Walking as urban outdoor recreation: public health for everyone

Abstract

This study aims to investigate whether the frequency of neighbourhood walks (both for recreation and for transport) is associated with various indicators of demographic and socio-economic position, indicators of self-reported physical activity and perceived health status. We compare the findings with participation (yes/no) in physical exercise/workouts. A survey (N=780) was conducted in the Norwegian town Moss. We used linear regression models to assess the potential links between the frequency of walks from home and the following self-reported indicators: income, education, housing type, employment, age, gender, raised in Norway or not, years of residence in Moss, number of financial household providers, household with children or not, exerciser or not, activity level at work, perceived health status, sedentary minutes per week, and dog ownership. The study reveals that neighbourhood walking appeals to all adults regardless of demographic situation or socio-economic position. Furthermore, owing a dog seems to be a successful factor for getting people to walk. Our results show a higher frequency of walks from home for transport than for the walk itself (usually called recreational walks). Given the global political health goal of encouraging people to be more physically active, this study demonstrates the potential of walking from a public health perspective. The study argues for the importance of health promoting urban planning, with attractive and walkable friendly urban environments. Furthermore, the study acknowledges the importance of promoting a broader understanding of outdoor recreation in urban settings, where neighbourhood walking, both for recreation and for transport, should be regarded as an activity within the frame of urban recreation.

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Management implications:

- Neighbourhood walking appeals to all adults regardless of demographic situation or socio-economic position.
- Young adults and people who are better economically situated favour physical exercise more than other adults do.
- In a world dominated by inactive adults, a moderate physical activity such as neighbourhood walking has great potential to improve public health.
- Public health policy and management should facilitate efficient measures to stimulate neighbourhood walking.
- Neighbourhood walking, both for recreation and for transport, should be regarded as an activity within the frame of urban recreation; both types are mostly performed in people's leisure time.
- It is important to base urban planning on the principle of developing a walkable city.

Keywords:

Physical activity, neighbourhood walking, physical exercise, socio-economic position, urban recreation, urban planning.

1. Introduction

Both international and national authorities (World Health Organization, 2017a; Hansen et al., 2015) are concerned about the high level of inactivity in the population (Hallal et al., 2012). The development of the modern welfare society has involved simplifying, automating and eliminating many bodily activities and routines that were previously part of most people's daily lives. Consequently, physical activities have systematically and increasingly been eliminated from household routines, transport and working life. Some people compensate for their sedentary lives with sport and exercise in their leisure time. However, participation in such activities tends to appeal to a small proportion of the population (Australian Bureau of Statistics, 2011; European Commission, 2014; U.S. Bureau of Labor Statistics, 2016; Beenackers et al., 2012; Breivik & Rafoss, 2017). Previous studies indicate that people with a higher socio-economic position (SEP) are overrepresented in sport and exercise, whereas people from a lower SEP are overrepresented among the inactive population (Beenackers et al., 2012; Breivik & Rafoss, 2017). There is need for a broad analysis of whether walking from home is influenced by any demographic or SEP indicators and whether walking tends to differ from performing physical exercise or working out. From a public health perspective, it is also important to identify and promote activities that seem especially likely to increase the general activity level in the population. Our study is based on the notion that neighbourhood walking is likely to be such an activity. Monitoring studies reveal that walking is one of the most common physical activities (Australian Bureau of Statistics, 2015; Statistics Norway, 2014). However, there are many types of and contexts for walking. In this study, we were primarily interested in low-threshold neighbourhood walks in a typical middle-sized Norwegian town.

1.1 Neighbourhood walking as urban outdoor recreation

Walking has mental, social and physical health benefits (Hanson & Jones, 2015). For instance, walking can increase positive affect and relaxation (Ekkekakis et al., 2000), well-being (Gatrell, 2013) and socialization (Friedman, 2014), potentially postpone mortality (Arem et al., 2015) and reduce the risk of obesity (Frank et al., 2004). Moreover, the WHO (2017b) includes walking as a recommended moderate-intensity activity and recommends (for adults) at least 150 minutes of moderate physical activity, or 75 minutes of more vigorous physical activity a week – and in bouts of at least 10 minutes duration. In a qualitative study from the same case area as this study, Rybråten et al. (accepted for publication) found that walking was a flexible and dynamic activity with great importance for citizens' health and wellbeing. Walkers ascribe a variety of qualities to their walks, several of which are often experienced during the same walk: walking may include different kinds of exercise, a transport aim, the opportunity to enjoy nature or other surroundings; it may facilitate contemplation and reflection; and it may serve as an activity for social interaction or for a solitary walk. Although several of the informants (op cit.) appreciated leisure walks in natural surroundings, recreational aspects were also highly evident in urban environments and during walks for transport. Walking for recreation and for transport is a natural part of urban daily life; as such, it has great importance for public health (see also Cerin et al., 2009). Hence, we find it reasonable to include both walking for recreation and walking for transport in the phrase "urban recreation". The importance of walking and walkability has also been acknowledged in the neighbourhood and urban planning literature (e.g. Friedman, 2014; Bannister, 2008; Southworth, 2005), not only for transport reasons but also because it is an appreciated activity. In Norway, as in many other parts of the world, people are increasingly moving to urban areas. In line with political agendas for sustainable urban development,

towns and cities are becoming denser. This development encourages walking as an important transportation mode (Hanssen et al., 2015; Buckley et al., 2017) as well as the need to plan for the convenience and pleasure of walking (Friedman, 2014).

There are several reasons for a more inclusive and broader understanding of urban walking as an activity within the concept of urban outdoor recreation. In Norway, traditional outdoor recreation (termed *friluftsliv*) is closely connected to people's visitation and experiences of nature. Skår (2010) argues that a narrow understanding of outdoor recreation as something that people do in nature and away from home may have contributed to de-emphasizing important outdoor activities in people's everyday lives. For example, Statistics Norway's regular monitoring of outdoor recreation activities includes activities such as fishing, cross-country skiing, hiking in forests and mountains, and strolls but not walking for transport (SSB 2014). However, it is encouraging that the latest Norwegian white paper on outdoor recreation (Ministry of Climate and Environment, 2016) emphasizes outdoor recreation in urban settings, such as neighbourhood walking.

1.2 Associations between walking and socio-economic position

There are many types of walking and many arenas and environmental conditions in which walking is, or can be, performed . Monitoring and research have revealed that some of these walking categories or situations represent biased participation concerning SEP. For example, for mountain walking in Norway, a higher level of education is related to higher levels of participation (Statistics Norway, 2014). This is not the case for recreational short walks/strolls (op cit.). Moreover, short recreational walks are (and have been for many years) the activity with the highest level of participation of all monitored outdoor recreation

activities in Norway (Dervo et al., 2015). For the majority of the monitored outdoor recreation activities, participation depends on socio-economic position (Ministry of Climate and Environment, 2016).

Findings and conclusions vary in studies on the correlation between different kinds of walking and various SEP indicators. For example, Cerin and Leslie (2008) found that people with high SEP walk more for recreation compared to those with lower SEP. Other studies have found that people with low SEP are more likely to walk for transport (Rachele et al., 2015, Turrell et al., 2013), whereas Cerin et al. (2009) found that both income and educational level influence even the frequency of walking for transport. Ghani et al. (2016) conducted a large multi-level study (N=7866) in Australia on gender and age and found that older persons were less likely to walk for transport but more likely to walk for recreation. With regard to gender, the authors found that women were more likely than men were to take recreational walks, whereas walking for transport showed no gender differences. Few studies have investigated the possible correlations between walking and a broad spectrum of SEP indicators. Instead, the literature tends to focus on another important issue: how environmental or neighbourhood factors motivate people to walk or prevent them from walking (Owen et al., 2004; Sundquist et al., 2011; Van Dyck et al., 2010a; Wei et al., 2016; Suminski et al., 2005; Lee et al., 2013; van Lenthe et al., 2005; Cerin et al., 2009). Some of these studies include analyses of some SEP indicators (Sundquist et al., 2011; Van Dyck et al., 2010a; Wei et al., 2016; van Lenthe et al., 2005; Cerin et al., 2009), but the findings illustrate the point presented above: there are various associations between SEP indicators and the different types of walking.

1.3 Associations between sport/exercise and socio-economic position

A large body of literature examines correlations between various SEP indicators and participation in exercise and more vigorous leisure activities. The report by the European Commission (2014) emphasizes the correlation between low education levels and no participation in sport or exercise. Furthermore, the report showed that men (and especially younger men) were more likely to be involved in sport and exercise than women were. In general, participation in sport and exercise decreases with age, which has also been found in the United States (U.S. Bureau of labor statistics, 2016). Both in Australia (Australian Bureau of Statistics, 2011) and the United States (U.S. Bureau of labor statistics, 2016), coherence was found between SEP (income, education, employment) and participation in physical exercise, higher SEP equalled increased participation in such activities. The above-mentioned international studies seem to indicate that physical exercise appeal to a narrower group of population compared to participation in neighbourhood walks.

In Norway, only 1/3 of the adult population reaches the recommended level of minimum 150 minutes of moderate physical activity per week (Hansen et al., 2015). Three Norwegian studies have found differences in participation in physical exercise/workout as a function of SEP (Hansen et al., 2015; Vaage, 2015; Breivik & Rafoss, 2017). First, all three studies reported that people with higher levels of education were more likely to be physically active at a vigorous level. However, Hansen et al. (2015) reported that higher levels of education at the same time correspond positively with sedentary time per day. Second, two of the studies (Breivik & Rafoss, 2017; Vaage, 2015) found that people with higher income were more likely to participate in physical exercise, even though the relationship was not as strong as for education; Hansen et al. (2015) found no such relationship. Third, Vaage (2015) found no significant gender differences concerning time spent on physical exercise. Breivik & Rafoss (2017) found that women were more active than men were, in fitness exercises and in outdoor

recreation activities. Furthermore, Hansen et al. (2015) found that men between the age of 35 and 49 years spent more time participating in vigorous physical activity per day compared to other age groups.

Based on the assessed literature, urban walking seems to reach a different and broader group of people compared to more vigorous physical exercises. However, we cannot identify clear patterns since the literature refer to different SEP indicators, different combinations of them, disparities in the ways that the indicators have been measured, and a magnitude in different walking activities and different types of more vigorous activities.

1.4 Aim of the study

Our aim was to identify the SEP-profiles of the neighbourhood walkers in the medium size Norwegian town Moss (32,400 inhabitants) and compare it with the SEP-profile of those who participate in physical exercise/workout. Any town is in one way unique, but the majority of the Norwegian population (5.26 million in total) live in small or medium sized towns and most of them have many similar challenges concerning e.g. SEP variation, health challenges, walkability and infrastructure. Based on previous literature, potential links between the frequency of neighbourhood walks and the following demographic and SEP indicators (see table 1) were assessed: income, education, housing type, employment, age, gender, raised in Norway or not, years of residence in Moss, the number of financial household providers, and households with/without children. In addition, we wanted to examine some other individual factors that might influence personal leisure activities: perceived health status, activity level at work, exercise performers, and sedentary minutes per week. We were also interested in frequency of walks among dog owners, since studies have shown that owning a dog can increase the likelihood of being physically active (Christian et al., 2013).

2. Method

2.1 The study site

We conducted a quantitative survey in the medium-sized town of Moss, located in Southeast Norway (on the bank and east of the Oslo fjord). From a public health perspective, Moss is an interesting case because its population (approximately 32,400 inhabitants) scores lower on the public health profile and on some SEP indicators compared to the average scores in Norway (Norwegian Institute of Public Health, 2015). Nine postal zones in the municipality were strategically chosen for the survey. These zones represent both urban town centre areas, which are more distant from green and forested spaces, and suburban and more rural areas in the northern parts of the town, closer to the urban forests. These postal zones represent areas with different housing types and various socio-demographic profiles of the inhabitants. From the perspective of both public health policy and urban planning, the site's heterogeneity and small/medium size should make this study relevant in other medium-sized towns with similar characteristics as Moss.

2.2 Data and questionnaire

Two interview approaches, both based on the same questionnaire, were used to collect data. First, we conducted a pilot study in two of the postal zones, in which 80 persons were interviewed on their doorsteps. A total of 386 households were visited; 79% of the households did not want to participate or were not at home, giving us a net pilot sample of 80 households. In addition to testing the questionnaire, we also started with doorstep interviews with the ambition to obtain more responses from those who were less physically active; we assumed that they would be less willing to complete a mailed questionnaire than answering

some questions at the doorstep. However, we found that doorstep interviews limited our potential to reach all households, especially in apartment buildings with locked main entrances. Hence, the pilot doorstep study was followed by mobile phone interviews, and 700 residents were subsequently interviewed by phone. We contacted people (≥ 18 years of age) in seven postal zones until we had obtained 700 completed questionnaires. Approximately eight times as many people as those who finally answered the questionnaire was contacted. Because the population was limited, we contacted individuals several times if they did not initially answer their phones.

We designed the questionnaire in order to assess the frequency of various walks from home, and a broad set of demographic and social-economic indicators (hereafter called SEP indicators), see Table I. We based the choice of independent variables, SEP indicators, on a review of the international literature on walking constraints (Vistad et al., 2014). The aim was to include several potential SEP indicators in the analysis, to get a deeper understanding of the importance of the individual or household related factors determining walking behaviour or participation in physical exercise. We asked the respondents to list separately the frequency of two types of neighbourhood walks: Walks during their leisure time for the sake of the walk itself[1], and walks for transport (defined as walks to work/school, to shops, to visit someone, doing errands etc.). Moreover, we asked separately for the summer season and for the winter season. For both types of walks, the question pointed out that the walk should start from home. We used a dichotomous variable (yes or no) to measure participation in physical exercise. The survey was obtained with the permission of the Norwegian Data Protection Official.

[1] Generally called "walks for recreation" throughout this paper, and in the literature.

[Insert Table I.]

2.3 The respondents

We merged data from the pilot study and the main survey, as there was no reason to consider the two samples incompatible. The respondents in our overall sample had a mean age of 52 years; 48 % were men; approximately 43 % lived in apartment buildings; 55 % were employed, and 82 % of those employed worked full-time. Retirees accounted for 33% of the respondents, which explained the relatively low employment percentage. For a more detailed description of the sample, see Table I.

2.4 Statistical analyses

We performed a descriptive data analysis using SPSS statistics 23. To explore how the frequency of walks and the probability of doing physical exercise varied as functions of demographic, SEP and other potentially relevant indicators (see Table 1) we utilized linear regression models and generalized linear regression models in R (R core team, 2014). We constructed four full models (all with N= 403) to explore physical exercise / no physical exercise (binomial), the frequency of all neighbourhood walks throughout the year, the frequency of walks for recreation and the frequency of walks for transport. All four full models included possible functions of the multiple set of indicators. Interactions between these indicators were included when feasible. For each full model, we performed a backward selection procedure based on Bayesian information criterion (BIC) values (see discussions of the use of BIC in model selection in Yin (2014). Different indicators and interactions were excluded from the specific candidate model until the lowest possible BIC value was obtained.

All models were restricted to include no more than two-way interactions between the different indicators.

3. Results

3.1 Frequency of walks and performance of physical exercise

On average, independent of the season, respondents reported walking from home 6.8 times a week, which included walks for both recreation and transport. Furthermore, we found that respondents reported more walks for transport than for recreation and more walks in the summer season than in the winter season, see Table II. Thirty-five percent of the respondents reported performing physical exercise/workout, see table I.

[Insert Table II]

3.2 SEP indicators influencing the frequency of walks from home

The three most supported linear models describing the frequency of walks for recreation, walks for transport, and total walks throughout the year differed in structure and the proportion of the variance explained ($R^2 = 0.19$, $R^2 = 0$ and $R^2 = 0.04$, respectively). Nonetheless, all the models portrayed the same picture – *no* convincing trends regarding the SEP indicators. The only indicator influencing frequency of walks was dog ownership. The most supported models describing the frequency of walks for recreation and total walks throughout the year included dog owners/non-dog owners as an explanatory variable, see Table III. In general, dog owners reported walks for recreation during a week approximately twice as often as non-dog owners did. Based on a generalized linear model, dog owners were shown to be evenly distributed across all SEP indicators, except for families with children,

which were approximately 14% less likely to own a dog. Exploring models concerning walks for transport, we found no good linear correlations with any explanatory variable.

[Insert Table III]

3.3 SEP indicators influencing the probability of physical exercise

The most supported generalized linear model describing the probability of physical exercise included the additive effects of age, income and the number of financial providers in the household. Age and the number of financial providers had an overall negative effect on the probability of physical exercise, while the level of income had a positive effect, see Table IV and Figure I. However, among the households with only one financial provider, the vast majority (81.5%) had no children living in the same household. Thus, some covariations exist between the financial provider variable and the variable describing households with/without children in this particular setting; therefore, the two variables are not effectively distinguished as influential in this case.

[Insert Table IV]

[Insert Figure I]

4. Discussion

4.1 The basic findings

In this study from Moss, Norway, the frequency of walks from home was not associated with SEP. No convincing trends were found between the frequency of walks from home (for neither recreation nor transport) and income, education, employment, age, gender, housing

type, households with or without children, grew up in Norway or not, years of residence in Moss, or the number of financial providers. Here, our main interest concerns the demographic and SEP indicators, but it is of course important also to state that was there was no association between number of walks and self-reported health status, personal activity level/sedentary time or participation in physical exercise/workout. The only significant positive influence on the number of walks was dog ownership (and only for recreational walks). Christian et al. (2013) who conducted a review and meta-analysis of studies exploring the relationship between dog ownership and frequency of walks found that people with dogs walked more than those without a dog. Furthermore, we found that respondents reported more walks for transport than for leisure and more walks in the summer than in the winter season.

When assessing SEP in relation to those who engage in physical exercise, we found that age, household income and the number of financial providers in the household influenced the probability of participation in physical exercise. Other research supports these findings regarding younger ages and participation in more vigorous physical activity (European Commission, 2014; U.S. Bureau of labor statistics, 2016). Furthermore, the relationship between income and exercise is found both nationally (Vaage, 2015; Breivik & Rafoss, 2017) and internationally (Australian Bureau of Statistics, 2011; U.S. Bureau of labor statistics, 2016). Regarding the correlation between exercising and presence of only one financial provider in the household, we assume that this variable is linked to these individual's general life situation. Childless households were overrepresented among the households with only one financial provider, and the mean age in this group was approximately 52 years old. Therefore, we believe that the categorical variable describing the number of financial providers in the household is a proxy for multiple variables, reflecting the amount of free

time e.g. available for exercising. If so, this finding is in line with those of previous international studies on family composition and participation in moderate physical activity (Australian Bureau of Statistics, 2011; U.S. Bureau of labor statistics, 2016; Pot & Keizer, 2016). Here, the literature on leisure constraints gives a relevant input; lack of time is usually among the most influencing constraints and can (partly) be regarded as a 'structural constraint' since it often is tied to certain periods in the lifespan, and especially when the family have (small) children (e.g. Godbey, 2005).

4.2 A public health perspective on the potential of walking

As shown in our study, more than participation in physical exercise, walking seems to have a broader social appeal and thus the potential to increase physical activity among "average citizens". It has also been documented the walking can prolong life. In their pooled analysis from six American and European studies, Arem et al. (2015) examined how different types and levels of leisure-time physical activity were associated with mortality. Walking was the most commonly performed activity in the total study population. The authors concluded that meeting the recommended minimum level by WHO *"by either moderate- or vigorous-intensity activities was associated with nearly the maximum longevity benefit"* (page 959). Other studies have noted many other health benefits associated with walking, including relaxation (Ekkekakis et al., 2000) and personal well-being (Gatrell, 2013). In our study we did not explore benefits with walking, however, this is done in a qualitative study from the same case area (Rybråten et al., accepted for publication). Walking is a flexible activity that can be adapted to different needs and situations – and can take the form of brisk walks, walks to run errands, walks for daily transport, walks for recreation etc. This flexibility makes

walking an accessible activity with a great potential to increase public health. In our study, we found that people walk more for transport than for recreation.

The surroundings are more or less suited for safe and pleasurable walking. The surroundings can be a structural constraint that prevents walking (Walker & Virden, 2005) and the surroundings can stimulate the motivation to walk and the walking frequency (e.g. Friedman, 2014; Sallis et al., 2006; Southworth, 2005). Further, the public health potential of walking is under-communicated, at least in the Norwegian context. When media present the health benefits of physical activity, they tend to focus on exercise or fitness rather than moderate physical activity, like walking. Even when the respected Norwegian newspaper *Aftenposten* presented the work of Arem et al. (2015) – see the section above – the headline was "The optimal amount of physical exercise" (Dyregrov, 2016) alongside a photograph of a running competition. The distribution of this type of information runs the major risk of demotivating inactive individuals. WHO (2017a) state that 1/3 of the adult global population was insufficiently active in 2008 (the latest figures available). The latest objective measures (by using accelerometer in a broad, long-term and representative study) from Norway conclude that 2/3 of the adults are insufficiently active (Hansen et al. 2015).

It seems likely that improved information about the health benefits associated with moderate physical activities, like daily walking, would be more helpful, or effective, in a public health perspective. Sallis et al. (2006) has shown, in their socio-ecological framework on physical activity, that mass media plays a role in changing behaviour to a more active lifestyle. Our study shows that physical exercise/workout appeal mostly to younger adults and people who are better off economically. This finding indicates that promoting vigorous activities like jogging or other types of exercise do not necessarily help stimulating physical activity among

the inactive ones (who tend to be more frequent in the lower end of the SEP-scale) (Breivik & Rafoss, 2017; Hansen et al. 2015; Beenackers et al., 2012).

4.3 Postscript – on urban recreation, walkability and urban planning

Given the political goal of encouraging people to be more physically active (World Health Organization, 2017b), this study has demonstrated the importance of viewing walking as an outdoor recreation activity with great potential for increasing public health. Others have noted that, if neighbourhoods were more walkable, people across different SEPs would be more likely to walk for recreation and for transportation (Van Dyck et al., 2010; Sundquist et al., 2011; Friedman, 2014). Owen et al. (2004) have shown that walking-friendly environments are related to aesthetic attributes, convenient walking facilities, access to natural areas and access to stores. Furthermore, green infrastructure planning, such as size of parks or distribution of green spaces, may affect walking behaviour (Rioux et al., 2016). Buckley et al. (2017) have reviewed the literature on what motivates people to walk. They identify a list of 15 motivators associated with walkability, of which some are related the physical environment and pedestrian planning. Others have noted that people, specifically women, will walk more often if their environments are attractive and safe (Suminski et al., 2005). Banister (2008) launched the term ‘sustainable mobility paradigm’ as opposed to the conventional ‘planning-for-car-traffic-approach’: there is a need for a change in modern urban planning, from focusing on motorized traffic (with use of the car as the normal) to focusing on people and soft transportation modes such as walking or biking. Hence, planners and politicians play essential roles in promoting public health, the social city, and the environmentally friendly city by facilitating walking and biking activities. Southworth (2005)

said that previously, moving by foot and bicycle was viewed only as recreational, but there is now a shift in policy were also walking is considered as a valid mode of transport. A good point, but in our opinion, the point can even be twisted: The term urban recreation should be expanded and include also walking or bicycling for transport! Anyhow, in several European cities (e.g. Amsterdam, Copenhagen and Oslo) there are strategies to develop walking and biking lanes, this to support human health, reduce emissions, and not least create a nice atmosphere in the city (see for example Copenhagen municipality, 2011; Oslo municipality, 2014). Lately, Norwegian policy-making on outdoor recreation has started changing its focus from mainly promoting traditional nature based outdoor activities to including also daily outdoor recreation in urban settings, such as neighbourhood walks (Ministry of Climate and Environment, 2013; 2016). Our study supports the importance of such a shift of focus.

4.4 Methodological limitations

In our study, we utilized broad statistical models to explore multiple explanatory indicators (primarily demographic and SEP indicators, but also indicators on personal activity/sedentary level and perceived health status) as well as their interactions, to reveal the correlations between reported frequencies of neighbourhood walks, as well as probability of participation in physical exercise/workout, and these indicators. We believe that our results are robust and reflect a broader picture compared with those of other studies, in which only a few SEP indicators (Sundquist et al., 2011, Van Dyck et al., 2010, Wei et al., 2016) or bivariate statistics (Lee et al., 2013) were used. In future, it would be relevant to include also environmental measures in the analyses. Such analysis would be in line with ecological models (Sallis et al., 2006; Cerin et al., 2009) in that it provides a broad perspective of both

physical, environmental and individual or social factors that may explain participation in physical activity (Bauman et al., 2012).

The participants walked, on average, 6.8 times a week. Based on our data, we cannot conclude the amount of time that they spent walking because we only asked for the number of walks that they took during an average week. People might overestimate their levels of physical activity. Our choice of method, mobile phone interviews instead of questionnaires, might have increased the chance of overestimation. As mentioned in other studies (Jensen, 2003), the tendency to overstate is well known. On the other hand, by using mobile phone numbers as the sampling method there is little risk of a biased sample. The responsible data-collection company (NORSTAT) reported that 98.7 % of the population own a mobile phone. But the willingness to answer the questions might of course be biased.

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