Maat, 2010). Research on AT-trends in different subgroups is therefore needed. Parents are in a position to influence their children's commuting habits (Deka, 2013; Merom, Tudor- Locke, Bauman, & Rissel, 2006), that they might bring into their adult life (Hirvensalo & Lintunen, 2011).

1.1 Objectives

The objective of this study was to assess changes in commuting habits in Norwegian parents between 2008 and 2018, in relation to age, sex socioeconomic status, country of birth and distance to work.

This thesis is presented as a research paper, with a widened theoretical background and elaborations on the research paper. To ease the reading of the thesis, the main part of the research paper is included as chapter 3. The article manuscript will be submitted to International Journal of Behavioral Nutrition and Physical Activity for publication, and the manuscript written in accordance with the submission guidelines is included as an appendix. The article abstract is excluded from chapter 3 but included in the article manuscript. References are provided for each chapter separately.

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2.0 Background

2.1 Physical activity

2.1.1 Physical activity in relation to health

Effects of Physical Activity

Physical inactivity is one of the leading underlying causes of mortality, and is estimated to cause 3.3 million premature deaths around the world each year (World Health Organisation [WHO], 2009). Regular physical activity (PA) brings several health benefits, like reduced all-cause mortality, reduced risk of heart and vascular diseases, type 2 diabetes, breast cancer and colon cancer (Lee et al., 2012). Additionally, PA can prevent depression (Mammen & Faulkner, 2013) and increase Health-Related Quality of Life (Anokye, Trueman, Green, Pavey, & Taylor, 2012). Further, a general increase in PA-levels will have a positive impact in reducing health care costs associated with cardiovascular diseases and indirect costs due to decreased productivity as a consequence of physical inactivity (Pratt, Norris, Lobelo, Roux, & Wang, 2014).

Recommendations

The World Health Organisation (WHO) (2010) recommends that adults in the age 18 – 64 engage in physical activity of moderate intensity for at least 150 minutes per week, in bouts of a minimum of 10 minutes at a time. This can be replaced by 75 minutes of vigorous PA, or a combination of these. The Norwegian health authorities are in line with WHO and have stated the same recommendations (Hansen et al., 2015), however American health authorities have removed the requirement of PA of minimum 10 minute bouts in their latest guidelines (U. S. Department of Health and Human Services, 2018), making the recommendations easier to reach by also including for example a five minute brisk walk to the bus stop. A share of 68 % of Norwegians between 20 and 75 years of age do not reach the current Norwegian guidelines of weekly physical activity, although the share would be 31 % if the American guidelines were used, not taking into consideration minimum 10 minutes bouts of PA (Loyen et al., 2016).

Non-Exercise Physical Activity

The official guidelines of PA specifically include different forms of Non-Exercise Physical Activity (NEPA) as a possibility of reaching the recommended levels of PA (Helsedirektoratet, 2014; World Health Organisation [WHO], 2010). NEPA is physical

activity that is a part of the daily life, without the primary goal of exercising. In addition to active modes of travelling, it can include garden work, house or car maintenance among other things (Ekblom-Bak, Ekblom, Vikström, de Faire, & Hellénius, 2014). Over the last decennium the availability of household and transport aids has increased rapidly. Doors can be opened by pushing a button, there are robotic lawn mowers and vacuum cleaners, and many people can easily reach work without walking more than a few meters to the parking lot. At the same time, more people are overweight (Stevens et al., 2012), and many people fail to reach the recommended PA-levels (Hallal et al., 2012). Borodulin et al. (2008) studied trends in PA in Finnish adults over a thirty-year period, and found that while leisure-time PA increased, the occupational and transport-related PA decreased.

2.1.2 Correlates/determinants of physical activity

Insight into which factors are associated with physical activity is important in order to understand what initiatives should be taken to further increase physical activity in the population. The reasons why some people are physically active and some are not, are complex and include individual, environmental and social factors (Bauman et al., 2012). The concepts of correlates and determinants are both used, however, Bauman et al. (2012) defines correlates as factors associated with PA, whereas a determinant has a causal relationship with PA. In an adapted ecological model presented by Bauman et al. (2012) (figure 1), they present determinants of physical activity at all levels. Individual factors include psychological and biological determinants, intrapersonal factors include social support and cultural norms. Environmental factors include social environment, such as seeing others active, built environment, such as walking and cycling facilities, and natural environment, such as topography, parks etc. Regional or national policy include transport systems, urban planning, and education and school sector, among others. The model also mentions global factors, like economic development and global media.

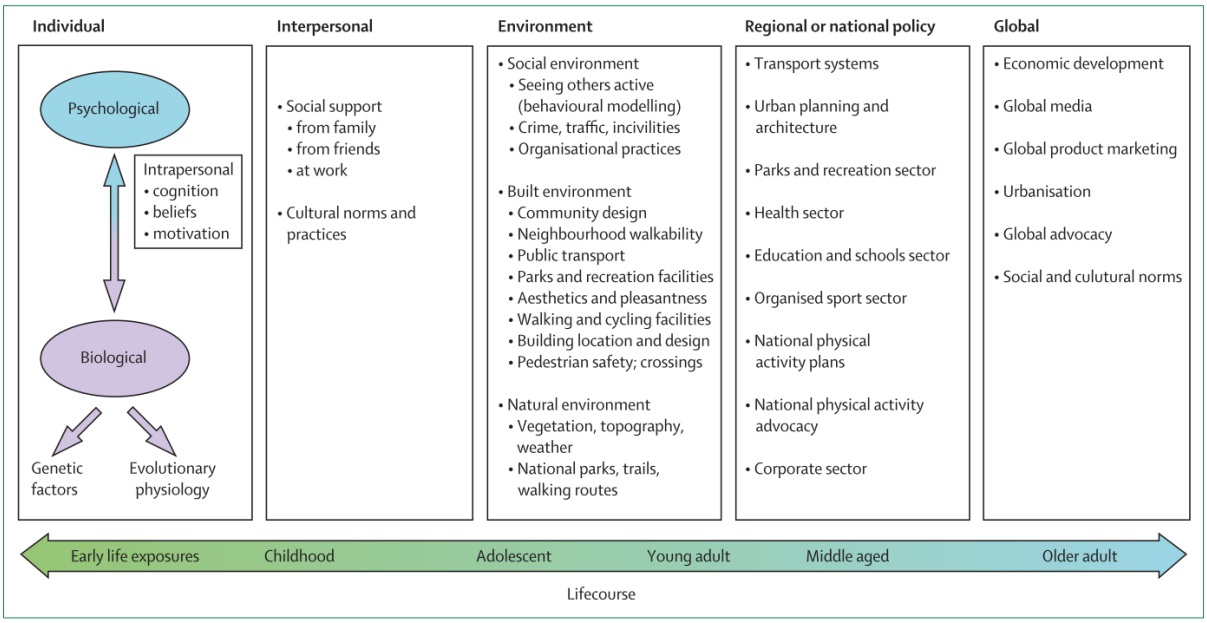

Figure 1. Adapted ecological model of the determinants of physical activity. From "Correlates of physical activity: why are some people physically active and others not?" by Bauman et al., 2012, The Lancet, p. 259.

Socioeconomic status (SES) is known to influence people's health in general. The social gradient in health means that there is a difference in health across the socio-economic ladder, and people lower on the socio-economic ladder is more at risk of experiencing poor health and has lower life expectancy (Marmot, 2005). Correlates and determinants of PA in the form of active transportation will be discussed further in chapter 2.2.3.

2.2 Active transportation

2.2.1 Definition

Active travel or active transportation can be defined as all forms of travel that is human-powered (U. S. Department of Health and Human Services, 2011). By this definition it would include walking and cycling, and it can also include walking and cycling to and from public transportation. Commuting is the travel that takes place between work and home on a regular basis, and active commuting is any form of active transportation between the place of residence and the workplace.

2.2.2 Levels of active transportation

Norway is the country in Europe with the second largest number of kilometres travelled by car per person, with 33 km per day each, and over the last 50 years, the numbers have increased six times (Pilskog, 2017). Even though Norway is a country with low population density and long distances to travel, a share of 45 % of all car trips is below 5 km distance (Hjorthol, Engebretsen, & Uteng, 2014). However, only 6 - 9 % of trips of this length is done by bicycles, while 29 % of trips 1 – 3 km and 14 % of trips 3 – 5 km are done by foot (Hjorthol et al., 2014), meaning there could be a great potential of replacing cars with bicycles or by foot on shorter distances. On distances 3 – 5 km, 10 % of all trips is done by public transportation, and the share of public transportation increases to 14 % for trips over 20 km (Hjorthol et al., 2014). The share of car drivers and passengers are 60 % for trips 1 – 3 km, and increases to 84 % for trips over 20 km.

There are differences in the level of active commuting between European countries. Countries like Denmark and the Netherlands which have a flat topography and well-developed infrastructure for cycling, have relative high rates of cycling for commuting purposes, with a share of 20 % (Institut for Transport, 2015) and 26 % (Statista, 2016), respectively. In Germany, cycling holds a share of 18 % of commuting trips (German Institute of Urban Affairs (Difu) GmbH, 2010), while in the UK the bicycle share is as low as 2 % of all trips (Department for Transport, 2017). The Netherlands, Denmark and Germany has seen an increase in cycling rates from the mid-1970s due to urban planning policies to increase cycling levels, while in UK the cycling rates were higher in 1950 than they are now in Germany (Pucher & Buehler, 2008). The share of walking for commuting is 13 % in Germany (German Institute of Urban Affairs (Difu) GmbH, 2010) and 10 % in UK (Department for Transport, 2017), while only 3 % in Denmark (Institut for Transport, 2015). In UK, the main mode of commuting is by private car (67 %), followed by public transportation (17 %) (Department for Transport, 2017). Like in UK, the private car holds the highest share of commuting trips in Denmark, by 66 %, while the share of public commuting is lower, with 11 % of commuting trips (Institut for Transport, 2015).

2.2.3 Determinants/Correlates of active transportation

Even though walking, cycling or public transportation can be a feasible and effective mode of transport, most people choose to commute by private car. Several studies have assessed

reasons and determinants of different modes of commuting, however not all studies conclude in the same manner. E.g. the picture of SES is complex in the aspect of transport, because increased wealth would increase availability of private cars and limit the effect of economic incentives to decrease car transport. Research on the effect of SES on commuting modes is not consistent (Beenackers et al., 2012; Heinen, Van Wee, & Maat, 2010). The adapted ecological model for the determinants of physical activity presented in chapter 2.1.2. can also be an indicator of the determinants for active transportation. Correlates and determinants of active transportation stretches across individual factors like sociodemographic variables and attitudes, through environmental factors like landscape, weather and built environment (Beenackers et al., 2012; Heinen et al., 2010).

Sociodemographic variables

Most studies find that men cycle more than women, even though woman generally have a shorter commuting distance (Heinen et al., 2010), although in countries with high cycling rates, cycling is more evenly distributed across sex (Engbers & Hendriksen, 2010; Heinen et al., 2010). Women cycle shorter distances than men (Engbers & Hendriksen, 2010), and more often reports picking up children and grocery shopping as reasons not to cycle to work (Heinen et al., 2010). A UK study assessing any form of active transport, found that women were more likely than men to take part in any active transport in general (J. Adams, 2010). Another UK study found that women were almost twice as likely as men to walk to work (Panter, Griffin, Jones, Mackett, & Ogilvie, 2011), while Bjorkelund, Degerud & Bere (2016) found no differences in walking between men and women in Norway.

Research is not consistent regarding age as a predictor for active transportation, and Heinen et al. (2010) found that some studies concluded that cycling declined with increased aged, while others concluded that there was no association between cycling levels and age. J. Adams (2010) assessing active transportation in general, found a decrease in the prevalence of any active transportation with increasing age, with a small increase among the oldest participants. A study assessing walking to public transit, found that the youngest and oldest age groups were more likely to walk more than 30 minutes per day (Besser & Dannenberg, 2005). Age has been shown to be inversely associated with walking to work by one study (E. J. Adams, Esliger, Taylor, & Sherar, 2017), while a study from Finland found increasing levels of walking with increasing age (Oja, Vuori, & Paronen, 1998).

Several studies find a high educational level to be associated with more cycling to work (de Geus, De Bourdeaudhuij, Jannes, & Meeusen, 2008; Heinen et al., 2010; Oja et al., 1998), while Engbers & Hendriksen (2010) did not find an association between education and cycling. A study including French women found neighbourhood education level to be a positive predictor for active commuting, independent of individual educational level (Perchoux et al., 2017). Besser & Danneberg (2005) found that the least educated group was more likely to walk to public transit for more than 30 minutes per day. Ton et al. (2018) did not find an association between educational level and walking, while Ball et al. (2007) found more walking for transport among highly educated women.

When it comes to ethnicity, being native has shown to be a positive determinant of being a bicycle commuter (Cole-Hunter et al., 2015), while minorities has been shown to be more likely to walk to public transit for more than 30 minutes per day (Besser & Dannenberg, 2005). On the other hand, Ton et al. (2018) did not find ethnicity to be significant for neither of the commuting modes in a Dutch study.

Environmental factors

Traffic safety and bicycle infrastructure is an important factor for cycling, although safety appears to be more important for women than for men (Heinen et al., 2010). High density areas seems to be more suitable for cycling and walking, due to shorter distances and lower levels of car ownership and car use (Heinen et al., 2010). Supporting this, low-density areas in Norway holds a higher share of car drivers than most other areas (Hjorthol et al., 2014). Favourable infrastructure, like high street connectivity to work, is perceived as important for active commuters, and mixed land use increases active transport in general (Badland, Schofield, & Garrett, 2008; Saelens, Sallis, & Frank, 2003). Traffic lights and stop signs can be important for bicycle safety but cause irritation due to delays (Heinen et al., 2010). Further, most studies conclude that bike-lanes are an important factor for more cycling, but more cycling can also stimulate authorities to facilitate bike-lanes (Heinen et al., 2010). Living in a neighbourhood with high walkability has been shown to be correlated with less use of motorized transport (Christiansen, Madsen, Schipperijn, Ersbøll, & Troelsen, 2014) and positively associated with walking to work (Craig, Brownson, Cragg, & Dunn, 2002). The amount of greenness within the work/study area was a positive determinant of being willing to become a bicycle-commuter in a study from Barcelona, while the mean elevation within the work/study area was a negative determinant (Cole-Hunter et al., 2015). People who have very good access to public transportation reports the highest share of public transport use in the

Norwegian national travel survey, however the access to public transportation varies across Norway with the best public transportation system in Oslo and other large cities, while the least developed public transportation system is found in low-density areas (Hjorthol et al., 2014). Heinen and colleagues state in their overview of literature that rain, cold temperatures and lack of daylight is negatively associated with cycling. Norway is a country with a large seasonal variety in weather and temperature, and this may be an obstacle for people to choose cycling or walking to work.

A large body of knowledge concludes that shorter commuting distance is related to more active transport (Badland et al., 2008; Cole-Hunter et al., 2015; Heinen et al., 2010). The Norwegian national travel survey shows that the average travel length to work for all transport modes has increased from 14.9 km in 2009 to 16.3km in 2013/14 (Hjorthol et al., 2014). For walking trips in general the average travel length is 2.2 km, and the average travel length for all cycling trips is 5.1 km (Hjorthol et al., 2014). Badland et al. (2007) found that 87 % of respondents with a commuting distance of less than 2 km, and 50 % of participants with a commuting distance less than 5 km perceived they could use active transportation modes for commuting, while 30 % of respondents living more than 5 km from work perceived they could use active commuting modes. Hence, it should be possible to replace a significant share of current passive travels with more active travels.

Psychosocial correlates of transport choice

Cultural norms and social support seems to be a positive predictor for cycling, and municipalities with high rates of cycling also seem to have high rates of cycling for commuting purposes (Vandenbulcke et al., 2011). Countries that have high cycling levels, have smaller socioeconomic differences in cycling (Pucher & Buehler, 2008), although this could be due to safer bicycle infrastructure (Ton et al., 2018). De Geus et al. (2008) also found that experiencing a high level of social support and modelling, were positively associated with cycling.

Habit seems to be an important factor in choosing mode of commuting to work, although distance to the workplace might be a contributor in developing a habit (Godin & Lemieux, 2009). Giles-Corti & Donovan (2003) found that people with a higher level of perceived behavioural control were more likely to be walkers. According to the Theory of Planned Behavior, intention is the main determinant for behavior, and attitudes toward the behavior, subjective norms and perceived behavioral control influences the intention to perform the

behavior (Ajzen, 1991). De Bruijn et al. (2009) suggests that intention is a significant determinant for bicycle use for those with a low level of habit strength, while less relevant when there was a high level of habit strength. Gardner & Abraham (2008) suggests that negative attitudes towards alternatives to car driving, such as overestimating public transport travel times, has a stronger association with car use than positive attitudes towards car driving.

Perceived reasons and barriers for active commuting

Personal reasons to engage in cycling to work are exercise and health benefits (Engbers & Hendriksen, 2010), in addition to being cheaper and beneficial for the environment (de Geus et al., 2008). Despite the many benefits of cycling, there are also many perceived barriers to cycling. Lack of time (de Geus et al., 2008; Engbers & Hendriksen, 2010), perspiration, weather dependency (Engbers & Hendriksen, 2010), being uncomfortable, and lacking sufficient fitness are some reasons not to cycle (Heinen et al., 2010). Some people need a car for their work, or have a long travelling distance to work (Engbers & Hendriksen, 2010).

2.3 Environmental issues regarding transportation

The United Nations (UN) (2015) has stated 17 sustainability goals, addressing both social and environmental sustainability to meet the world's challenges regarding climate change and poverty. The sustainability goals strives to achieve better health for all, including a reduction in deaths and injuries caused by traffic accidents, and a reduction in mortality and diseases caused by pollution (United Nations, 2015). Sustainable cities and communities is a target area in goal 11, focusing among other things on giving all citizens easy access to safe and sustainable transport systems, and stopping climate change is a focus area in the 13th goal (United Nations, 2015). Sustainability is also one of the 5 cornerstones of the Norwegian public health act, giving the municipalities, counties and government of Norway a responsibility for promoting sustainable infrastructures, also including transport systems (Folkehelseloven, 2011).

According to current evidence, greenhouse gas emissions are responsible for a major contribution to the climate changes and the following mitigation the world is facing (IPCC, 2014; Karl & Trenberth, 2003). According to the European Environment Agency (EEA) (2018), transport accounts for 27 % of the EU's total CO2 emissions, with cars and vans contributing with two thirds. Further, there has been a 22 % increase in emissions caused by

road transport between 1990 and 2016 (European Environment Agency (EEA), 2018). In addition to global climate effects, road traffic causes local contamination that affects the health of inhabitants, by causing cardiopulmonary diseases in adults and acute respiratory infections in children, especially in urban areas (Cohen et al., 2005).

2.4 Risk factors of active transportation

Even though active transportation brings several benefits, there are also some risk factors of engaging in AT. Walkers and cyclists are at increased risk of being hurt in traffic accidents, although fatalities and injury rates among bicyclists are higher in low-bicycling countries like UK and USA than in high-bicycling countries like the Netherlands and Denmark (Pucher & Buehler, 2008). Active commuters also have higher inhalation doses of air pollutants than car commuters (Magda Cepeda et al., 2017). However, the positive effects of active transportation seem to outweigh the negative effects (de Hartog, Boogaard, Nijland, & Hoek, 2010; Magda Cepeda et al., 2017). The health benefits of active transportation has been shown to be larger than the health risk of walking or cycling in polluted areas (Magda Cepeda et al., 2017), and more life years are gained from cycling than life years lost due to inhalation of pollutants and fatalities in traffic accidents (de Hartog et al., 2010). Fatality rates are showing a decline both for walkers and for cyclists, in many countries (Buehler & Pucher, 2017), and in Denmark, where cycling levels have been rising over the last years, the fatality rates are declining (Andersen et al., 2018).

2.5 Policies regarding active transportation

2.5.1 Internationally

Throughout the WHO (2018) global action plan on physical activity, there is a focus on active transportation as one mean of increasing physical activity levels globally. The action plan advices countries on implementing "upstream" actions, like urban design for promoting walking and cycling, and improving safety of walkers and cyclists, in addition to "downstream actions", like educational campaigns, to increase physical activity (World Health Organisation [WHO], 2018). Likewise, in the WHO European Region's physical activity strategy, the reduction of car traffic, and increase in walking and cycling is an objective, focusing on both infrastructures promoting walking and cycling, and congestion and parking fees to reduce car driving (World Health Organisation [WHO], 2015).

2.5.2 Nationally

The 2015 Norwegian white paper on public health states a need for better facilitation for walkers and cyclists to increase physical activity (Helse- og omsorgsdepartementet, 2015). Further, the Norwegian national transportation plan for 2010-2019 states the need to ensure a well-developed public transport system in the cities and commuting surrounds, while better and safer roads will be a priority in rural areas (Samferdselsdepartementet, 2009). Later transport plans have stated a target of zero growth in private transportation in urban areas (Samferdselsdepartementet, 2013, 2017). This means that growth in transportation in urban areas due to population increase, should be done by walking, cycling and public transportation. In order to reach this goal, the Norwegian government has developed a set of economic incentives towards the largest urban areas in Norway (Samferdselsdepartementet, 2019). This includes a governmental contribution to the funding of walking- and bicycle lanes, and grants for improvement of public transportation, in addition to the collection of tolls as another form of funding for these projects. A reward system for urban areas who reach the targets are also part of the deals (Samferdselsdepartementet, 2019). The main purpose is to reduce the emission of greenhouse gasses (Samferdselsdepartementet, 2019), although an increase in active transportation will also have a positive impact on PA (Foley, Panter, Heinen, Prins, & Ogilvie, 2015; Yang, Panter, Griffin, & Ogilvie, 2012), and further, improve public health.

The Norwegian national strategy for bicycling (Vegdirektoratet, 2012b) has a health focus as well as an environmental focus and states a target that bicycling constitutes a share of 8 % of all travels in Norway by the year 2023, while the share in 2013/14 was 5 % (Hjorthol et al., 2014). In order to reach this target, the strategy focuses on cooperation between governmental institutions, counties and municipalities to create better infrastructure for bicycling, like establishing express lanes for cyclists and ensure plowing of snow and gritting in the winter season. Communication and campaigns towards individuals, companies and policy makers is also part of the strategy (Vegdirektoratet, 2012b).

The Norwegian national strategy for walking (Vegdirektoratet, 2012a) has, like the strategy for bicycling, both a health focus and an environmental focus, and states a target that 50 % of Norwegians conducts one complete trip by foot per day. The strategy focuses on cooperation between different sectors, designing and maintaining walking friendly environments and

infrastructure, better interaction in traffic between different modes of transport giving walkers a higher priority, and creating a culture for walking by for example campaigns and knowledge increase (Vegdirektoratet, 2012a).

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3.0 The research paper

3.1 Background

Regular physical activity (PA) is associated with decreased risk of mortality (Andersen, Schnohr, Schroll, & Hein, 2000), better Health Related Quality of Life (Anokye, Trueman, Green, Pavey, & Taylor, 2012) and reduced risk of several non-communicable diseases, like coronary heart disease, type 2 diabetes, breast cancer and colon cancer (Lee et al., 2012). The World Health Organisation (WHO) (2010) and Norwegian health authorities (Hansen et al., 2015) both recommend that adults stay physically active at moderate to vigorous intensity (MVPA) for at least 150 minutes per week. However, a report based on self-reported physical activity questionnaires in 122 countries, indicates that 31.1 % of people worldwide and 34.8 % of the European population, do not reach these recommendations (Hallal et al., 2012). A study conducted by the Norwegian Directorate of health, using accelerometer to determine participants PA levels, showed that 68 % of the participants did not reach the recommended level of PA (Hansen et al., 2015).

A high rate of non-exercise physical activity (NEPA), which includes active transportation such as walking and cycling to work, is shown to be associated with lower all-cause mortality, regardless of exercising regularly or not (Ekblom-Bak, Ekblom, Vikström, de Faire, & Hellénius, 2014). Evidence suggests that active commuting is associated with an increase in people's general PA levels (Foley, Panter, Heinen, Prins, & Ogilvie, 2015; Yang, Panter, Griffin, & Ogilvie, 2012). A UK study concludes that participants who used public transport, walk or cycle to work was less likely to be overweight than those using private transport (Laverty, Mindell, Webb, & Millett, 2013). Cycling to work is associated with lower risk of perceived stress (Avila-Palencia et al., 2017), and walkers seems to be the most satisfied commuters in general (St-Louis, Manaugh, van Lierop, & El-Geneidy, 2014).

Research is not consistent regarding the importance on personal factors on active transportation. Beenackers and colleagues (2012) found no clear differences in sex or socioeconomic status (SES) in the use of active transport. Another study found that age and education did not predict being a cyclist or not (Engbers & Hendriksen, 2010). However, de Geus and colleagues (2008) found that high education was correlated with more cycling to work. Time pressure is a common feeling among Scandiavian parents (Gunnarsdottir, Petzold, & Povlsen, 2014), and lack of time is an important reason not to cycle to work (de Geus et al., 2008). Further, shorter commuting distance is related to more active transport (Badland,

Schofield, & Garrett, 2008; Cole-Hunter et al., 2015; Heinen, Van Wee, & Maat, 2010). Public transport users seem to be more negative towards their mode of commuting than other travellers in relation to travel time and unpredictability (Gatersleben & Uzzell, 2007).

In addition to individual health outcomes, a change towards more active transportation may also be a contributor in reducing CO^2 emissions globally (Chapman, 2007). Road traffic causes local air pollution that affects the health of inhabitants of urban areas (Cohen et al., 2005). In Norway, road traffic counts for 19 % of the country's CO^{2-} emissions (Fedoryshyn, 2017). Due to the climate change the world is facing, several initiatives have been taken to reduce greenhouse gas emissions, and in the Kyoto Protocol that came into effect in 2005 (United Nations Framework Convention on Climate Change (UNFCCC), 2008), followed by the Paris agreement in 2016 (Klima- og miljødepartementet), Norway have committed to limit the emission of greenhouse gasses. A 2007 white paper on Norwegian climate policy advocates the use of taxes and tolls to promote environmentally friendly traffic choices, and stresses efforts to improve access for cyclists in towns (Klima- og miljødepartementet, 2007).

Despite the positive effects of active transportation, the Norwegian national travel survey shows that 63 % of daily trips is done by car, 6-9 % of trips below 5 km is done by bicycle, and average travel length for bicycle trips is 5.1 km. Further, 68 % of trips below 1 km, 29 % of trips from 1-2.9 km and 14 % of trips from 3-4.9 km is done walking. Average travel length for walking trips is 2.2 km. Public transportation increases with increased travel length, from 3 % of trips from 1-2.9 km, to 14 % of trips above 20 km (Hjorthol, Engebretsen, & Uteng, 2014). Few European or Norwegian studies have assessed time trends in commuting habits among parents. Between 2009 and 2013/14 a small increase in walking, cycling and public transport, and a small decrease in car driving for transportation to work by the adult population in general was reported in Norway (Hjorthol et al., 2014).

Several studies have concluded that habit is an important predictor for active transportation (de Bruijn, Kremers, Singh, van Den Putte, & van Mechelen, 2009) and physical activity habits from childhood may predict physical activity habits in adulthood (Hirvensalo & Lintunen, 2011). Parents' transportation habits to work influence children's transport methods to school (Deka, 2013; D. Merom, Tudor- Locke, Bauman, & Rissel, 2006). It is therefore of interest to assess parents' commuting habits, and to study time trends in commuting habits succeeding global and governmental policies regarding more environmentally friendly transportation. The aim of this study was to assess changes in commuting habits in Norwegian parents from 2008 to 2018, in relation to age, sex, SES, country of birth and distance to work.

3.2 Methods

Research design

This study is a part of the Active Transportation to school and work in Norway project (ATN) that collected data together with the Fruit and Vegetables Makes the Marks project (FVMM). Research clearance was obtained from the Faculty Ethical Committee at the Faculty of Health and Sport Sciences of University of Agder, and from the Norwegian Social Science Data Services (NSD). Informed consent was obtained from all the participants.

In 2001 38 randomly selected schools in the Norwegian counties of Hedmark and Telemark was invited to participate in the FVMM project. These schools were also invited to participate in a repeated cross-sectional survey in 2008 (the FVMM/ATN survey), and 27 schools agreed to participate. The same 38 schools were asked again in 2018, when 25 schools accepted the invitation. In 2008 and 2018, both surveys were conducted in September. Pupils in 6th and 7th grade with parental consent filled out a questionnaire at school and brought home a questionnaire for one of their parents to fill out and send back to school.

Study sample

A total of 1012 parents participated in the 2008 survey, and 609 parents participated in the 2018 survey (Table 1). Parents whom reported “do not work” or “working at home” was excluded (n=179). Further, 105 of the respondents were excluded due to missing answers on transportation habits. Therefore, 1337 respondents were included in the analyses, 808 from the 2008 survey, and 529 from the 2018 survey.

Measurements

The questionnaire included a matrix for the parents to report mode of travel to and from work within the four seasons of the year. The matrix is shown to have acceptable test-retest reliability with a Spearman correlation coefficient of 0.82-0.95 for parents (Bere & Bjørkelund, 2009). The question in the matrix was “How do you usually travel to and from work. Fill in number of days in a normal week in each season”. The alternatives were: walking, cycling, by car, or by public transportation. There were separate lines for “to work” and “from work”. Parents were then categorised into main mode of commuting (“walkers”, “cyclists”, “car commuters” or “public commuters” if more than 50% of all reported trips

were done by that mode of commuting. Participants who didn't add up to over 50% in any mode of commuting were categorised as "mixed commuters".

Educational level (as a measure of SES) was assessed by the question: "What level of education have you completed?" with the alternatives being: "elementary school", "high school", "University or college (3 years or less)" or "university or college (more than 3 years)". In the analysis this variable was dichotomized into low: no college or university education or high: having attended college or university. Country of birth was obtained by two questions in the pupil's questionnaire. They were asked in which country each of their parents were born. The parent who responded to the questionnaire was then categorised into "born in Norway" or "born outside Norway". The participants age was obtained by asking for their year of birth. They were also asked for their sex, "male" or "female". Distance to work was obtained by the open-ended question "How far is it from your home to your workplace?" This variable was recoded into two new dichotomous variables: "living less than 3 km from work" or "living 3 km or more from work" (used in the statistical analysis for "walkers") and "living less than 5 km from work" or "living 5 km or more from work" (used in the statistical analyses for "cyclists", "car commuters" and "public commuters").

Statistical analyses

Chi-squared tests (for dichotomous variables) and t-tests (for continuous variables) were conducted to analyse differences between 2008 and 2018 across participants' county, sex, age, level of education, country of birth and distance to work (Table 1). Table 2 presents percentages of participants categorised in each mode of transport in the different seasons, and for the full year. Differences between 2008 and 2018 were analysed using chi-squared tests.

The main analyses conducted were binary logistic regression models, with separate models for each mode of transportation (Table 3); i.e. "walkers" vs "non-walkers", "cyclists" vs "non-cyclists", "car commuters" vs "non-car commuters" and "public commuters" vs "non-public commuters". Independent variables included were "year" (2008/2018), "sex" (male/female), "age" (in years), "education" (low/high), "country of birth" (Norway/outside Norway) and "distance" (</≥3 km for walker vs non-walkers, </≥ 5 km for cyclists vs. non-cyclists, car commuters vs. non-car commuters and public commuters vs. non-public commuters).

The assumptions for logistic regressions were checked. Further, a stepwise procedure was followed, where univariate logistic regression analyses were first conducted with each of the

independent variables separately. The variables were included in the multivariate analyses if they were statistically significant at p<0.3 in the univariate analyses (Williams, Gauss, Bursac, & Hosmer, 2008). Independent variables were then excluded stepwise backwards if they were non-significant (p>0.05) in the multivariate analyses. The variable "year" (2008/2018) was included in all the multivariate analyses, regardless of level of significance, further "age", "country of birth" and "distance" was included for walkers and car commuters, "distance" was included for cyclists, and "distance" and "country of birth" was included for public commuters. Possible interaction effects between "year" and each of the other included independent variables in the multivariate analyses were explored, and stratified analyses were conducted if interactions were significant (p<0.1) (Twisk, 2006). All analyses were conducted using IBM SPSS Statistics, version 25.

3.3 Results

The participants were generally higher educated in 2018 than in 2008 (p <0.001) (table 1). The share of respondents born in Norway was significantly lower (p<0.001) in the 2018 survey compared to the 2008 survey. The parents were older (p<0.001) in 2018 (42.3 years) than in 2008 (41.3 years). There was no significant difference between years in share of participants working less than 3 or 5 km from home or share of respondents being male or female.

Table 1
Characteristics of the study sample in 2008 and 2018.

	2008	**2018**	**P-value***
Number of schools	27	25	
Eligible parents	1712	1734	
County (% Hedmark)	67	52	<0.001
Number of included participants	808	529	
Participation rate (%)	59	35	
Sex (% female)	77	79	0.427
Age (mean, years (SD))	41.3 (5.0)	42.3 (5.1)	<0.001
Education (% with higher edu.)	59	72	<0.001
Country of birth (% Norway)	94	86	<0.001
Distance to work (% less than 3 km)	29	28	0.579
Distance to work (% less than 5km)	48	42	0.053

*P-values are based on independent samples t-test for continuous variables and on chi-squared tests for dichotomous variables.

In both 2008 and 2018, 8 % of the participants were categorised as walkers for the full year (p=0.826). There was no significant change for walkers in the different seasons (Table 2).

Share of participants categorised as cyclists for full year, was 12 % in 2008 and 9 % in 2018 (p=0.054). However, for all seasons except winter, there was a significant reduction of parents categorised as cyclists. In fall there was 16 % categorized as cyclists in 2008, versus 11 % in 2018 (p=0.013). In spring 15 % and 11 % (p=0.039), respectively, and for summer, the numbers were 22 % and 16 % (p=0.006).

Table 2

Proportion (%) of respondents categorised in each mode of transport in 2008 and 2018, for the full year and for each season separately (n=1337).

	Walkers			Cyclists			Car commuters			Public commuters			Mixed commuters		
	2008	2018	p-value	2008	2018	p-value	2008	2018	p-value	2008	2018	p-value	2008	2018	p-value
Fall	8	8	0.619	16	11	0.013*	71	77	0.024*	3	2	0.227	3	3	0.544
Winter	14	13	0.383	3	3	0.571	77	81	0.097	3	2	0.142	3	2	0.698
Spring	9	9	0.608	15	11	0.039*	70	75	0.046*	2	2	0.410	4	4	0.733
Summer	8	8	0.941	22	16	0.006*	64	70	0.022*	2	2	0.522	4	4	0.689
Full year	8	8	0.826	12	9	0.054	70	76	0.013*	2	2	0.286	7	5	0.092

*Significant difference between years ($p \leq 0.05$ Chi-squared tests).

The share of participants categorised as car commuters increased from 2008 to 2018, for both the full year (70 % vs. 76 %, p=0.013), and during fall (71 % vs. 77 %, p=0.024), spring (70 % vs. 75 %, p=0.046) and summer (64 % vs. 70 %, p=0.022).

A share of 2 % was categorised as public commuters for the full year both years, while 7 % of the participants was categorised as mixed commuters in 2008 vs. 5 % in 2018. For public commuters and mixed commuters, there were no significant changes between years.

For the binary logistic regressions, the results show no significant differences between 2008 and 2018 for walkers in total when "age", "country of birth" and "distance" (</≥ 3 km) are included in the model (Table 3). However, the interaction variable "year*distance to work" was significant (p=0.008), and the analyses for walkers were also conducted stratified by the variable "distance to work". Those living more than 3 km from work were 80 % less likely (OR 0.2, 95 % CI 0.0-0.9) to be walkers in 2018 (n=2) versus 2008 (n=15). For those living less than 3 km from work there was no significant differences between years.

There was no significant difference between 2008 and 2018 in odds ratios for being categorised as a cyclist when adjusted for "distance" (</≥ 5 km).

For car commuters in total, the binary logistic regressions showed no significant difference between years when adjusted for "country of birth" and "distance" (</≥ 5 km), however it was borderline significant (OR 1.3, 95 % CI 0.997-1.8). There was a significant (p=0.065) interaction in "year*country of birth", and the analyses for car commuters were also conducted stratified by "country of birth", showing no significant changes between years in either of the groups (born in Norway/born outside Norway).

For public commuter, the variables "distance" (</≥ 5 km) and "country of birth" was included in the models, showing no significant changes between 2008 and 2018 in odds ratios for being a public commuter.

Table 3

Odds ratios for being a walker, cyclist, car commuter or public commuter

				<3km distance		≥3km distance		Born in Norway		Born outside Norway	
		OR	CI (95%)	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
Walkers (n=93)[a]	Year (2018 vs. 2008)	1.1	(0.7-1.7)	1.4	(0.8-2.3)	0.2*	(0.0-0.9)				
	Age	0.95*	(0.91-1.00)								
	Country of birth (Norway vs. outside Norway)	0.5*	(0.2-0.9)	0.4*	(0.2-0.7)						
	Distance (<3km vs. ≥3km)	15*	(8.8-26.9)								
Cyclists (n=41)	Year (2018 vs. 2008)	0.8	(0.5-1.2)								
	Distance (<5km vs. ≥5km)	9.5*	(5.8-15.6)								
Car commuters (n=882)[b]	Year (2018 vs. 2008)	1.3	(0.997-1.8)					1.2	(0.9-1.7)	2.6	(0.9-7.4)
	Age									1.14*	(1.03-1.26)
	Country of birth (Norway vs. outside Norway)	2.3*	(1.4-3.7)								
	Distance (<5km vs. ≥5km)	0.1*	(0.1-0.1)					0.1*	(0.1-0.1)	0.1*	(0.0-0.2)
Public commuters (n=21)	Year (2018 vs. 2008)	0.4	(0.2-1.2)								
	Distance (<5km vs. ≥5km)	0.1*	(0.0-0.5)								
	Country of birth (Norway vs. outside Norway)	0.2*	(0.1-0.7)								

* Significant differences between groups (binary logistic regressions, p≤0.05)

a) Analyses for walkers in total, and stratified by "Distance to work", due to significant (p=0.008) interactions in "Year*</≥ 3 km distance"

b) Analyses for car commuters in total, and stratified by "Country of birth" due to significant (p=0.065) interactions in "Year*Country of birth"

3.4 Discussion

The results of this study indicate that between 2008 and 2018 there have been small changes in mode of commuting to work among parents living in two Norwegian counties. There has been an overall increase in the share of car commuters, however, the adjusted results show no significant differences between years. There has been a decrease in the share of cyclists in the fall, spring and summer, but no significant change for the winter, the full year, or in the adjusted analyses. For walkers, public commuters and mixed commuters there is no significant change in the proportion of participants categorised in each group. However, the adjusted results show a reduction in the group of walkers living 3 km or more from the workplace.

The trends in the Norwegian national travel survey showed a small increase between 2009 and 2013/14 in walking and cycling, in addition to public transportation (Hjorthol et al., 2014). The discrepancy between the present study and the national transport survey might be explained by different topography, built environment and infrastructure in Hedmark and Telemark, compared with other counties in Norway. Hedmark and Telemark consists of rural areas, in addition to some small and medium sized towns. Governmental initiatives to increase walking and cycling have been conducted mainly in urban areas (Samferdselsdepartementet, 2013), which in turn pose less impact in smaller towns and rural areas. The national travel survey includes the general population, whereas the present study includes parents of children in the age 10 to 12, which can explain differences in the results, as households with children have shown to be more dependent on car use in their daily life than other households (Ryley, 2006). Compared with previous findings, a Finnish study concludes that there was a decline in active commuting over a 30-year period between 1972 and 2002 (Borodulin, Laatikainen, Juolevi, & Jousilahti, 2008). Although ending in 2002, this may indicate a trend in transportation habits that is supported by the results of the present study. However, an Australian study concludes with the opposite, i.e. an increase in active travel between 1997 and 2007 (Dafna Merom, van Der Ploeg, Corpuz, & Bauman, 2010). Differences between countries regarding climate and distances must be taken into consideration when it comes to comparison of these studies and may be a reason for different results.

The reduction of walkers living 3 km or more from their workplace could be explained by a feeling of time pressure. There has been a general increase in Norwegian purchasing power over the last decades (Statistics Norway (SSB), 2014). With increased wealth, people put a higher value on time, and are more often under the feeling of time pressure (Devoe, Pfeffer, &

Kozlowski, 2011), and one could argue that increased prosperity could lead to more time-effective choices, like riding a car instead of taking the bus, walking or cycling. High income usually leads to good health choices, but can also lead to more cars, and being less affected by tolling stations and parking fees. The family's income was not included in the analyses of this study.

Electric cars have free or discounted passing through tolling stations in Norway (Statens vegvesen, 2018), and also free parking in several towns. Hence, they may be less affected by taxes and tolls introduced to reduce car traffic. This study did not ask whether the car used for commuting was electric or not, nor did it investigate the extent of tolling stations in the areas where data collection took place. However, considering the general increase in sales numbers of electric cars in Norway (Norsk elbilforening, 2018b), it would be reasonable to assume that a considerably greater share of car travels in 2018 than in 2008 was conducted with electric cars. In turn, if the electric cars replace traditional cars this might favour environmental sustainability, yet not individuals through increased levels of PA. Besides, like for infrastructural initiatives targeting increased active transport, the share of electric cars is still greater in more urban areas (Norsk elbilforening, 2018a).

A large share of Norwegians live in urban areas (Statistics Norway (SSB), 2018b) , and efforts to limit the use of private cars and increase active transportation will have a larger impact in urban areas in relation to environmental purposes (Klima- og miljødepartementet, 2007). However, these efforts may have a positive side effect in people being more open to active transportation and could have a positive impact also on public health in these areas. This might lead to an inequality in health, due to inhabitants in rural areas not being affected by these efforts. The Norwegian national travel survey states that the share of public transportation is higher when the public transportation system is better (Hjorthol et al., 2014) and if passengers walk or cycle to the public transportation, this could also be a contributor to increased active transportation. Initiatives to increase the public transportation might therefore have a positive impact on increasing physical activity for parents living too far away from work to be a walker or cyclist.

The study's strengths and limitations.

The study's main strengths are the reliable measurement on self-reported mode of commuting to work (Bere & Bjørkelund, 2009), and the possibility to examine time trends with a repeated cross-sectional design. Focusing on parents in small and medium sized towns and rural areas,

it can be an important supplement to the national travel survey, giving insight into the commuting habits of parents in these areas.

A limitation to this study is that only two of Norway's 19 counties was included, reducing generalizability as Norway is a diverse country regarding topography and climate. Another limitation is the low response rate, especially in the 2018 survey, which may have a negative effect on the validity of this study. The share of respondents having completed higher education was greater than the population in general, and there was an increase from 2008 (59%) to 2018 (72%). However, there has been an overall increase in the share of inhabitants having attended higher education in Norway. In the counties of Telemark and Hedmark, 29% of people aged 30-49 years had a high education level in 2008, versus 37% in 2017 (Statistics Norway (SSB), 2018a). The low response rate in 2018 might be a reason for the increased share of respondents reporting high education. There was also a high rate of female respondents both years.

3.5 Conclusions

This repeated cross-sectional study indicates that there have been small changes in commuting habits among parents of 10 to 12-year-old children in the Norwegian counties Telemark and Hedmark over the last 10 years. The results indicate that parents living more than 3 km from work are less likely to be walkers in 2018 than in 2008. There has been a focus on environmental issues regarding transportation, and initiatives have been taken to reduce car transport, although aiming mostly on urban areas, and not affecting rural and small-town areas to the same extent. To increase public health, actions should be taken to increase active transportation and reduce car driving, aiming at and customized to small towns and rural areas.

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4.0 Elaborations on the research paper

4.1 Methodological considerations

4.1.1 Study design and sample

This study has a repeated cross-sectional design, with different participants at the two data collections which took place ten years apart. Cross-sectional designs cannot draw conclusions regarding causal relationships, but repeated cross-sectional designs can examine changes at the population level and in relationships across variables (Menard, 2008). To be able to make comparisons across time, the questionnaires at the different time points have to be identical (Davis & Smith, 1992, cited in Menard, 2008). In compliance, the questions used in the analysis for this study was identical in the 2008 and 2018 surveys.

The response rate in this survey was calculated as the number of returned questionnaires divided by the total sample who were sent the information letter and consent form. Researchers have over many years seen a general decline in response-rates in surveys (de Leeuw, Hox, & Luiten, 2018), which is also the case in this study. This may often lead to nonresponse bias, i.e. a study sample differing from the population of interest and thus influencing the samples representativeness (Fincham, 2008).

To be able to compare two groups on an outcome variable the groups ought to be as similar as possible in regards of demographic variables. In this selection of parents, there was significant differences between the two groups (2008 and 2018) in regards of age, level of education and country of birth, however these differences do to a large extent reflect changes in the society in general. There was a small, but significant increase in the participants mean age between 2008 (41.3, SD 5.0) and 2018 (42.3, SD 5.1). However, at the population level mothers' age at birth increased from 29.2 to 30.3 between 1999 and 2007 (Statistics Norway (SSB), 2019), which means that the parents' age in this study sample can reflect the population of parents of 6^{th} and 7^{th} graders in 2008 and 2018 in Norway in general. In our samples, a share of 6 % was reported to be born outside Norway in 2008 versus 14 % in 2018. This change does to some extent represent changes in the population in general, where respectively 10 % and 16 % of the population was born outside Norway in 2008 and 2018 (Eurostat, 2019). As discussed in the research paper, the share of participants with a high educational level was higher in 2018 than 2008, and it was also higher than for the population in general, although this also to a certain extent reflects an increase in the educational level in general.

The families were free to choose which of the parents who filled out the questionnaire. The result was that more mothers than fathers filled out the questionnaire both years. A reason for this could be that mothers more often communicate with the child's school. The skewness in sex affect the representativeness of the respondents, and further the external validity of the results.

The counties Hedmark and Telemark was chosen by convenience, as the first FVMM- survey in 2001 was based on a subscription scheme for school fruit which was implemented in these counties this year. 38 schools were invited to participate in both 2008 and 2018, by contacting the principal and sending information on the project. 27 schools agreed to participate in 2008, and 25 schools agreed to participate in 2018. A few weeks prior to data collection, information letters and consent form for all the pupils were sent to each of the schools. A contact was asked to administrate the handout of information letters and consent forms. The pupils were asked to bring information letters and consent forms home to their parents, and to return the consent form if signed by a parent. In the 2018 survey, four master's degree students from University of Agder participated in the data collection, along with two students from other universities in Norway. The pupil questionnaires were filled out at school, with one or more of the master students present. Parent questionnaires with matching id-number were brought back home by the students, for one of their parents to fill out. The parents were asked to return the questionnaire to school by their child in a closed envelope. The school contact sent the parent questionnaires to University of Agder by prepaid envelopes. The selection process is described in Figure 1. It is reason to believe it would have been more effective if the parents could fill out an online questionnaire instead, however this is more likely to raise issues with confidentiality if the answers can be linked to IP addresses.

In addition to questions on demographic variables and commuting behaviour, the questionnaire also included a 24-hour food-recall, a food frequency questionnaire, and questions on attitudes towards climate change and the environment. The parent questionnaire was estimated to take approximately 30 minutes to complete, and the questions regarding transport were placed in the middle section of the questionnaire. Edwards, Roberts, Sandercock & Frost (2004) found that longer questionnaires were less likely to be responded than shorter questionnaires, and this might be a reason for low response rates in this survey. However, using a shorter questionnaire would limit the possibility to include several projects.

Self-reported questionnaires can be affected by social desirability bias, meaning participants answers in a way they think they should, rather than what is true (Adams et al., 2005). There

is a chance that the social desirability bias could be reinforced by the questionnaires being handed out and collected at school, if the parents do not trust the confidentiality of the project.

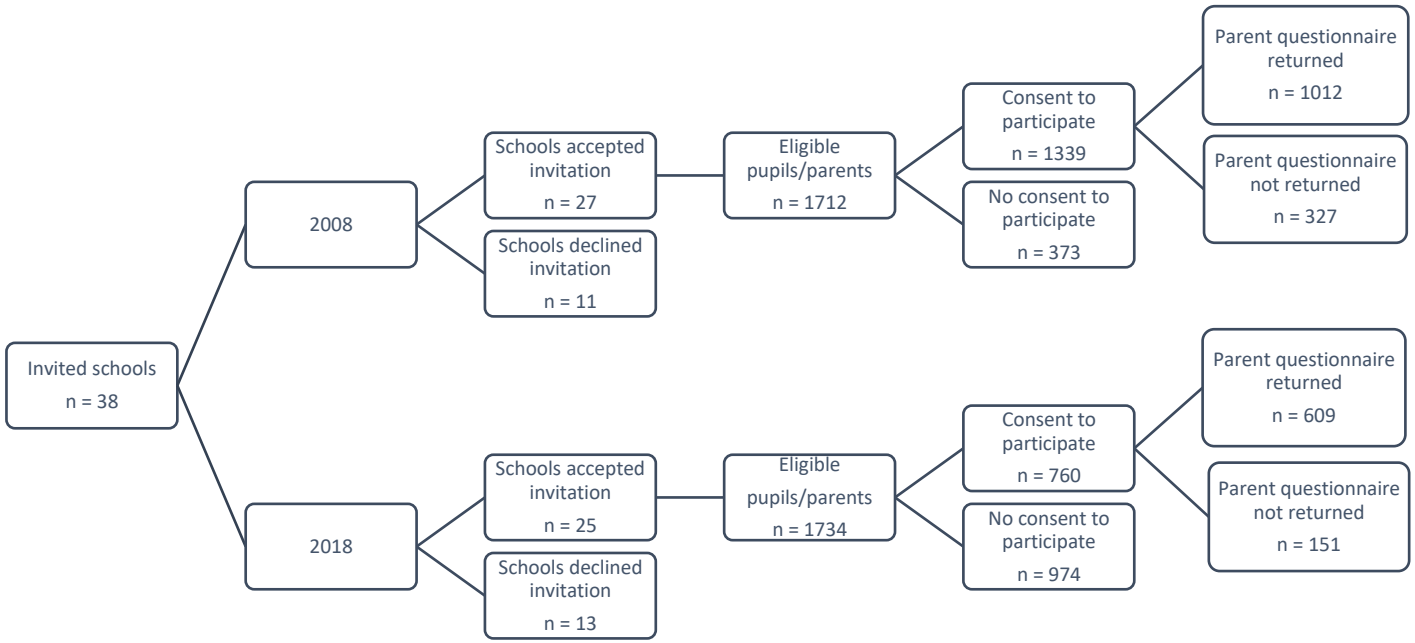

Figure 2. Flow chart of the inclusion process in 2008 and 2018, showing number of schools accepting or declining invitation to participate, and further number of eligible pupils/parents, number of returned parental consent and number of returned parent questionnaire.

The schools participating in 2008 (27 schools) and 2018 (25 schools), were not the same schools. Some schools accepted the invitation to participate in 2008, but declined in 2018, and vice versa. To add power to the study, all schools were included in the analysis. However, sensitivity analysis were conducted on the schools participating both years (18 schools, n=915), to identify potential differences in the results. The sensitivity analysis showed the same indications as the main analysis and in the demographic variables in the total sample.

Data processing

In 2018, four of the participating master's students contributed to plotting of the questionnaires into SPSS-files, using the same codebook as the 2008 survey. Each part of the questionnaire was plotted by the same student for all the questionnaires. The files were cleaned, i.e. checked for plotting errors, and then merged to a complete file with both parent and child data from the 2008 and 2018 surveys.

4.1.2 Measurements

The matrix used to assess commuting behaviour has been shown to have a test-retest correlation coefficient of 0.82 - 0.95 for parents, and 95 % of the parents were categorised into the same mode of commuting both at test and retest, which took place 14 days apart (Bere & Bjørkelund, 2009). This means that the questionnaire used to assess commuting mode is a reliable tool. However, one could argue that there is a risk of losing some data when categorizing the parents into one commuting mode. A mixed commuter could be a mix of bicycling/walking and would qualify as active commuter. A parent driving three times and walking twice a week will be put in the same category as someone driving five times a week.

Parts of the questionnaire is retrospective; the participants are asked how they normally get to work during the different seasons. Retrospective studies can be affected by recall bias (Coughlin, 1990). However, there is no reason to believe recall bias would occur more often at one of the two data collections. On the other hand, the answers in the questionnaires could be affected by climatic differences the two years of data collection. If the winter one year carried more snow, there might be a chance that fewer participants that year would report walking or bicycling during winter.

Data on ethnicity was not collected in the parent questionnaire. However, the children were asked in which country their mother and father were born. This question was used to assess

the participating parent's country of birth. This was then dichotomized into "born in Norway" or "born outside Norway". "Country of birth" is considered a less sensitive question/variable than "ethnicity" and can therefore be better suited for use as a confounder, when ethnicity is not the main variable of interest. In previous studies regarding active transportation, nationality of the country studied or not has been used as a variable instead of ethnicity (Cole-Hunter et al., 2015). Country of birth is however more diverse than these two alternatives. Participants could have been categorised into "Nordic countries" or "European countries" etc, however this would cause problems with small numbers in each group in the analysis.

Educational level was chosen as a measurement of SES, as it is a relatively stable variable. Higher educational level has shown to increase likelihood of engaging in health-enhancing activities (Ross & Wu, 1995). The variable educational level has in this study been dichotomised into "low education" and "high education". By dichotomising this variable, we might lose interesting information. Adler and colleagues (1994) have criticized research for comparing "low" versus "high" when using a SES-variable for confounding, because of the social gradient in health which means there can be differences between all the levels of education. Nevertheless, dichotomisation has been chosen in this study to avoid small groups in the analysis, and is however a common way to treat the SES variable (Maccallum, Zhang, Preacher, Rucker, & West, 2002).

The variable distance to work was dichotomised into "<3 km" or "≥3 km" for walkers, and "<5 km" or "≥5 km" for the other modes of commuting. As for educational level, there is a risk of losing some information when dichotomising this variable, and it might have served better as a confounding variable if included as a ratio scale. However, dichotomisation eases the interpretation of the logistic regression. The Norwegian national travel survey reports 80 % of walking trips and bicycle trips are under 3 km and 5 km, respectively (Hjorthol, Engebretsen, & Uteng, 2014), and the cut-offs for dichotomisation are set at these distances in this study.

4.1.3 Statistical analyses

The statistical method chosen for the main analysis in this thesis was binary logistic regression with a stepwise procedure. Regression models are used to describe the relationship between an outcome and a predictor, commonly including a set of covariates in the models, when the outcome is categorical or dichotomous (Hosmer, Lemeshow, & Sturdivant, 2013).

The result of the logistic regression is presented in this thesis as odds ratio. One assumption for conducting logistic regression analysis is that the study sample does not include repeated measures (Field, 2013). Although the data in this thesis is collected at two time points, the samples in 2008 and 2018 are independent groups, and the time of data collection is included in the models as the dichotomous variable "year": "2008" or "2018". According to assumptions for doing logistic regression, multicollinearity between the covariates was checked by performing a linear regression with the same variables and outcomes as the binary logistic regression, showing that Variance Inflation Factor (VIF) was <10 and tolerance >0.1 for all covariates (Field, 2013). Further, the standard error (SE) was checked, not being higher than 3 times the regression coefficient (B), except for the covariate "year" in the model for all walkers, where SE was 0.24 and the regression coefficient was 0.05. When including continuous predictors in the logistic regression model, linearity between the predictor and the log of the outcome should be checked (Field, 2013). In this study, age was the only continuous variable. An interaction between age and the log of the outcomes showed p-values greater than 0.5, meaning this assumption was met (Field, 2013). When including categorical or dichotomous variables in logistic regression, there can be a problem with small groups sizes (Pallant, 2010). In this data, there were only 2 walkers among the participants living 3 km or more from work in 2018. There were also only 2 public commuters living less than 5 km from work. For non-parametric tests in general, no cells should have expected values of less than 1, and no more than 20 % of the cells should have expected values of less than 5 (Field, 2013). In the regression analyses there were one cell with expected count below 5; public commuter born outside Norway. In the chi-square statistics assessing differences between years in share of participants categorised in each mode of transport (table 2), all cells in the crosstabs had expected counts more than 5.

The stepwise procedure of multivariate regressions has been criticised for selecting covariates merely based on significance level (Tabachnick & Fidell, 2013). Other covariates, although not significant, might have influenced the results in another direction. The significance level was set as high as <0.3 to minimize this risk, supported by Williams, Gauss, Bursac & Hosmer (2008) who states that inclusion level can be set >0.25 in order to provide a more complete set of possible predictors. However, the backwards exclusion level was set at <0.05. Statisticians have different opinions on this subject, and Williams et al. (2008) point at the possibility of large standard errors if all relevant variables are included, in addition to numerically unstable estimates. In order to test for moderation, i.e. the combined effect of two

variables on the outcome variable (Field, 2013), interaction terms were included in the analyses, revealing that there were changes between the years for specific groups. Because interactions have less power, the significance levels of interactions can be set >0.05 (Twisk, 2006), and in the analysis in this study they the significance level was set at $p \leq 0.1$. On the other hand, it might have been interesting to also conduct and present the binary logistic regression analyses without adjusting for the distance variable. Even if the reason for increased car use might be longer distances, it will still represent a transport trend which can affect PA-levels, public health and environmental sustainability.

Because participants are clustered by the schools of their children, and therefore living in specific areas, they might be affected by unobserved area characteristics. For example, it could be a removal of a tolling station, or road works being done, which could affect the results.

In this thesis, significance level is set at $p \leq 0.05$ except when stated otherwise. This is in line with scientific standards (Polit & Beck, 2018). Insignificant results by this level has been discussed with precaution or not at all in the research paper. However, many scientists have raised questions over the practise of using 0.05 as an absolute line for significant results, and several scientists call for the concept of statistical significance to be abandoned, and rather use p-value as a measure of the uncertainty of the results without categorising into "significant" or "non-significant" (Amrhein, Greenland, & McShane, 2019). The results in the research paper of this thesis which have been reported as "no significant change", can indeed show changes between the years, although with a higher degree of uncertainty. In the case of this study, an odds ratio of 1.3 with a confidence interval barely crossing 1 (CI 0.997-1.8), meaning 30 % increased likelihood of being a car commuter in 2018 versus 2008 with a relatively small degree of uncertainty, is still a non-significant result.

4.2 Ethical considerations

Researchers should assess risks and benefits of the research being done, and the risks for the participants should not be larger than the benefits of the study (Cozby & Bates, 2015). The benefits of this project can be high, due to the multiple research questions included in the project. In addition to commuting habits it will gain insight into eating habits among both parents and children and attitudes towards the environment. The questions used for this study are not considered very sensitive.

The survey is held confidential, and there is no link from id-number to names of participants. A few of the participants might be recognisable when the child's school is linked to specific questions like country of birth, work situation etc., however, no participant is identified in the research papers or theses of this project. Data files are only available for project members and is kept on password protected computers. Sensitive data will be deleted in the end of 2019.

Both information letter with consent form and the questionnaires were handed out at school for the pupils to bring home to their parents. This could cause a feeling of pressure to participate in the survey. However, both school leaders, teachers, pupils and parents (written in information letter and in the beginning of the questionnaire) are informed that participation is completely voluntarily. Parents and pupils were also informed that they were free to withdraw at any moment, and if there were questions they did not want to answer they could leave them unanswered.

4.3 Further elaborations of the results

The results of this study suggest that the transportation habits of parents in the counties of Hedmark and Telemark is not going in the direction desired by the national authorities, who targets more active transportation and public commuting, and less car driving. The share of participants categorised as car commuters is significantly higher in 2018 than in 2008, and the share of cyclists is lower in 2018 than in 2008, although borderline significant for the full year (table 2). The characteristics of the study sample (table 1) reveals that a lower proportion of the participants lived less than 5 km from work in 2018 than in 2008, which can be a cause for the increase in car commuters and decline in cyclists. In the binary logistic regression models in this study, distance shows a significant association with all transport modes. Parents are more likely to be categorised as a walker if they live less than 3 km from work, and they are more likely to be categorised as a cyclist and less likely to be categorised as a car commuter or public commuter if they live less than 5 km from work. This supports several previous studies (Badland, Schofield, & Garrett, 2008; Cole-Hunter et al., 2015; Heinen, Van Wee, & Maat, 2010). The Norwegian national travel survey also shows an increase in average commuting distance for the population in general, although not causing a similar decline in active transportation (Hjorthol et al., 2014). This might be due to differences in initiatives taken to increase active transportation in different areas. The national policies for transportation focus to a large extent on urban areas, and the major economic incentives for

reduced car driving is aimed at the largest urban areas in Norway, which include one area in Telemark, but none in Hedmark (Samferdselsdepartementet, 2019).

In addition to infrastructure like bicycle- and walking lanes to promote walking and cycling, mixed land use has been shown to be a good facilitator for active transportation (Badland et al., 2008; Saelens, Sallis, & Frank, 2003). Mixed land use means to locate residential, commercial and industrial areas in near proximity to each other, to reduce the need for car transport due to reduced distances (Healthy Spaces & Places, 2009). Municipalities is responsible for urban design planning (Plan- og bygningsloven, 2008), and which considerations are taken into account might vary between municipalities.

The Norwegian national transportation plan for 2010-2019 stated that better and safer roads would be a priority in rural areas (Samferdselsdepartementet, 2009). While the intention was to decrease the risk for accidents, this might also have had an effect of more effective car travels, and hence, an incentive to use private car and an increase in car commuters in rural areas. Inhabitants of smaller towns and rural areas will also be less affected by congestion, which will make car commuting more effective than in larger cities.

It seems that initiatives taken in Hedmark and Telemark have not been sufficient in order to reduce car driving and increase walking, cycling and public commuting in these areas. The lack of increase in active transportation among parents in these areas may have a negative effect on their general PA-levels. As parents' transportation and PA habits is known to influence their children's habits (Deka, 2013; Merom, Tudor- Locke, Bauman, & Rissel, 2006), this may have a negative impact also for the younger generation. As an increase in active transportation has been shown to reduce socioeconomic differences in PA (Del Duca et al., 2016), and the general active transportation levels seems to be going in an opposite direction in Norway in general (Hjorthol et al., 2014), it is reason to believe these results imply a negative effect on public health in these areas.

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5.0 Conclusions

The results of this study suggest that there have been small changes in transportation habits in parents in Hedmark and Telemark between 2008 and 2018. There has been a reduction of walkers in parents living more than 3 km from work, and unadjusted, the share of car commuters has increased. This study implies that there should be a focus on initiatives on different levels to increase active transportation among parents in these areas, and initiatives should be evaluated to see if they have the desired effect.

Ansatteprosjekter - Kommentar

Navn: Elling Tufte Bere

Kommentar: Kommentert versjon av FEK søknad FVMM_ATN survey 2018.pdf

Kommentar: Hei!
Under forutsetning av at prosjektet gjennomføres som beskrevet i søknaden har FEK ingen etiske betenkeligheter med prosjektet .
Lykke til!

Mvh FEK

Karakter:

Evaluering: Godkjent

Avbryt

Universitetet i Agder
Att: Elling Bere
Elling.bere@uia.no

Vår dato: 21.08.2018 Vår ref:60714 MSS/LR Deres dato: Deres ref:

VURDERING AV BEHANDLING AV SÆRSKILTE KATEGORIER PERSONOPPLYSNINGER I PROSJEKTET: *EN SPØRREUNDERSØKELSE OM KOSTHOLD, FYSISK AKTIVITET OG MILJØ - FVMM/ATN 2018 SURVEY*

NSD - Norsk senter for forskningsdata AS viser til meldeskjema innsendt 09.05.2018. Meldingen gjelder behandling av personopplysninger til forskningsformål.

Etter avtale med den behandlingsansvarlige, Universitetet i Agder, har NSD foretatt en vurdering av om den planlagte behandlingen er i samsvar med personvernlovgivningen.

Resultat av NSDs vurdering:

NSD vurderer at det vil bli behandlet særskilte kategorier personopplysninger om helseforhold og etnisk bakgrunn frem til 31.12.2019.

NSDs vurdering er at behandlingen vil være i samsvar med personvernlovgivingen, og at lovlig grunnlag for behandlingen er samtykke.

Vår vurdering forutsetter at prosjektansvarlig behandler personopplysninger i tråd med:

- opplysninger gitt i meldeskjema og øvrig dokumentasjon
- dialog med NSD, og vår vurdering (se under)
- Universitetet i Agder sine retningslinjer for datasikkerhet, herunder regler om hvilke tekniske hjelpemidler det er tillatt å bruke
- Universitetet i Agder sine retningslinjer for bruk av databehandler.

Nærmere begrunnelse for NSDs vurdering:

1. Beskrivelse av den planlagte behandlingen av personopplysninger

FORMÅL
Formålet med dette prosjektet er å undersøke utviklingen i kosthold og fysisk aktivitet over tid. Universitetet i Agder gjennomførte en tilsvarende undersøkelse i 2001 og 2008. Dette gir unike data for å kunne evaluere den nasjonale ordningen med gratis skolefrukt som varte fra 2007 til 2014. I tillegg kan man i dette datamaterialet se på utviklingen over tid på sentrale kostparametere, transportvaner og holdninger til et bærekraftig kosthold. Dette sett opp mot

sosioøkonomisk status og kjønn. Det inkluderes nå også en undersøkelse på videregående skoler for å se på langtidseffekten av gratis skolefrukt..

UTVALG OG REKRUTTERING
Det rekrutteres tre utvalg i forbindelse med studien:
1) 6. og 7. klassinger ved 38 skoler i Hedmark og Telemark,
2) Elevenes foreldre
3) personer som bor i Hedmark og Telemark og er født i 2000/ 2001.

Totalt består utvalget av maksimalt 1300 barn, 8000 ungdom og 1000 foreldre/voksne. Undersøkelsen på 6. og 7. trinnet gjennomføres ved hjelp av papirskjema i skoletiden. Foreldre og barn rekrutteres via skolen.

Det har ikke lykkes prosjektleder å få gjennomført ungdomsundersøkelsen i skoletiden ved de videregående skolene og rekruttering vil derfor skje via Facebook. Det er ønskelig å innhente besvarelser på elektronisk spørreskjema fra 1000 ungdommer. Ved for lav svarprosent vil utvalget utvides til å også omfatte Agder-fylkene.

De 38 skolene i del 1 er skolene som i 2001 var med i prosjektet Fruits and Vegetables Make the Marks (FVMM, NSD prosjektnr. 12395). En rekrutterer ungdommer i Hedmark og Telemark født i 2000/2001 for å kunne sammenligne med FVMM data fra 2001 og 2008.

DATAMATERIALE
Det innhentes blant annet opplysninger om kosthold, aktivitet, transportvaner og holdninger til et bærekraftig kosthold, samt sosioøkonomisk status og kjønn. Det vil registreres navn på skole i forbindelse med undersøkelsen på 6. og 7. trinn.

METODE
Opplysningene innhentes gjennom papirbasert spørreskjema blant elever på 6. og 7. trinn. Papirskjema kodes for å kunne kobles mot foreldrenes besvarelse som gjennomføres elektronisk.

Spørreundersøkelse blant ungdommer gjennomføres elektronisk.

INFORMASJON OG SAMTYKKE
Barneskolene kontaktes først på e-post, så på telefon. Lærerne informerer elevene og foreldrene ved å levere ut informasjonsskriv med samtykkeerklæring.

Ungdommene rekrutteres og får informasjon via Facebook, samt i informasjonstekst innledningsvis i elektronisk spørreskjema.

BEHANDLINGENS VARIGHET
Ifølge e-post fra forsker, mottatt den 31.07.2018, og i tråd med informasjonen til de registrerte, vil opplysningene behandles frem til 31.12.2019. Innen 31.12.2019 skal personidentifiserbare opplysninger slettes fra datamaterialet, eller bearbeides på en slik måte at enkeltindivider ikke kan identifiseres.

2. Personvernprinsipper

NSDs vurdering er at behandlingen følger personvernprinsippene, ved at personopplysninger;

- skal behandles på en lovlig, rettferdig og åpen måte med hensyn til den registrerte (se punkt 3 og 4)

- skal samles inn for spesifikke, uttrykkelig angitte og berettigede formål og der personopplysningene ikke viderebehandles på en måte som er uforenelig med formålet (se punkt 1 og 3)
- vil være adekvate, relevante og begrenset til det som er nødvendig for formålet de behandles for (se punkt 6)
- skal lagres på en slik måte at det ikke er mulig å identifisere de registrerte lengre enn det som er nødvendig for formålet (se punkt 5 og 6)

3. Lovlig grunnlag for å behandle særskilte kategorier personopplysninger

Særskilte kategorier - Samtykke ((art. 6.1. a), art. 9.2 a)
Det fremgår av meldeskjema vi har fått tilsendt at det vil bli innhentet samtykke fra de registrerte. NSD vurderer at den planlagte behandlingen av personopplysninger er lovlig fordi:

- det skal innhentes uttrykkelig samtykke fra de registrerte og
- forsker har oppfylt den særskilte rådføringsplikten

Samtykke dokumenteres ved at det innhentes samtykkeerklæringer hvor foreldre til elever under 15 år har underskrevet. Samtykke fra elever ved videregående skole innhentes ved at den forespurte besvarer et elektronisk spørreskjema og at kobling mot IP loggføres.

4. De registrertes rettigheter

NSD vurderer at den registrerte har krav på å benytte seg av følgende rettigheter: informasjon, innsyn, retting og sletting av personopplysninger, begrensning, dataportabilitet, protest.

NSD finner at informasjonsskrivet stilet til elever og foreldre mottatt den 31.07.2018 vil gi de registrerte god informasjon om hva behandlingen innebærer og om hvilke rettigheter de har. Vi ber likevel om at det tydeliggjøres hvordan man går frem for å benytte seg av sine rettigheter, d.v.s. hvem man kontakter f.eks. dersom man ønsker å trekke seg fra studien og få opplysningene anonymisert. Vi foreslår at dette tilføyes avslutningsvis hvor det blant annet står «Dersom du har spørsmål eller andre henvendelser omkring prosjektet, vennligst ta kontakt med:...»

NSD finner at informasjonsskrivet stilet til ungdommene er noe mangelfullt, og ikke gir de registrerte god nok informasjon om hva behandlingen innebærer og om hvilke rettigheter de har. Vi forutsetter derfor at følgende endres/tilføyes før det gis til utvalget;

- Formuleringen «Det er **viktig** at du leser forklaringen for hvordan du fyller ut skjemaet nøye. Ved å fylle ut denne undersøkelsen kan få mulighet til å være med i trekningen av 10 gavekort. Hvert gavekort er på 1000 kroner», bør ikke stå innledningsvis i informasjonsskrivet. Fokuset på en potensiell belønning skal ikke gå på bekostning av annen viktig informasjon om hva deltakelsen innebærer. Vi foreslår at formuleringen står avslutningsvis under overskriften «Hva innebærer det for deg å delta?»
- Det må påføres hvordan den enkelte går frem dersom man vil benyttes seg av rettighetene sine, som f.eks. å trekke seg fra undersøkelsen. Dette må fremgå tydeligere under overskriften «Hvor kan jeg finne ut mer?»

Reviderte informasjonsskriv må sendes til personverntjenester@nsd.no, husk å oppgi prosjektnummer.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har Universitetet i Agder plikt til å svare innen en måned. Vi forutsetter at prosjektansvarlig informerer institusjonen så fort som

mulig og at Universitetet i Agder har rutiner for hvordan henvendelser fra registrerte skal følges opp.

5. Informasjonssikkerhet

I følge meldingen skal personopplysningene behandles ved hjelp av datamaskin i nettverkssystem tilknyttet internett tilhørende virksomheten, privat datamaskin, og på server i Universitetet i Agders nettverk. Vi minner om at Universitetet i Agder er pålagt å ha kontroll på behandlingen av personopplysninger og vi anbefaler derfor ikke at personopplysninger behandles på privat utstyr uten at dette kravet kan innfris. Dette er en vurdering Universitetet i Agder må foreta. Da også studenter fra to andre forskningsinstitusjoner skal benytte opplysninger fra prosjektet, anbefaler vi at det sikres at disse dataene ikke inneholder indirekte identifiserende opplysninger.

Alle lagringsenheter beskyttes med brukernavn og passord.

Koblingsnøkkel oppbevares på passordbeskyttet pc. Kun prosjektansvarlig skal ha tilgang til denne i følge informasjonen til de som forespørres om deltakelse.

NSD forutsetter at personopplysningene behandles i tråd med personvernforordningens krav og institusjonens retningslinjer for informasjonssikkerhet.

6. Varighet

Ifølge meldeskjema skal personopplysninger behandles frem til 31.12.2019. Opplysninger som kan knyttes til en enkeltperson skal da slettes/anonymiseres.

Universitetet i Agder må kunne dokumentere at datamaterialet er anonymisert.

Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan bli identifisert. Det gjøres ved å:

- Slette navn, fødselsnummer/andre ID-nummer, adresse, telefonnummer, epostadresse, IP-adresse og andre nettidentifikatorer
- Slette eller grovkategorisere alder, bosted, navn på skole, institusjon, og andre bakgrunnsopplysninger

For en utdypende beskrivelse av anonymisering av personopplysninger, se Datatilsynets veileder: https://www.datatilsynet.no/globalassets/global/regelverk-skjema/veiledere/anonymisering-veileder-041115.pdf

Meld fra om endringer
Dersom behandlingen av personopplysninger endrer seg, kan det være nødvending å melde dette til NSD via Min side. På våre nettsider informerer vi om hvilke endringer som må meldes. Vent på svar før endringen gjennomføres.

Informasjon om behandlingen publiseres på Min side, Meldingsarkivet og nettsider
Alle relevante saksopplysninger og dokumenter er tilgjengelig:

- via Min side for forskere, veiledere og studenter
- via Meldingsarkivet for ansatte med internkontrolloppgaver ved Universitetet i Agder.

NSD tar kontakt om status for behandling av personopplysninger
Etter avtale med Universitetet i Agder vil NSD følge opp behandlingen av personopplysninger ved planlagt avslutning.

Vi sender da en skriftlig henvendelse til prosjektansvarlig og ber om skriftlig svar på status for behandling av personopplysninger.

Se våre nettsider eller ta kontakt ved spørsmål. Vi ønsker lykke til med behandlingen av personopplysninger.

Med vennlig hilsen

Marianne Høgetveit Myhren
seksjonsleder

Marie S. Schildmann
seniorrådgiver

.....

Lovhenvisninger

NSDs vurdering er at den planlagte behandlingen av personopplysninger:

- er regulert av personopplysningsloven, jf. § 2.
- oppfyller prinsippene i personvernforordningen om:
  - lovlighet, rettferdighet og åpenhet jf. art. 5.1 a)
  - formålsbegrensning jf. art. 5.1 b)
  - dataminimering jf. art. 5.1 c)
  - lagringsbegrensning jf. art. 5.1 e).
- kan finne sted med hjemmel i personvernforordningen art. 6.1 a), art. 9.2 a)
- gjennomføres på en måte som ivaretar de registrertes rettigheter jf. personvernforordningen **art. 11-22**

NSD legger til grunn at institusjonen også sørger for at behandlingen gjennomføres i samsvar med personvernforordningen:

- art. 5.1 d) og art. 5.1. f) og art. 32 om sikkerhet
- art. 26-29 ved felles behandlingsansvar med andre institusjoner eller bruk av databehandler
- kapittel 5 ved overføring av personopplysninger til tredjeland/internasjonale organisasjoner

Elling Tufte Bere

Fra: Marie Strand Schildmann <Marie.Schildmann@nsd.no>
Sendt: onsdag 22. august 2018 09:30
Til: Elling Tufte Bere
Emne: Prosjektnr: 60714. En spørreundersøkelse om kosthold, fysisk aktivitet og miljø - FVMM/ATN 2018 survey

Korrigering av vurdering av prosjektet «FVMM/ATN 2018»

Jeg viser til e-post mottatt 22.08.2018 og påfølgende telefonsamtale med deg som daglig ansvarlig.

Det er nå avklart at både barn på 6. og 7. trinn samt deres foreldre vil få spørreskjema i papirformat. Det vil slik sett ikke eksistere noen koblingsmulighet mot direkte identifiserbare opplysninger (f.eks. IP-adresse). Samtykkelister er ikke knyttet til de kodene som deles ut. Kodene er tilfeldige og kan kun benyttes for å gjøre kobling av besvarelse fra elev og foreldre mulig. Den eneste muligheten for identifisering vil være gjennom bakgrunnsvariabler og navn på skole i noen få tilfeller. Jeg foreslår derfor at dette utdypes i informasjonsskrivet, f.eks. ved at dere benytter forklaringene ovenfor. Da de registrertes rettigheter likevel må stå , kan det med fordel også understrekes i avsnittet som omhandler rettighetene, at anledningen til å trekkes seg eller benytte seg av de andre rettighetene utelukkende vil være relevant dersom de helt klart kan identifiseres i datamaterialet. Det er svært få personer som vil kunne identifiseres i dette materialet, men det bør fremgå av informasjonsskrivet at dere blant annet vil ha opplysninger om hvilken skole besvarelsen fra den enkelte kommer fra.

Send det endelige informasjonsskrivet til meg og personverntjenester@nsd.no så snart det er klart!

Vennlig hilsen
Marie Strand Schildmann
Seniorrådgiver | Senior Adviser
Seksjon for personverntjenester | Data Protection Services
T: (+47) 55 58 31 52

NSD – Norsk senter for forskningsdata AS | NSD – Norwegian Centre for Research Data
Harald Hårfagres gate 29, NO-5007 Bergen
T: (+47) 55 58 21 17
postmottak@nsd.no www.nsd.no

UNIVERSITETET I AGDER

Til elever og foresatte i 6. og 7. klassetrinn

Dato: 22.08.2018

Besøksadresse: Gimlemoen 25 I
Direkte: 38 14 23 29

Forespørsel om å delta i forskningsprosjektet FG6/ATN/(M)EAT 2018 om ernæring og fysisk aktivitet

Vi skal ved Universitetet i Agder (UiA) gjennomføre en større spørreundersøkelse i forbindelse med prosjektene Frukt og grønt i 6. (FG6), Aktiv transport til skole og jobb i Norge (ATN) og (M)EAT (om bærekraftig kosthold). I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg og ditt barn.

Formål
Vi er interessert i inntaket av frukt og grønnsaker, hvordan nordmenn kommer seg til skole og jobb, samt bærekraftig kosthold. Prosjektet FG6 startet i 2001. Resultat fra dette prosjektet har bl.a. bidratt til at regjeringen fra 2007 til 2014 satte av penger til gratis skolefrukt. Nå ønsker vi å evaluere denne ordningen samt å se på endring av kostvaner over tid. I prosjektet ATN ønsker vi å se på utvikligne fra 2008 til 2018 på transportvaner til jobb og skole, og i prosjektet (M)EAT ønsker vi å se på nordmenns forhold til et bærekraftig kosthold.

Ansvarlig for prosjektene
Dette er forskningsprosjekt i regi av Universitetet i Agdet (UiA). Seks masterstudenter (fire fra Universitetet i Agder), en fra OsloMet - storbyuniversitetet og en fra Norges miljø- og biovitenskapelige universitet (NMBU) skal skrive sine oppgaver basert på data som samles inn.

Hvorfor får du spørsmål om å delta?
Vi har tilfeldig trukket ut 38 skoler i Hedmark og Telemark hvor 6. og 7. klassinger og en av deres foreldre inviteres til å delta. Tilsvarende undersøkelsen har blitt gjennomført på de samme skolene i 2001 og 2008.

Hva innebærer det for deg og din sønn/datter å delta?
Deltagelse vil si at du og ditt besvarer et spørreskjema hver (som inkluderer alle de tre nevnte prosjektene). Barna fyller ut skjemaet i en time på skolen i uke 37 eller uke 38 (september 2018). Hvis du ønsker å se spørreskjemaet til elevene før de fyller det ut, vennligst ta kontakt med undertegnede. De får så med seg en konvolutt hjem med et spørreskjema som en av foreldrene skal fylle ut, og returnere til skolen i lukket konvolutt. Dette spørreskjemaet tar ca 30 minutter å fylle ut.

Spørsmålene i spørreskjemaene omhandler inntak av frukt, grønnsaker og kjøtt, samt andre kostholdsvaner, hvordan man kommer seg til/fra skole/jobb, annen fysisk aktivitet, samt faktorer som kan relateres til dette (for eksempel tilgjengeligheten av frukt og grønnsaker hjemme, holdninger til bruk av bil, og utdanningsnivå). Elevene vil også bli spurt om høyde og vekt, om han/hun har forsøkt å slanke seg og om han/hun har prøvd alkohol og tobakk.

Det er frivillig å delta
For at du og ditt barn skal kunne delta i spørreundersøkelsen trenger vi ditt samtykke. For å delta må du derfor fylle ut svarslippen som er vedlagt og levere den til ditt barns kontaktlærer.

Det er frivillig å delta i prosjektet. Hvis dere velger å delta, kan dere når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om dere vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for dere hvis dere ikke vil delta eller senere velger å trekke dere.

Deres personvern – hvordan vi oppbevarer og bruker deres opplysninger
Vi vil bare bruke opplysningene om dere til formålene vi har fortalt om i dette skrivet, og ingen vil gjenkjennes i publikasjoner. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. De som har tilgang på data er de nevnte masterstudentene samt veiledere. Spørreskjemaene er merket med et nummer som kobler svar fra barn og forelder, men som ikke kan kobles til navn. Undersøkelsen er likevel ikke helt anonym, da vi samler inn data som potensielt indirekte, i få tilfeller, kan kunne identifisere enkelte ved å koble variabler. F.eks. hvilken skole barnet går på samen med bakgrunnsvariabler fra foreldrenes spørreskjema.

Hva skjer med opplysningene deres når vi avslutter forskningsprosjektet?
Opplysningene anonymiseres når prosjektet er avsluttet, senest 31. desember 2019.

Deres rettigheter
De som kan identifiseres i datamaterialet (dette vil gjelde svært få, se over under *Deres personvern*), har rett til:

- innsyn i hvilke personopplysninger som er registrert om deg,
- å få rettet personopplysninger om deg,
- få slettet personopplysninger om deg,
- få utlevert en kopi av dine personopplysninger (dataportabilitet), og
- å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om dere?
Vi behandler opplysninger om deg basert på ditt samtykke. På oppdrag fra Universitetet i Agder har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket. Studien har etisk godkjenning fra Etisk komite ved fakultet for Helse- og idrettsvitenskap, Universitetet i Agder (FEK).

Hvor kan jeg finne ut mer?
Har du spørsmål eller senere ønsker å trekke deg fra prosjektet vennligst ta kontakt med:

- Universitetet i Agder ved professor Elling Bere (telefon 38142329, e-post elling.bere@uia.no) eller masterstudent Helene Kristin Olsen (telefon 93215307, e-post heleno17@student.uia.no)
- Vårt personvernombud: Ina Danielsen (telefon 45254401, e-post personvernombud@uia.no)

Vennlig hilsen

Helene Kristin Olsen
Masterstudent

Elling Bere
Professor

Samtykkeerklæring
FG6/ATN/(M)EAT 2018

Jeg har mottatt og forstått informasjon om prosjektet FG6/ATN/(M)EAT 2018, og har fått anledning til å stille spørsmål.

- ☐ Jeg samtykker til at mitt barn kan delta i spørreundersøkelsen, at han/hun kan ta med et spørreskjema hjem til meg, og at våre opplysninger behandles frem til prosjektet er avsluttet 31.12.19

Navn på barnet:_____

Skole/klasse:_____

Navn forelder (blokkbokstaver):_____

Dato og signatur

…….....

Svarslippen sendes med ditt barn tilbake til kontaktlærer.

UNIVERSITETET I AGDER

F

Universitetet i Agder
Institutt for folkehelse, idrett og ernæring
v/ Elling Bere
Serviceboks 422
4604 Kristiansand

Telefon 38 14 23 29
-FVMM/ATN.foreldre.cohortIII.sep18-

Spørreskjema om kosthold, fysisk aktivitet og miljø - FG6/ATN/(M)EAT 2018

Takk for at du vil delta i den felles datainnsamlingen for prosjektene Frukt og grønt i 6. (FG6), Aktiv transport til skole og jobb i Norge (ATN) og (M)EAT (om bærekraftig kosthold).

I dag har elevene i din datter/sønns klasse svart på et liknende spørreskjema.

Det er kun en av elevens foreldre/foresatte som skal fylle ut dette spørreskjemaet.

Alle svarene behandles konfidensielt. Er det spørsmål du ikke kan eller vil svare på kan du la det være.

Det ferdig utfylte skjemaet legges i den konvolutten den kom i, forsegles og sendes med din sønn/datter tilbake til kontaktlærer.

Dersom du har spørsmål eller andre henvendelser omkring prosjektet, vennligst ta kontakt med Helene Kristin Olsen på telefon 93215307, eller e-post heleno17@student.uia.no.

TAKK FOR HJELPEN!

Elling Bere
Professor
Prosjektleder

Helene Kristin Olsen
Masterstudent

1. Er du?

(1) ☐ Mann

(2) ☐ Kvinne

2. I hvilket år er du født?

1	9		

3. Hvilken dato er det i dag?

Del A - Hva spiste du i går?

Dagen i går er delt opp i 4 perioder: Frokost, mellom frokost og middag, middag og kvelds.

- Kryss av for om du spiste de forskjellige matvarene til de forskjellige tider eller ikke.
- For **frukt, grønnsaker, poteter**, o**g kjøtt** skal du også skrive HVA du spiste og HVOR MYE. Under følger en beskrivelse av hvordan du skal gjøre dette.
- Du skal også skrive ned om du kastet mat i går, samt hva og hvor mye.

For å skrive ned hvor mye du spiste og drakk skal du tenke på følgende:

Frukt og **bær** måles i antall (f.eks. ett eple, en banan) eller i porsjon (f.eks. en porsjon fruktsalat)

Grønnsaker måles i antall (f.eks. en gulrot) eller i porsjon (f.eks. en porsjon salat, en porsjon brokkoli)

Poteter måles i antall (f.eks. 2 poteter) eller i porsjon (f.eks. en porsjon potetstappe eller en porsjon stekte poteter)

Kjøtt måles i antall (f.eks. pølser/skinkeskiver på brødskiven) eller porsjon (til middag)

Hvis du spiste noe som ikke kan måles i stykker, porsjoner eller antall, må du beskrive best mulig hvor mye du spiste (f.eks. 2 never bringebær, 1½ skive kålrot, 3 ringer paprika).

Kjøtt deles i rødt kjøtt (f.eks. svin, lam og storfe) og hvitt kjøtt (kylling og kalkun).

Tenk tilbake til i går tidlig

Frokost

4. Spiste du frokost i går tidlig?

☐ Ja ☐ Nei

5. Spiste du frukt eller bær i går tidlig?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **frukt** og **bær** du spiste her:

6. Spiste du grønnsaker i går tidlig?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **grønnsaker** du spiste her:

7. Spiste du kjøtt i går tidlig?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **kjøtt** du spiste her:

8. Kastet du mat i går tidlig?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **mat du kastet**:

Tenk på tiden mellom frokost og middag i går

9. Spiste du lunsj/ formiddagsmat i går?

☐ Ja ☐ Nei

10. Spiste du frukt eller bær i tiden mellom frokost og middag i går?

Formiddag

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **frukt** og **bær** du spiste her:

11. Spiste du grønnsaker i tiden mellom frokost og middag i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **grønnsaker** du spiste her:

12. Spiste du kjøtt i tiden mellom frokost og middag i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **kjøtt** du spiste her:

13. Kastet du mat i tiden mellom frokost og middag i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **mat du kastet** her:

Tenk tilbake til middagstid i går

Middag

14. Spiste du middag i går?

☐ Ja ☐ Nei

15. Spiste du potet til middag i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned i hvilken form og hvor mye **potet** du spiste her:

16. Spiste du grønnsaker til middag i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **grønnsaker** du spiste her:

17. Spiste du frukt eller bær til middag eller som dessert i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **frukt** og **bær** du spiste her:

18. Spiste du kjøtt til middag i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **kjøtt** du spiste her:

19. Kastet du mat i forbindelse med middagen i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **mat** du kastet her:

Tenk tilbake til tiden etter middag i går

20. Spiste du kveldsmat i går kveld?

☐ Ja ☐ Nei

Kvelds

21. Spiste du frukt eller bær etter middag eller til kvelds i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **frukt** og **bær** du spiste her:

22. Spiste du grønnsaker etter middag eller til kvelds i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **grønnsaker** du spiste her:

23. Spiste du kjøtt etter middag eller til kvelds i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **kjøtt** du spiste her:

24. Kastet du mat etter middag eller til kvelds i går?

☐ Ja ☐ Nei

Hvis ja, skriv ned hva slags og hvor mye **mat** du kastet her:

Del B - Hva spiser du vanligvis?

Når du fyller ut disse spørsmålene skal du tenke på hva du vanligvis spiser/drikker. Tenk gjerne på hva du har spist/drukket de siste 3 månedene. Tenk på både hva du spiser hjemme, på arbeid og i fritiden. Kryss av i den ruten du føler passer best for deg.

1. Hvor ofte spiser du potet?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

2. Hvor ofte spiser du grønnsaker til middag?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

3. Hvor ofte spiser du grønnsaker på brødskivene?

(11) ☐ Aldri
(12) ☐ Sjeldnere enn 1 gang i uken
(13) ☐ 1 gang i uken
(14) ☐ 2 ganger i uken
(15) ☐ 3 ganger i uken
(16) ☐ 4 ganger i uken
(17) ☐ 5 ganger i uken
(18) ☐ 6 ganger i uken
(19) ☐ Hver eneste dag
(20) ☐ Flere ganger hver dag

4. Hvor ofte spiser du andre grønnsaker (f.eks. gulrot til lunchen)?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

5. Hvor ofte spiser du eple, appelsin, pære og banan?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

6. Hvor ofte spiser du annen frukt og bær (andre frukter og bær enn eple, appelsin, pære og banan)?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

7. Hvor ofte spiser du nudler (f.eks. Mr.Lee)?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

8. Hvor ofte spiser du potetgull?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

9. Hvor ofte spiser du godterier (sjokolade, blandet godt osv.)?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

10. Hvor ofte spiser du boller, muffins, kake eller annen søt gjærbakst?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

11. Hvor ofte drikker du juice?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

12. Hvor ofte drikker du saft?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

13. Hvor ofte drikker du brus MED sukker?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

14. Hvor ofte drikker du brus UTEN sukker?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

15. Hvor ofte drikker du vann fra springen?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

16. Hvor ofte drikker du reint kjøpevann? (uten kullsyre og smak)

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

17. Hvor ofte drikker du vann med kullsyre og/ eller smak?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

18. Hvor ofte spiser du RØDT kjøtt som pålegg (skinke, pølse)?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

19. Hvor ofte spiser du pålegg av kylling/kalkun?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

20. Hvor ofte spiser du RØDT kjøtt til middag (som kotelett, karbonader, pølse, kjøttdeig)?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

21. Hvor ofte spiser du kylling/kalkun til middag?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver dag
(10) ☐ Flere ganger hver dag

Del C - Spørsmål om deg og ditt

1. Hvor mye bor du sammen med din sønn/datter?

(1) ☐ Hele tiden
(2) ☐ 50% eller mer av tiden
(3) ☐ Mindre enn 50%

2. Hvor mange personer er dere i familien (bor sammen til daglig)?

☐ Voksne

☐ Barn

3. Hva veide du sist du veide deg?

_____ kg

4. Hvor høy var du sist du målte deg?

_____ cm

5. Trener/mosjonerer du regelmessig?

(1) ☐ Ja

(2) ☐ Nei

(3) Hvis ja, skriv hva :

6. Utenom arbeidstid: Hvor mange GANGER i uken driver du idrett eller mosjonerer du så mye at du blir andpusten og/eller svett?

(1) ☐ Hver dag

(2) ☐ 4 - 6 ganger i uken

(3) ☐ 2 - 3 ganger i uken

(4) ☐ En gang i uken

(5) ☐ En gang i måneden

(6) ☐ Mindre enn en gang i måneden

(7) ☐ Aldri

7. Utenom arbeidstid: Hvor mange timer per dag pleier du å se på TV og/eller sitte foran PC'en?

(1) ☐ Ingen

(2) ☐ Mindre enn en ½ time om dagen

(3) ☐ ½ - 1 time

(4) ☐ 2 - 3 timer

(5) ☐ 4 timer

(6) ☐ Mer enn 4 timer

8. Har du egen sykkel (uten el-motor)?

(1) ☐ Ja

(2) ☐ Nei

9. Har du egen el-sykkel?

(1) ☐ Ja

(2) ☐ Nei

10. Hvor stor andel av syklingen din gjøres med el-sykkel (0-100%)?

_____ %

11. Hvor mange biler har familien din?

☐ Bil(er)

12. Neste gang familien skal kjøpe bil: Kommer dere til å kjøpe en "miljøvennlig" bil?

(1) ☐ Ja, helt klart

(2) ☐ Det vil bli vurdert

(3) ☐ Nei

13. Hvor mange bøker har dere hjemme hos dere?

(50 bøker er ca. 1 meter i bokhyllen)

(1) ☐ Ingen bøker

(2) ☐ Mindre enn 20

(3) ☐ 20 - 50

(4) ☐ 50 - 100

(5) ☐ 100 - 500

(6) ☐ 500 – 1000

(7) ☐ Mer enn 1000

14. Hvor ofte er familien din på tur i skogen/ på fjellet

(1) ☐ Aldri

(2) ☐ Sjeldnere enn 1 gang per måned

(3) ☐ Sjeldnere enn 1 gang per uke

(4) ☐ 1 gang i uken

(5) ☐ Mer enn 1 gang i uken

15. Røyker du?

(1) ☐ Nei, jeg har aldri røykt fast

(2) ☐ Nei, jeg har sluttet

(3) ☐ Ja, men ikke daglig

(4) ☐ Ja, daglig

16. Snuser du?

(1) ☐ Nei, jeg har aldri snust fast

(2) ☐ Nei, jeg har sluttet

(3) ☐ Ja, men ikke daglig

(4) ☐ Ja, daglig

17. Hvor ofte drikker du alkohol?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uka
(3) ☐ Ukentlig, men ikke daglig
(4) ☐ Daglig

18. Prøver du å slanke deg?

(1) ☐ Nei, vekten min er passe
(2) ☐ Nei, men jeg trenger å slanke meg
(3) ☐ Ja

19. Hvor mange timer sover du vanligvis om natten?

☐ Timer

20. Hvor lang utdanning har du?

(1) ☐ Grunnskole
(2) ☐ Videregående skole (inkl. gymnas/yrkesskole)
(3) ☐ Universitet eller høyskole (3 år eller mindre)
(4) ☐ Universitet eller høyskole (mer enn 3 år)

21. Hvor lang utdanning har din ektefelle/samboer?

(1) ☐ Grunnskole
(2) ☐ Videregående skole (inkl. gymnas/yrkesskole)
(3) ☐ Universitet eller høyskole (3 år eller mindre)
(4) ☐ Universitet eller høyskole (mer enn 3 år)
(5) ☐ Har ikke ektefelle/samboer

22. Hva var din husstands samlede årsinntekt for forrige år (brutto)?

_____ kr

23. Ranger trafikksikkerheten på skoleveien til barnet ditt fra 1 (meget farlig vei) til 10 (helt trygg vei)?

☐ km

24. Hva er ditt og din partners nåværende arbeid og stillingsprosent?

Deg selv_____ i _____%

Din partner_____ i _____%

25. Hvis det hadde vært stortingsvalg kommende mandag, hvilket parti ville du stemme på?

(1) ☐ Rødt
(2) ☐ Sosialistisk Venstreparti
(3) ☐ Arbeiderpartiet
(4) ☐ Senterpartiet
(5) ☐ Miljøpartiet: De grønne
(6) ☐ Kristelig folkeparti
(7) ☐ Venstre
(8) ☐ Høyre
(9) ☐ Fremskrittspartiet
(10) ☐ Annet parti……...
(11) ☐ Ville ikke stemt

26. Hvor ofte ser du på tv mens du spiser?

(1) ☐ Aldri
(2) ☐ Sjeldnere enn 1 gang i uken
(3) ☐ 1 gang i uken
(4) ☐ 2 ganger i uken
(5) ☐ 3 ganger i uken
(6) ☐ 4 ganger i uken
(7) ☐ 5 ganger i uken
(8) ☐ 6 ganger i uken
(9) ☐ Hver eneste dag
(10) ☐ Flere ganger hver da

Del E - Spørsmål om hvordan du kommer deg til arbeid (arbeider du både utenfor hjemmet og hjemme, tenk kun på arbeidsplassen utenfor hjemmet)**.**

1. Hvordan er din arbeidssituasjon?

(1) ☐ Arbeider kun utenfor hjemmet

(2) ☐ Arbeider både utenfor hjemmet og hjemme

(3) ☐ Arbeider kun hjemme/hjemmekontor (gå til spørsmål 21)

(4) ☐ Arbeider ikke/er hjemmeværende (gå til spørsmål 21)

2. Hvor mange dager i uka arbeider du utenfor hjemmet?

☐ dager

3. Hvordan kom du deg til arbeid i går?

(1) ☐ Gikk

(2) ☐ Syklet

(3) ☐ Kjørte bil

(4) ☐ Tok kollektiv transport (buss, tog e.l.)

(5) ☐ Var ikke på jobb utenfor hjemmet i går

4. Hvordan kom du deg fra arbeid i går?

(1) ☐ Gikk

(2) ☐ Syklet

(3) ☐ Kjørte bil

(4) ☐ Tok kollektiv transport (buss, tog e.l.)

(5) ☐ Var ikke på jobb utenfor hjemmet i går

5. Hvordan kommer du deg vanligvis til og fra arbeid utenfor hjemmet. Skriv inn antall dager i en normal uke ved de forskjellige årstidene. Summer for hver linje (jobber du 5 dager/uke utenfor hjemmet skal summen for hver linje bli 5, jobber du 3 dager utenfor hjemmet/uke skal summen bli 3).

Årstid		Går	Sykler/ el-sykler	Kjører bil (motorsykkel e.l.)	Kollektiv transport	Totalt
Høst (sept- nov)	Til arbeid					=
	Fra arbeid					=
Vinter (des- feb)	Til arbeid					=
	Fra arbeid					=
Vår (mars- mai)	Til arbeid					=
	Fra arbeid					=
Sommer (jun- aug)	Til arbeid					=
	Fra arbeid					=

6. Har du tilgang på parkeringsplass på arbeidsplassen?

(1) ☐ Ja

(2) ☐ Nei

7. Når du kjører/tar bil til jobb, hvor mange voksne er det vanligvis i bilen?

☐ voksne

8. Hvor langt er det fra hjemmet til arbeidet?

☐ km

9. Hvor lang tid bruker du på å gå *til og fra* arbeid (NB: et svar til arbeid og et svar fra):

	Til	Fra	
(1)	☐	☐	Mindre enn 10 min
(2)	☐	☐	10-20 min
(3)	☐	☐	20-30 min
(4)	☐	☐	30 min eller mer
(5)	☐	☐	Går aldri

10. Hvor lang tid bruker du på å sykle *til og fra* arbeid:

	Til	Fra	
(1)	☐	☐	Mindre enn 10 min
(2)	☐	☐	10-20 min
(3)	☐	☐	20-30 min
(4)	☐	☐	30 min eller mer
(5)	☐	☐	Sykler aldri

11. Dersom du går eller sykler *til og fra* arbeid, blir du andpusten og/eller svett?

	Til	Fra	
(1)	☐	☐	Ja
(2)	☐	☐	Nei

12. Har du sykkelhjelm?

(3) ☐ Ja

(4) ☐ Nei

13. Bruker du sykkelhjelm når du sykler til jobb?

(1) ☐ Ja

(2) ☐ Av og til

(3) ☐ Nei

(4) ☐ Sykler aldri

14. Ranger trafikksikkerheten på arbeidsveien din fra 1 (meget farlig vei) til 10 (helt trygg).

☐

15. Er det noe konkret som hindrer deg i å gå /sykle til arbeid så ofte som du vil?

(1) ☐ Ja

(2) ☐ Nei

(3) Hvis ja, skriv hva:

☐

16. Dersom du tar kollektiv transport til arbeid, hvor langt er det fra der du bor til holdeplassen/stasjonen?

☐ km

17. Dersom du tar kollektiv transport, hvordan kommer du deg som regel til holdeplassen/stasjonen

(1) ☐ Går

(2) ☐ Sykler

(3) ☐ Kjører bil

Her er noen påstander rundt arbeids- og skolevei. Hvor enig/uenig er du i påstandene?

18. Jeg liker å gå/sykle til arbeid

(1) ☐ Helt uenig

(2) ☐ Litt uenig

(3) ☐ Verken enig eller uenig

(4) ☐ Litt enig

(5) ☐ Helt enig

19. Jeg bruker veien til arbeid som trening for å holde meg i god fysisk form

(6) ☐ Helt uenig

(7) ☐ Litt uenig

(8) ☐ Verken enig eller uenig

(9) ☐ Litt enig

(10) ☐ Helt enig

20. Jeg går/sykler sjelden til/fra arbeid hvis det er dårlig vær

(11) ☐ Helt uenig
(12) ☐ Litt uenig
(13) ☐ Verken enig eller uenig
(14) ☐ Litt enig
(15) ☐ Helt enig

21. Jeg er opptatt av at mitt barn skal gå/sykle til skolen

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

Del F - Hvor enig/uenig er du i følgende påstander relatert til klima/miljø

1. Miljøpolitikken har stor betydning for hvilket parti jeg stemmer på

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

2. Jeg reduserer mitt generelle forbruk for å ta vare på miljøet

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

3. Jeg velger bevisst varer som er merket med disse miljømerkene:

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

4. Jeg utfører miljøvennlige tiltak i hjemmet mitt for å få ned energibruken

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

5. Jeg er flink til å kildesortere husholdningsavfallet

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

6. Jeg kjører minst mulig bil for å begrense mitt CO2 utslipp.

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

7. Jeg går og sykler ofte distanser hvor andre gjerne kjører bil

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

8. Når jeg har et reelt reisevalg så velger jeg alltid det mest miljøvennlige alternativet (f.eks. tog vs fly, sykkel vs bil)

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

9. Jeg bruker alltid bil når jeg skal handle mat

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

10. Jeg handle ofte økologiske matvarer

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

11. Jeg handler ofte lokalproduserte matvarer

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

12. Jeg prøver å spise mindre animalske matvarer (kjøtt, fisk, meieriprodukter og egg) for å spare miljøet

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

13. Jeg kaster nesten aldri mat

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

14. Jeg prøver å kjøpe matvarer når de er i sesong

(1) ☐ Helt uenig
(2) ☐ Litt uenig
(3) ☐ Verken enig eller uenig
(4) ☐ Litt enig
(5) ☐ Helt enig

15. Jeg dyrker spiselige planter hjemme til eget bruk (f.eks. bær, grønnsaker).

(1) ☐ Ja i stor grad
(2) ☐ Ja noe
(3) ☐ Nei

16. Jeg høster spiselige ville planter (f.eks. ville bær) og/eller plukker sopp.

(1) ☐ Ja i stor grad
(2) ☐ Ja noe
(3) ☐ Nei

17. Jeg fisker

(1) ☐ Ja i stor grad
(2) ☐ Ja noe
(3) ☐ Nei

18. Jeg går på jakt

(1) ☐ Ja i stor grad
(2) ☐ Ja noe
(3) ☐ Nei

19. Hvis vi antar at klimaet endrer seg (mot global oppvarming), mener du…

(1) ☐ Det hovedsakelig skyldes menneskelig aktivitet
(2) ☐ Det hovedsakelig skyldes naturlige endringer
(3) ☐ Det skyldes likeverdig menneskelig aktivitet og naturlige endringer
(4) ☐ Ingen av delene over da klimaet ikke endrer seg
(5) ☐ Vet ikke

20. Hvor viktig er global oppvarming som tema for deg personlig

(1) ☐ Ikke viktig i det hele tatt
(2) ☐ Ikke spesielt viktig
(3) ☐ Litt viktig
(4) ☐ Veldig viktig

For hver av de følgende endringene i livsstil, kryss av for hvor effektivt du mener de forskjellige er for å motvirke global oppvarming

21. Stemme på et parti som har global oppvarming høyt på agendaen

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

22. Redusere mitt generelle forbruk

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

23. Velge produkt som er merket med miljømerker

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

24. Redusere energibruken hjemme

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

25. Kildesortere matavfallet

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

26. Begrense bilbruken

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

27. Fly mindre

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

28. Handle mer økologiske matvarer

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

29. Handle mer lokalproduserte matvarer

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

30. Spise mindre kjøtt

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

31. Kaste mindre mat

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

32. Kjøpe mat som er i sesong

(1) ☐ Ikke effektivt i det hele tatt
(2) ☐ Ikke særlig effektivt
(3) ☐ Noe effektivt
(4) ☐ Veldig effektivt
(5) ☐ Vet ikke

TAKK FOR HJELPEN!

Har du noen kommentar til spørreskjemaet eller noe du vil si om kosthold/aktivitet/miljø?
Skriv det gjerne her!

Title: Changes in transportation habits to work in Norwegian parents between 2008 and 2018: a repeated cross-sectional study

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Abstract

Background

Regular physical activity is associated with several health benefits. Active transportation to and from work can be an opportunity to make physical activity a part of everyday life, and reduced car traffic is beneficial for the environment, both locally and globally. The main aim of this study is to assess changes in commuting habits in Norwegian parents from 2008 to 2018, in relation to age, sex, socioeconomic status, country of birth and distance to work.

Methods

This study has a repeated cross-sectional design. In 2008, 1012 parents of 6th and 7th grade pupils of 27 schools in the Norwegian counties Telemark and Hedmark, completed a questionnaire including questions regarding commuting habits. In 2018, 609 parents of 6th and 7th grade pupils of 25 schools in the same counties completed the same questionnaire. Data were analysed using binary logistic regressions.

Results

The adjusted results show no significant differences between 2008 and 2018 in odds ratios for being a cyclist, car driver or puplic commuter, however, parents living 3 km or more from work were less likely to be a walker in 2018 than 2008.

Conclusions

This study indicates that there have been small changes in commuting habits among parents in the counties of Telemark and Hedmark, and that measures should be taken to increase active transportation and reduce car driving, aiming at small towns and rural areas.

Keywords: Active commuting, active transportation, parents, time trends

Background

Regular physical activity (PA) is associated with decreased risk of mortality (1), better Health Related Quality of Life (2) and reduced risk of several non-communicable diseases, like coronary heart disease, type 2 diabetes, breast cancer and colon cancer (3). The World Health Organisation (WHO) (4) and Norwegian health authorities (5) both recommend that adults stay physically active at moderate to vigorous intensity (MVPA) for at least 150 minutes per week. However, a report based on self-reported physical activity questionnaires in 122 countries, indicates that 31.1 % of people worldwide and 34.8 % of the European population, do not reach these recommendations (6). A study conducted by the Norwegian Directorate of health, using accelerometer to determine participants PA levels, showed that 68 % of the participants did not reach the recommended level of PA (5).

A high rate of non-exercise physical activity (NEPA), which includes active transportation such as walking and cycling to work, is shown to be associated with lower all-cause mortality, regardless of exercising regularly or not (7). Evidence suggests that active commuting is associated with an increase in people's general PA levels (8, 9). A UK study concludes that participants who used public transport, walk or cycle to work was less likely to be overweight than those using private transport (10). Cycling to work is associated with lower risk of perceived stress (11), and walkers seems to be the most satisfied commuters in general (12).

Research is not consistent regarding the importance on personal factors on active transportation. Beenackers and colleagues (13) found no clear differences in sex or socioeconomic status (SES) in the use of active transport. Another study found that age and education did not predict being a cyclist or not (14). However, de Geus and colleagues (15) found that high education was correlated with more cycling to work. Time pressure is a

common feeling among Scandiavian parents (16), and lack of time is an important reason not to cycle to work (15). Further, shorter commuting distance is related to more active transport (17-19). Public transport users seem to be more negative towards their mode of commuting than other travellers in relation to travel time and unpredictability (20).

In addition to individual health outcomes, a change towards more active transportation may also be a contributor in reducing CO^2 emissions globally (21). Road traffic causes local air pollution that affects the health of inhabitants of urban areas (22). In Norway, road traffic counts for 19 % of the country's CO^{2-} emissions (23). Due to the climate change the world is facing, several initiatives have been taken to reduce greenhouse gas emissions, and in the Kyoto Protocol that came into effect in 2005 (24), followed by the Paris agreement in 2016 (25), Norway have committed to limit the emission of greenhouse gasses. A 2007 white paper on Norwegian climate policy advocates the use of taxes and tolls to promote environmentally friendly traffic choices, and stresses efforts to improve access for cyclists in towns (26).

Despite the positive effects of active transportation, the Norwegian national travel survey shows that 63 % of daily trips is done by car, 6-9 % of trips below 5 km is done by bicycle, and average travel length for bicycle trips is 5.1 km. Further, 68 % of trips below 1 km, 29 % of trips from 1-2.9 km and 14 % of trips from 3-4.9 km is done walking. Average travel length for walking trips is 2.2 km. Public transportation increases with increased travel length, from 3 % of trips from 1-2.9 km, to 14 % of trips above 20 km (27). Few European or Norwegian studies have assessed time trends in commuting habits among parents. Between 2009 and 2013/14 a small increase in walking, cycling and public transport, and a small decrease in car driving for transportation to work by the adult population in general was reported in Norway (27).

Several studies have concluded that habit is an important predictor for active transportation (28) and physical activity habits from childhood may predict physical activity habits in adulthood (29). Parents' transportation habits to work influence children's transport methods to school (30, 31). It is therefore of interest to assess parents' commuting habits, and to study time trends in commuting habits succeeding global and governmental policies regarding more environmentally friendly transportation. The aim of this study was to assess changes in commuting habits in Norwegian parents from 2008 to 2018, in relation to age, sex, SES, country of birth and distance to work.

Methods

Research design

This study is a part of the Active Transportation to school and work in Norway project (ATN) that collected data together with the Fruit and Vegetables Makes the Marks project (FVMM). Research clearance was obtained from the Faculty Ethical Committee at the Faculty of Health and Sport Sciences of University of Agder, and from the Norwegian Social Science Data Services (NSD). Informed consent was obtained from all the participants.

In 2001 38 randomly selected schools in the Norwegian counties of Hedmark and Telemark was invited to participate in the FVMM project. These schools were also invited to participate in a repeated cross-sectional survey in 2008 (the FVMM/ATN survey), and 27 schools agreed to participate. The same 38 schools were asked again in 2018, when 25 schools accepted the invitation. In 2008 and 2018, both surveys were conducted in September. Pupils in 6th and 7th grade with parental consent filled out a questionnaire at school and brought home a questionnaire for one of their parents to fill out and send back to school.

Study sample

A total of 1012 parents participated in the 2008 survey, and 609 parents participated in the 2018 survey (Table 1). Parents whom reported “do not work” or “working at home” was excluded (n=179). Further, 105 of the respondents were excluded due to missing answers on transportation habits. Therefore, 1337 respondents were included in the analyses, 808 from the 2008 survey, and 529 from the 2018 survey.

Measurements

The questionnaire included a matrix for the parents to report mode of travel to and from work within the four seasons of the year. The matrix is shown to have acceptable test-retest reliability with a Spearman correlation coefficient of 0.82-0.95 for parents (32). The question in the matrix was “How do you usually travel to and from work. Fill in number of days in a normal week in each season”. The alternatives were: walking, cycling, by car, or by public transportation. There were separate lines for “to work” and “from work”. Parents were then categorised into main mode of commuting (“walkers”, “cyclists”, “car commuters” or “public commuters” if more than 50% of all reported trips were done by that mode of commuting. Participants who didn’t add up to over 50% in any mode of commuting were categorised as “mixed commuters”.

Educational level (as a measure of SES) was assessed by the question: “What level of education have you completed?” with the alternatives being: “elementary school”, “high school”, “University or college (3 years or less)” or “university or college (more than 3 years)”. In the analysis this variable was dichotomized into low: no college or university education or high: having attended college or university. Country of birth was obtained by two questions in the pupil’s questionnaire. They were asked in which country each of their parents were born. The parent who responded to the questionnaire was then categorised into “born in Norway” or “born outside Norway”. The participants age was obtained by asking for

their year of birth. They were also asked for their sex, “male” or “female”. Distance to work was obtained by the open-ended question “How far is it from your home to your workplace?” This variable was recoded into two new dichotomous variables: “living less than 3 km from work” or “living 3 km or more from work” (used in the statistical analysis for “walkers”) and “living less than 5 km from work” or “living 5 km or more from work” (used in the statistical analyses for “cyclists”, “car commuters” and “public commuters”).

Statistical analyses

Chi-squared tests (for dichotomous variables) and t-tests (for continuous variables) were conducted to analyse differences between 2008 and 2018 across participants’ county, sex, age, level of education, country of birth and distance to work (Table 1). Table 2 presents percentages of participants categorised in each mode of transport in the different seasons, and for the full year. Differences between 2008 and 2018 were analysed using chi-squared tests.

The main analyses conducted were binary logistic regression models, with separate models for each mode of transportation (Table 3); i.e. “walkers” vs “non-walkers”, “cyclists” vs “non-cyclists”, “car commuters” vs “non-car commuters” and “public commuters” vs “non-public commuters”. Independent variables included were “year” (2008/2018), “sex” (male/female), “age” (in years), “education” (low/high), “country of birth” (Norway/outside Norway) and “distance” (</≥3 km for walker vs non-walkers, </≥ 5 km for cyclists vs. non-cyclists, car commuters vs. non-car commuters and public commuters vs. non-public commuters).

The assumptions for logistic regressions were checked. Further, a stepwise procedure was followed, where univariate logistic regression analyses were first conducted with each of the independent variables separately. The variables were included in the multivariate analyses if they were statistically significant at $p<0.3$ in the univariate analyses (33). Independent

variables were then excluded stepwise backwards if they were non-significant ($p>0.05$) in the multivariate analyses. The variable "year" (2008/2018) was included in all the multivariate analyses, regardless of level of significance, further "age", "country of birth" and "distance" was included for walkers and car commuters, "distance" was included for cyclists, and "distance" and "country of birth" was included for public commuters. Possible interaction effects between "year" and each of the other included independent variables in the multivariate analyses were explored, and stratified analyses were conducted if interactions were significant ($p<0.1$) (34). All analyses were conducted using IBM SPSS Statistics, version 25.

Results

The participants were generally higher educated in 2018 than in 2008 ($p <0.001$) (table 1). The share of respondents born in Norway was significantly lower ($p<0.001$) in the 2018 survey compared to the 2008 survey. The parents were older ($p<0.001$) in 2018 (42.3 years) than in 2008 (41.3 years). There was no significant difference between years in share of participants working less than 3 or 5 km from home or share of respondents being male or female.

Table 1

In both 2008 and 2018, 8 % of the participants were categorised as walkers for the full year ($p=0.826$). There was no significant change for walkers in the different seasons (Table 2).

Share of participants categorised as cyclists for full year, was 12 % in 2008 and 9 % in 2018 (p=0.054). However, for all seasons except winter, there was a significant reduction of parents categorised as cyclists. In fall there was 16 % categorized as cyclists in 2008, versus 11 % in 2018 (p=0.013). In spring 15 % and 11 % (p=0.039), respectively, and for summer, the numbers were 22 % and 16 % (p=0.006).

Table 2

The share of participants categorised as car commuters increased from 2008 to 2018, for both the full year (70 % vs. 76 %, p=0.013), and during fall (71 % vs. 77 %, p=0.024), spring (70 % vs. 75 %, p=0.046) and summer (64 % vs. 70 %, p=0.022).

A share of 2 % was categorised as public commuters for the full year both years, while 7 % of the participants was categorised as mixed commuters in 2008 vs. 5 % in 2018. For public commuters and mixed commuters, there were no significant changes between years.

For the binary logistic regressions, the results show no significant differences between 2008 and 2018 for walkers in total when “age”, “country of birth” and “distance” (</≥ 3 km) are included in the model (Table 3). However, the interaction variable “year*distance to work” was significant (p=0.008), and the analyses for walkers were also conducted stratified by the variable “distance to work”. Those living more than 3 km from work were 80 % less likely (OR 0.2, 95 % CI 0.0-0.9) to be walkers in 2018 (n=2) versus 2008 (n=15). For those living less than 3 km from work there was no significant differences between years.

There was no significant difference between 2008 and 2018 in odds ratios for being categorised as a cyclist when adjusted for “distance” (</≥ 5 km).

For car commuters in total, the binary logistic regressions showed no significant difference between years when adjusted for “country of birth” and “distance” (</≥ 5 km), however it was borderline significant (OR 1.3, 95 % CI 0.997-1.8). There was a significant (p=0.065) interaction in “year*country of birth”, and the analyses for car commuters were also conducted stratified by “country of birth”, showing no significant changes between years in either of the groups (born in Norway/born outside Norway).

For public commuter, the variables “distance” (</≥ 5 km) and “country of birth” was included in the models, showing no significant changes between 2008 and 2018 in odds ratios for being a public commuter.

Table 3

Discussion

The results of this study indicate that between 2008 and 2018 there have been small changes in mode of commuting to work among parents living in two Norwegian counties. There has been an overall increase in the share of car commuters, however, the adjusted results show no significant differences between years. There has been a decrease in the share of cyclists in the fall, spring and summer, but no significant change for the winter, the full year, or in the adjusted analyses. For walkers, public commuters and mixed commuters there is no significant change in the proportion of participants categorised in each group. However, the adjusted results show a reduction in the group of walkers living 3 km or more from the workplace.

The trends in the Norwegian national travel survey showed a small increase between 2009 and 2013/14 in walking and cycling, in addition to public transportation (27). The discrepancy between the present study and the national transport survey might be explained by different

topography, built environment and infrastructure in Hedmark and Telemark, compared with other counties in Norway. Hedmark and Telemark consists of rural areas, in addition to some small and medium sized towns. Governmental initiatives to increase walking and cycling have been conducted mainly in urban areas (35), which in turn pose less impact in smaller towns and rural areas. The national travel survey includes the general population, whereas the present study includes parents of children in the age 10 to 12, which can explain differences in the results, as households with children have shown to be more dependent on car use in their daily life than other households (36). Compared with previous findings, a Finnish study concludes that there was a decline in active commuting over a 30-year period between 1972 and 2002 (37). Although ending in 2002, this may indicate a trend in transportation habits that is supported by the results of the present study. However, an Australian study concludes with the opposite, i.e. an increase in active travel between 1997 and 2007 (38). Differences between countries regarding climate and distances must be taken into consideration when it comes to comparison of these studies and may be a reason for different results.

The reduction of walkers living 3 km or more from their workplace could be explained by a feeling of time pressure. There has been a general increase in Norwegian purchasing power over the last decades (39). With increased wealth, people put a higher value on time, and are more often under the feeling of time pressure (40), and one could argue that increased prosperity could lead to more time-effective choices, like riding a car instead of taking the bus, walking or cycling. High income usually leads to good health choices, but can also lead to more cars, and being less affected by tolling stations and parking fees. The family's income was not included in the analyses of this study.

Electric cars have free or discounted passing through tolling stations in Norway (41), and also free parking in several towns. Hence, they may be less affected by taxes and tolls introduced to reduce car traffic. This study did not ask whether the car used for commuting was electric

or not, nor did it investigate the extent of tolling stations in the areas where data collection took place. However, considering the general increase in sales numbers of electric cars in Norway (42), it would be reasonable to assume that a considerably greater share of car travels in 2018 than in 2008 was conducted with electric cars. In turn, if the electric cars replace traditional cars this might favour environmental sustainability, yet not individuals through increased levels of PA. Besides, like for infrastructural initiatives targeting increased active transport, the share of electric cars is still greater in more urban areas (43).

A large share of Norwegians live in urban areas (44) , and efforts to limit the use of private cars and increase active transportation will have a larger impact in urban areas in relation to environmental purposes (26). However, these efforts may have a positive side effect in people being more open to active transportation and could have a positive impact also on public health in these areas. This might lead to an inequality in health, due to inhabitants in rural areas not being affected by these efforts. The Norwegian national travel survey states that the share of public transportation is higher when the public transportation system is better (27) and if passengers walk or cycle to the public transportation, this could also be a contributor to increased active transportation. Initiatives to increase the public transportation might therefore have a positive impact on increasing physical activity for parents living too far away from work to be a walker or cyclist.

The study's strengths and limitations.

The study's main strengths are the reliable measurement on self-reported mode of commuting to work (32), and the possibility to examine time trends with a repeated cross-sectional design. Focusing on parents in small and medium sized towns and rural areas, it can be an important supplement to the national travel survey, giving insight into the commuting habits of parents in these areas.

A limitation to this study is that only two of Norway's 19 counties was included, reducing generalizability as Norway is a diverse country regarding topography and climate. Another limitation is the low response rate, especially in the 2018 survey, which may have a negative effect on the validity of this study. The share of respondents having completed higher education was greater than the population in general, and there was an increase from 2008 (59%) to 2018 (72%). However, there has been an overall increase in the share of inhabitants having attended higher education in Norway. In the counties of Telemark and Hedmark, 29% of people aged 30-49 years had a high education level in 2008, versus 37% in 2017 (45). The low response rate in 2018 might be a reason for the increased share of respondents reporting high education. There was also a high rate of female respondents both years.

Conclusions

This repeated cross-sectional study indicates that there have been small changes in commuting habits among parents of 10 to 12-year-old children in the Norwegian counties Telemark and Hedmark over the last 10 years. The results indicate that parents living more than 3 km from work are less likely to be walkers in 2018 than in 2008. There has been a focus on environmental issues regarding transportation, and initiatives have been taken to reduce car transport, although aiming mostly on urban areas, and not affecting rural and small-town areas to the same extent. To increase public health, actions should be taken to increase active transportation and reduce car driving, aiming at and customized to small towns and rural areas.

Table 1

Characteristics of the study sample in 2008 and 2018.

	2008	**2018**	**P-value***
Number of schools	27	25	
Eligible parents	1712	1734	
County (% Hedmark)	67	52	<0.001
Number of included participants	808	529	
Participation rate (%)	59	35	
Sex (% female)	77	79	0.427
Age (mean, years (SD))	41.3 (5.0)	42.3 (5.1)	<0.001
Education (% with higher edu.)	59	72	<0.001
Country of birth (% Norway)	94	86	<0.001
Distance to work (% less than 3 km)	29	28	0.579
Distance to work (% less than 5km)	48	42	0.053

*P-values are based on independent samples t-test for continuous variables and on chi-squared tests for dichotomous variables.

Table 2

Proportion (%) of respondents categorised in each mode of transport in 2008 and 2018, for the full year and for each season separately (n=1337).

	Walkers			Cyclists			Car commuters			Public commuters			Mixed commuters		
	2008	2018	p-value	2008	2018	p-value	2008	2018	p-value	2008	2018	p-value	2008	2018	p-value
Fall	8	8	0.619	16	11	0.013*	71	77	0.024*	3	2	0.227	3	3	0.544
Winter	14	13	0.383	3	3	0.571	77	81	0.097	3	2	0.142	3	2	0.698
Spring	9	9	0.608	15	11	0.039*	70	75	0.046*	2	2	0.410	4	4	0.733
Summer	8	8	0.941	22	16	0.006*	64	70	0.022*	2	2	0.522	4	4	0.689
Full year	8	8	0.826	12	9	0.054	70	76	0.013*	2	2	0.286	7	5	0.092

*Significant difference between years ($p \leq 0.05$ Chi-squared tests).

Table 3

Odds ratios for being a walker, cyclist, car commuter or public commuter

				<3km distance		≥3km distance		Born in Norway		Born outside Norway	
		OR	CI (95%)	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
Walkers (n=93)[a]	Year (2018 vs. 2008)	1.1	(0.7-1.7)	1.4	(0.8-2.3)	0.2*	(0.0-0.9)				
	Age	0.95*	(0.91-1.00)								
	Country of birth (Norway vs. outside Norway)	0.5*	(0.2-0.9)	0.4*	(0.2-0.7)						
	Distance (<3km vs. ≥3km)	15*	(8.8-26.9)								
Cyclists (n=41)	Year (2018 vs. 2008)	0.8	(0.5-1.2)								
	Distance (<5km vs. ≥5km)	9.5*	(5.8-15.6)								
Car commuters (n=882)[b]	Year (2018 vs. 2008)	1.3	(0.997-1.8)					1.2	(0.9-1.7)	2.6	(0.9-7.4)
	Age									1.14*	(1.03-1.26)
	Country of birth (Norway vs. outside Norway)	2.3*	(1.4-3.7)								
	Distance (<5km vs. ≥5km)	0.1*	(0.1-0.1)					0.1*	(0.1-0.1)	0.1*	(0.0-0.2)
Public commuters (n=21)	Year (2018 vs. 2008)	0.4	(0.2-1.2)								
	Distance (<5km vs. ≥5km)	0.1*	(0.0-0.5)								
	Country of birth (Norway vs. outside Norway)	0.2*	(0.1-0.7)								

* Significant differences between groups (binary logistic regressions, p≤0.05)

a) Analyses for walkers in total, and stratified by "Distance to work", due to significant (p=0.008) interactions in "Year*</≥ 3 km distance"

b) Analyses for car commuters in total, and stratified by "Country of birth" due to significant (p=0.065) interactions in "Year*Country of birth"

Abbreviations

PA: Physical activity; SES: Socioeconomic status; ATN: Active Transport in Norway; FVMM: Fruit and Vegetables Make the Marks-project

Declarations

Ethical approval

Ethical approval and research clearance for the FVMM/ATN-study was obtained from The Norwegian Social Science Data Services and the Faculty Ethical Committee at the Faculty of Health and Sport Sciences of University of Agder, and all participants were given written information about study objectives and methods prior providing consent.

Consent for publication

Not applicable.

Availability of data and material

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

EB and HTH conceived the study, HTH collected and analyzed the data. HTH interpreted the data and drafted the manuscript together with EB and HBB. All authors have read and approved the final version of the manuscript.

Author's information

Not applicable

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