Introduction

Commuting distances in most western countries are increasing – employed people travel further and use more time to get to work (Frändberg & Vilhelmson, 2011; Lyons & Chatterjee, 2012; Viry, Ravalet, & Kaufmann, 2015). This development is to some degree a result of promoted policies. Peoples willingness to undertake longer commuting journeys is believed to strengthen the labour markets and the development of competitive industrial regions (Green, Hogarth, & Shackleton, 1999; Sandow, 2008), and investments in transportation infrastructure and services are often motivated by the potential for creating larger regional labour markets and enhancing opportunities for commuting. As commuting distances increases there is growing concern for the potential implications for employees. Various health-related studies report that extensive commuting may have negative effects for the individual, such as increased stress and reduced well-being (Evans, Wener, & Phillips, 2002; Rissel, Petrunoff, Wen, & Crane, 2014). Moreover, studies have documented that commuting decreases the amount of time spent with spouses and children (Christian, 2012), as well as engagement in social activities and political participation (Mattisson, Hakansson, & Jakobsson, 2015; Newman, Johnson, & Lown, 2014). Thus, commuting may have wide-ranging consequences and negatively impact family life and social commitments in general.

Work-family balance refers to the extent to which an individual is equally engaged in – and equally satisfied with – his/her work role and family role (Greenhaus, Collins, & Shaw, 2003p. 513). The significance of work-family balance for predicting job satisfaction, organizational commitment, family satisfaction and life satisfaction is documented several studies, where individuals' satisfaction with work-family balance has been explained by work-, individual-, and family-related factors (Marks & McDermid, 1996). Still, the potential bearings of commuting on work-family balance has received limited attention. van der Klis and Karsten (2009) used a qualitative approach to examine work-family balance in families where one parent worked on the local scale and the other on the (inter)national scale, but apparently no attempt has been made to quantify these effects. In view of the recent developments described above, it is reasonable to believe that commuting represents an increasing and significant threat to peoples' feelings of how they cope with work and family responsibilities. On a more general level, Olsson et al. (2013p. 256) state that *"Work commutes are … a neglected aspect of everyday life"*, which signifies the need for more research on the causes and consequences of commute satisfaction.

The aim of the present study is to expand previous research by focusing on commute satisfaction as a primary determinant for individuals' satisfaction with work-family balance.

Commute satisfaction is analysed together with "general" predictors of work-family balance to determine the relative impact of commuting. While the major focus of previous studies on commuting and family related issues have been on business travel and/or long distance commuting (e.g. Gustafson, 2013; Jensen, 2013) the current work look at the daily commute, i.e., the routine and repeated journey between home and work. The great majority of workers are not involved in long-distance commuting, but rather have commuting times between 20 and 30 minutes. For example, according to the U.S. Census Bureau, the average travel time to work in the United States is 25.4 minutes. Still, there are good reasons to believe that the work commute impact peoples' ability to cope with work- and family responsibilities. Results from the present study of a sample of Norwegian knowledge workers support this assumption. It is shown that commute satisfaction in fact is more influential for their satisfaction with work-family balance than "general" predictors such as the number of hours worked per week and work flexibility. Findings suggest that employees commuting strains should be highly emphasised in and human resource management practices.

The rest of the paper is organized as follows. In the next section, a set of hypotheses are developed based on a review of relevant literature (2). In the subsequent sections, we present the data and the methodological approach taken (3) and the results (4). Finally, results are discussed and implications for transport research and policy makers on different levels are put forward (6).

Literature review and hypotheses

Commute satisfaction and work-family balance

The primary objective of this study is to estimate the impact of work commute satisfaction on individuals' satisfaction with work-family balance. In the context of work-family balance, to be balanced is to approach each role – work and family – with an approximately equally high level of attention, involvement or commitment. An important point for many studies in this area is that roles related to work and home can affect each other in negative as well as positive ways, and both inter-role conflicts and inter-role facilitation are key elements in the concept of work-family balance. Thus, it has been assumed that high role enhancement/facilitation combined with low role conflicts represents a work-family balance, while low enhancement and many conflicts represents an imbalance (Carlson, Grzywachs, & Zivnuska, 2009; Frone, 2003). Yet, research has argued that inter-role balance is something unique and quite different from both conflict and enrichment. Evidence from psychometric studies has supported the view that

conflict, enrichment and balance are distinct constructs (Carlson et al., 2009). Although varying uses and definitions of the term work-family balance exist, we define work-family balance as an overall appraisal regarding the individual's satisfaction with his/her work and family life (Allen, 2012; Greenhaus & Allen, 2010).

Previous studies have identified various determinants of individuals' satisfaction with work-family balance. For instance, long working hours is negatively related to perceptions of work-family balance, while time spent with children is reported to improve satisfaction (Valcour 2007; (Milkie, Bierman, & Schieman, 2008). Moreover, job-related factors, such as task complexity and control over work time seem to influence the perceived balance. Also, individual traits and characteristics have been recognized as significant predictors (Duncan & Pettigrew, 2012). In a recent study of working parents, Allen (2012) found that mindfulness was positively related to work-family balance, while sleep quality and vitality may function as important mediating variables. Thus, various factors determine an individual's ability to cope with work and home responsibilities.

The inclusion of commuting as a predictor of work-family balance is motivated by the impact of the work commute on framing family activities and social relationships (Fine-Davis, Fagnani, Giovanni, Højgaard, & Clarke, 2004; Lyons & Chatterjee, 2012; Meil, 2009). Commuting time influence how couples organize their everyday activities, and research has documented that longer distance commuters spent less time with family and friends than those with shorter commutes. More precisely, Christian (2012) found that a one-hour increase in commuting time was associated with an 11.9-minute decrease in time spent with friends. Moreover, the risk for divorce/break up is significantly higher for couples where one of the partners is commuting long distance (Sandow, 2014). Also the commuter's wider social network may suffer. A study focussing on commuters' local environment and social networks showed that commutes of over thirty minutes translate to a reduced satisfaction with one's social contacts (Delmelle, Haslauer, & Prinz, 2013). Thus, time spent commuting may be at the expense of time spent developing social relationships in the local community and general local engagements. Empirical works have found general support for Robert Putnam's (2000) argument that commuting time is responsible for the decrease in social capital among citizens in the US over the past decades (Besser, Marcus, & Frumkin, 2007; Newman et al., 2014). Negative relationships between civic engagements, local social networks and commuting time have also been documented in European studies (Mattisson et al., 2015). Finally, "spillover effects" may occur, where the psychological state in one life domain transfer to another domain, for instance, commuting conditions and associated moods affecting performance at work and one's mood at home (Wener, Evans and Boately 2005). For

instance, Abou-Zei and Ben-Akiva (2011) reported a positive effect of work commute satisfaction and work well-being. It is reasonable to assume spillover effects also in the present context, i.e., when people reflect about their ability to cope with responsibilities at work and home, they take into consideration their overall satisfaction with the work commute.

Taken together, the above discussion suggests the following hypothesis:

H1: Work commute satisfaction is positively related to satisfaction with work-family balance

Determinants of work commute satisfaction

Provided support for H1, antecedents of satisfaction should be determined to increase positive feelings during the work commute. Various travel characteristics explain commute satisfaction. *Commuting time* is generally negatively related to travel satisfaction mainly due to many travelers' perception of travel time as wasted time. Henscher, Stopher and Bullock (2003) found that travel time, together with travel costs, were the two greatest sources of negative satisfaction among bus passengers, while Olsson et al. (2013 p. 259) state that *"…negative feelings during the work commute increases with the length of the commute."* Moreover, for long distance commuting research has found that the commute may have negative effects on the commuter's mental health and increase stress levels (Evans et al., 2002; Legrain, Eluru, & El-Geneidy, 2015; Rissel et al., 2014). On the other hand, Mokhtarian and Solomon (2001) proposed the term "anti-activities" to denote the use of travel time for relaxing, thinking, and shifting gears mentally between origin and destination activities and roles, implying that the traveller may not always try to minimize travel time. In an indicative study of travellers in the San Francisco bay area, the authors found that the ideal one-way commute was on average set to 16 minutes. This is half of the average commuting time in urban areas in the US (Wener, Evans, & Boately, 2005), suggesting that the great majority of US workers (and elsewhere) have commuting times beyond the ideal.

On the other hand, access to mobile communication technology can convert travel time to productive time. Activities once closely related to geographical places – work, education and leisure – have become increasingly fragmented into multiple smaller timeslots in different places, including transport (Alexander, Ettema, & Dijst, 2010; Lenz & Nobis, 2007). In particular, public transportation has become a "place" where different activities are carried out, and provides an opportunity for multi-tasking of different degrees of complexity (Guo, Derian, & Zhao, 2015; Kenyon & Lyons, 2007). A recent study shows that 98 % of public transportation passengers have access to mobile communication devices on their journey, and approximately 80 % have

smartphones or other smart devices (Julsrud & Denstadli, 2017). Internet access and mobile communication devices facilitate work or other productive activities en route, which is likely to increase commute satisfaction.

Commuting can elevate high levels of stress. Indeed, in a time use survey, Kahneman et al. (2004) found the work commute to be among the events that generate most negative feelings during the day. Singer et al (1978) reported that commuting by train increased objective indicators of stress such as blood pressure and neuroendocrine processes. Subsequent studies using objective and self-report measures of stress have reached corresponding conclusions (Bhat & Sardesai, 2006), and Wener, Evans and Boately (2005) concluded that infrastructure improvements enhance passenger well-being by reducing commuting stress. Although the level of commuting stress is related to transport mode (see below), empirical evidence generally points to the work commute as an experience that can elevate stress and generate negative feelings.

Two other travel characteristics that are hypothesized to impact commute satisfaction are travel costs and environmental perceptions. *Travel costs* is a general predictor of mode choice and travel satisfaction. For public transportation, several studies report fare to significantly impact passengers' satisfaction with the transit systems (Henscher, Stopher, & Bullock, 2003; Tyrinopoulos & Antoniou, 2008). Thus, the traveler's satisfaction with commuting costs is likely to be positively related to commute satisfaction. Finally, we assume a positive link between *environmentally friendly travel* and commute satisfaction. Traveling by environmentally friendly modes represents an additional benefit of the commute that is likely to positively impact the overall experience with the journey. This relates to the commuters subjective feeling of the eco-friendliness of the transport mode, which may or may not agree with the real situation (e.g., a commuter who is car-pooling and one who is cycling may have equal ratings of the eco-friendliness of the commute).

Based on the above discussion, the following hypothesis are suggested:

H2: Commuting time is negatively related to work commute satisfaction

H3: Perceived commuting stress is negatively related to work commute satisfaction

H4: Opportunities to work while commuting is positively related to commute satisfaction

H5: Satisfaction with commuting costs is positively related to commute satisfaction

H6: Perceived eco-friendliness of the commute is positively related to commute satisfaction

Determinants of commuting stress

Several factors determine the individual's perceived stress with the work commute. *Predictability* relates to the likelihood of unforeseen occurrences during the commute. Delays caused by unexpected traffic jams or unreliable public transport services has been identified as main determinants of commuting stress (Evans et al., 2002; Wener et al., 2005) A higher levels of stress were reported among train commuters who perceived the journey as unpredictable, and this group also had higher levels of salivary cortisol (use as a marker of psychological stress) compared to passengers with more predictable commutes (Evans et al. 2002). *Caretaking responsibilities* restricts flexibility. Schools and kindergartens operate within specific timetables at both ends of the day, and it is reasonable to assume that getting children to/from school/childcare may produce a "transport problem space" (Jain, Line, & Lyons, 2011) with negative impacts on perceptions of stress. Commuting stress has also been linked to *transport mode*. In general, car drivers tend to experience higher levels of stress than public transport users, bikers and walkers (Bergstad et al., 2011; Gatersleben & Uzzel, 2007). Active travel modes (biking and walking) are perceived as more relaxing, and the element of physical exercise also contributes to their popularity(Lawrence et al., 2006). In addition, commuting time is assumed to impact perceived stress on the work journey, as indicated in several studies (Evans et al., 2002; Legrain et al., 2015; Rissel et al., 2014). Based on the above, the following hypotheses are suggested:

H7: Commuting time is positively related to perceived commuting stress

H8: Predictability is negatively related to perceived commuting stress

H9: Caretaking responsibilities are positively related to perceived commuting stress

H10: Car commuters perceive higher levels of stress than do commuters by public transport, biking or walking

Research model

The previous discussion is summarised in Figure 1. The main relationship to be tested is the impact of work commute satisfaction on satisfaction with work-family balance (H1). Seven "general" predictors of work-family balance, located in the lower part of the model, are included as control variables. These comprise three work-related factors (hours worked per week, whether the respondent holds a managerial position, and workplace flexibility policies), two variables related to family demands (whether the respondent has children of age 18 or younger, and if he/she lives in a two-income household), and two individual factors (gender and age). Previous

studies have documented the importance of these variables in predicting satisfaction with work-family balance (Kossek & Lautsch, 2012; McNamara, Pitt-Catsouphes, Matz-Costa, Brown, & Valcour, 2013; Valcour, 2007).

The discussion above identified five determinants of work commute satisfaction, described by H2 to H6 in the model. Three variables are hypothesised to be negatively related to work commute satisfaction (commuting time, commuting stress, and travel costs), while a positive relationship is expected for opportunities to work en route and perceptions of environmentally friendly travel. Finally, the model describes four predictors of commuting stress; commuting time (H7), commute predictability (H8), caretaking responsibilities (H9) and transport mode (H10). The model is estimated using structural equation modelling.

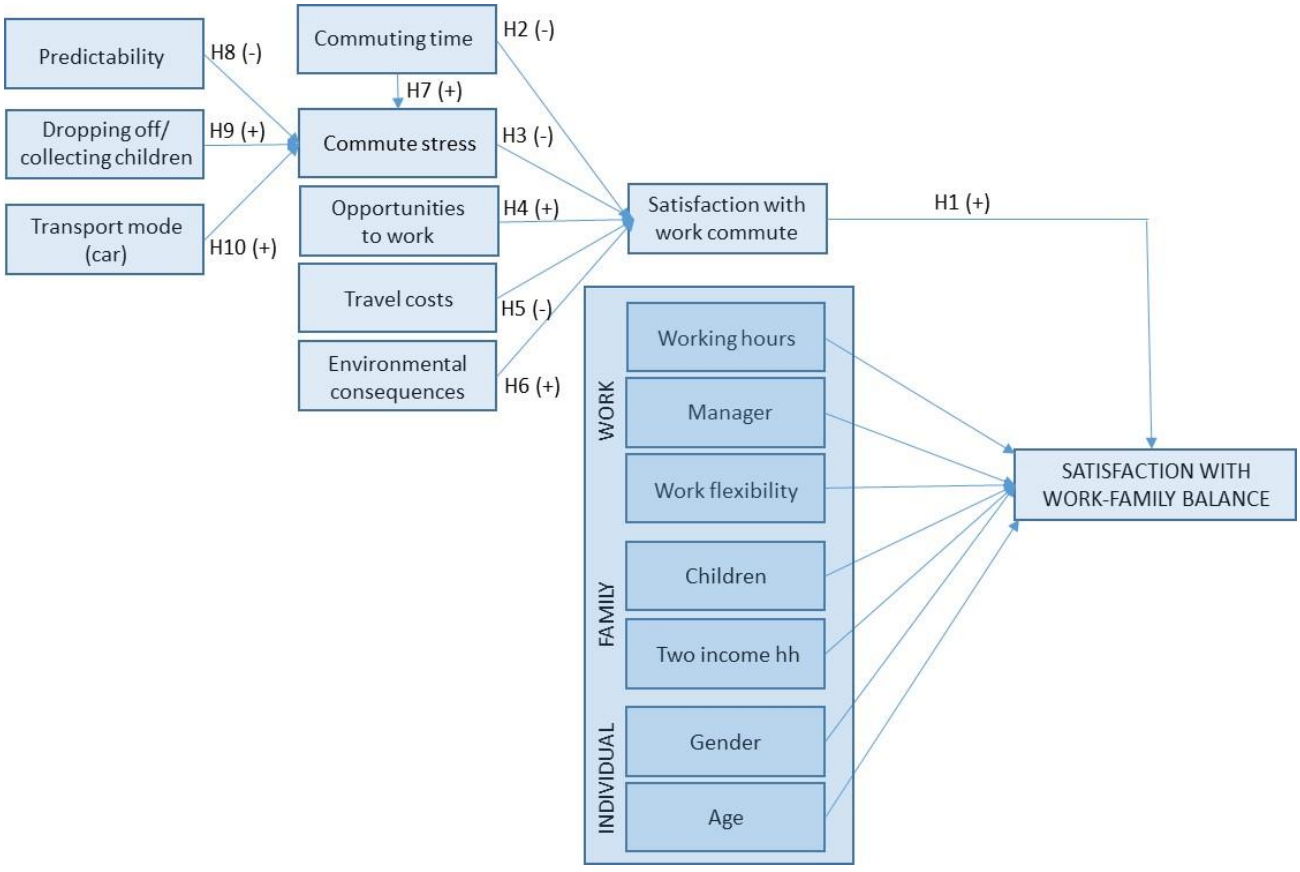

Figure 1: Research model

Data and methodological approach

Case study: Xenon

This work is based on data from *Xenon*[1], a Norwegian finance and insurance company situated in Oslo, Norway. The majority of its employees have a higher education and an above-average income level. The work is largely information-based and analytical, and the enterprise may be classified as a typical knowledge-intensive organisation (Alvesson, 2004; Robertson & Swan, 2003).

Xenon represent an industry that usually makes it possible for employees to work from home or during travel on public transport. At the same time Xenon have a high degree of knowledge workers, a group of employees that tends to be vulnerable for overwork, and that often faces challenges in their efforts to balance work and family life (Currie & Eveline, 2010; Heijstra & Rafnsdottir, 2010). Although there are no single definition available, knowledge workers are usually described as highly qualified individuals that work with high flexibly and autonomously (Alvesson, 2004; Robertson & Swan, 2003).

Xenon is located in the central business district in Oslo. In total, about 5,000 new apartments and 20,000 workplaces are located there. The company is situated within 600 metres of the main rail station. This is a major central node point for travels by train, metro, tram, as well as local and regional buses. The area has arguably the best public transport service in Norway, which might reduce the potential effects of commuting on work-family balance. Consequently, Xenon can be seen as a "crucial case" (Eckstein, 1975) for understanding whether variations in commuting and flexible work forms influence knowledge workers' satisfaction with work-family balance.

Previous studies have shown that the car share is low for work commutes to the central parts of Oslo, due to a combination of good public transport facilities and rather extensive restrictions on car use (Christiansen, Engebretsen, Fearnley, & Hanssen, 2017). Only 3 % of employees can potentially park in the parking spaces offered by Xenon. There are private parking spaces available in adjacent areas, but at a relatively high cost. In addition, there are tolls for driving into Oslo municipality. Therefore, the company has offered a combination of different measures in order to make work commutes more flexible. Three electric cars are available for business travels. It is also possible to reserve a parking space in advance.

[1] The name is a pseudonym to ensure the anonymity of the enterprise.

The data were obtained through a survey conducted among the 989 employees at the company. The respondents were recruited through email, and requested to fill out an electronic questionnaire. The response rate ended up at 69 %. From the company we received information on the employees' gender and place of residence. Comparing sample and population data on these two variables, we find little differences.

The questionnaire covered a broad set of aspects. Details about the choice of transport modes, time spent on work commutes and public transport frequencies at home were covered. Variables relating to paid work were occupational status and weekly working hours, as well as information about homeworking frequency. Socio-demographic data included gender, age, income, marital status and the number and ages of children. In addition, the respondents were asked to report how satisfied they were with their work commute and work-life balance. *Table 1* describes measurements for the variables included in the research model.

Table 1: Measurements for the variables included in the research model

Model	Variable	Measurement
Satisfaction with WFB	Satisfaction with WFB	5-item scale developed by Valcour (2007). The factor analyzed items produced a uni-dimensional WFB component explaining 84.3% of the variance in the set of items (Cronbach's alpha=.953).
	Commute satisfaction	"Overall, how satisfied are you with your work commute?" (1=very dissatisfied, 5=very satisfied)
	Working hours	Number of hours normally worked in a week
	Manager	If respondent have a managerial position in the company
	Work flexibility	
	Flextime	If respondent has flexible working hours as opposed to a working schedule with fixed hours (e.g., 8 am to 4 pm)
	Home-based work	Respondent's opportunities to work from home at certain times
	Children < 18 years	Whether respondent has children age 18 years or younger
	Two income household	If spouse/partner is working full time (dual earner household)
Commute satisfaction	Commute time	Duration (in min.) of work commute door-to-door, one way. Time spent on errands (e.g., dropping off children at school) not included.
	Commute stress	"The commute to work is stressful to me" (1="Totally disagree"; 5="Totally agree")
	Commute time use	"How satisfied or dissatisfied are you with the opportunity for utilizing travel time for work-related tasks?" (1="Very dissatisfied"; 5="Very satisfied")
	Travel cost	"How satisfied or dissatisfied are you with work commute costs?" (1="Very dissatisfied"; 5="Very satisfied")
	Environmental consequences	"How satisfied or dissatisfied are you with the environmental consequences of your work commute?" (1="Very dissatisfied"; 5="Very satisfied")

Commute stress	Commute predictability	"My daily commute is predictable" (1="Totally disagree"; 5="Totally agree")
	Dropping off/collecting children	Whether respondents normally drop off/collect children to school/kindergarten
	Mode	Transport mode normally used on work commute

Sample characteristics

Table 2 provides detailed sample characteristics. On average, respondents work 41.7 hours a week, which is above the average for Norwegian working life. This reflects the fact that the sample comprises knowledge workers, who in general work longer hours than do employees in other industries. The mean commuting distance is 22.8 km, ranging from under 1 km to 150 km. The average commuting distance for the general labour force in Norway is 16.3 km (Hjorthol, Engebretsen & Uteng, 2015), suggesting that employees in our case company commute relatively long distances.

Moreover, we find that 16 % have managerial responsibilities, and a majority of respondents hold a post providing a high degree of flexibility. Nine out of ten have flexible working hours, and 87 % report opportunities for teleworking. Nevertheless, not all employees within the case company are allowed to telework, and not all employees have the opportunity to work flexible hours, illustrating that even within the same company work flexibility differs.

Regarding demographic characteristics, 56 % of the respondents have children aged 18 or younger living in the household. Close to two thirds live in a dual-earner relationship, 10 % in a single-earner relationship, while 20 % are single. The split between female and male respondents is 48/52, and the average age is just above 46 years. Not surprisingly, the majority of employees commute by public transport, but 13 % walk or cycle and 12 % use private car.

Table 2: Sample characteristics

	N	Mean / %
Hours worked per week	689	41.7
Commuting distance (km)	689	22.8
Age	600	46.1
Managerial position	689	16 %
Opportunities for home-based work	689	87 %
Flexible working hours	689	90 %
Children aged 18 or younger	689	56 %
Family	689	
Single		20 %
Couple, single earner		10 %
Couple, dual earner		64 %
Gender (female)	687	48 %

Transport mode	686	
Non-motorised (walking/cycling)		13 %
Public transport		75 %
Private car		12 %

Results

Mean scores for the variables commute satisfaction and satisfaction with work-family balance are 3.70 (SD=1.10) and 3.61 (SD=.80) respectively. This indicates that respondents in general are quite satisfied with their daily commute and experience a fairly balanced fit between family and work-related requirements. The frequency distribution for commute satisfaction in Figure 2 shows that the great majority (63 %) are either somewhat or very satisfied with their commute, while 16 % are on the dissatisfied side of the scale. Corresponding figures for satisfaction with work-family balance are 72 % and 15 % respectively (Figure 3). The scatter plot in Figure 4 demonstrate a strong positive relationship between the two variables (r=.388, p<.001).

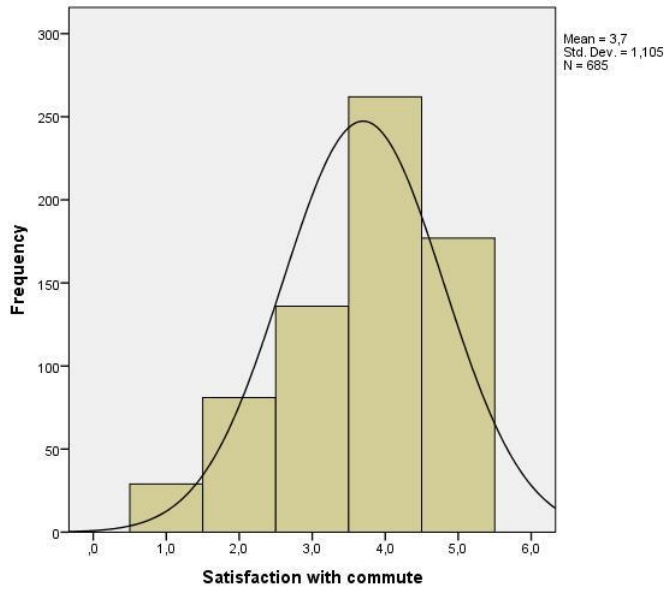

Figure 2: Frequency distribution satisfaction with commute

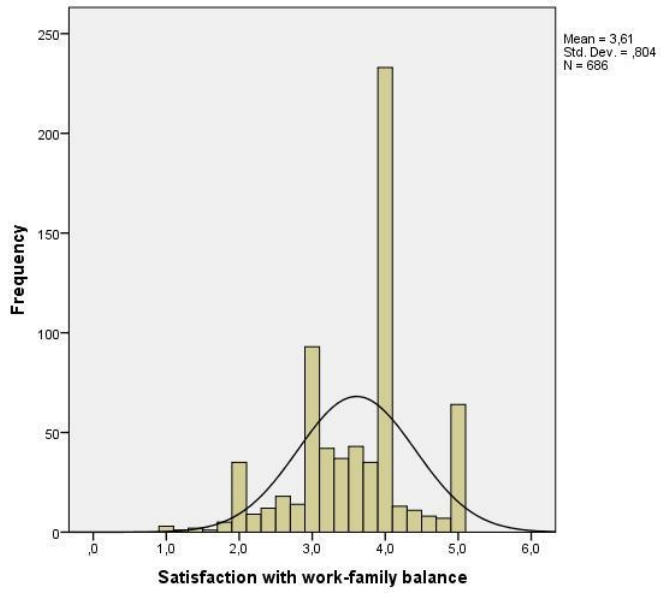

Figure 3: Frequency distribution satisfaction with work-family balance

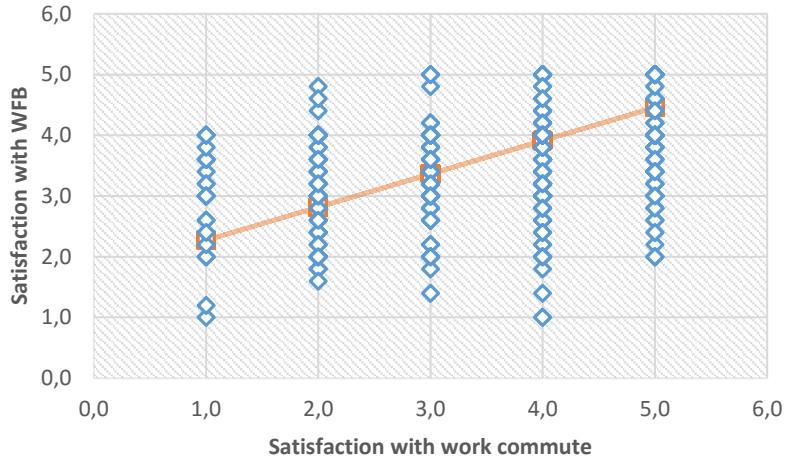

Figure 4: Correlation between work commute satisfaction and satisfaction with work-family balance

Model estimation and fit

The model shown in Figure 1 was estimated using the Amos software for Structural Equation Modelling. Estimation results are provided in Table 3. Model test statistics show the following: Comparative Fit Index (CFI)=.936; Normed Fit Index (NFI)=.904; TuckerLewis Index (TLI)=.922; Root Mean Square (RMSEA)=.051. The CFI, NFI and TLI measure the incremental fit of the model compared to a model that corresponds to completely unrelated variables. Ullman (2007) refers to values greater than .95 as indicative of good-fitting models, while Chi and Qu (2008) denote .90 as the recommended lower level. The model satisfies the latter requirement. RMSEA estimates the lack of fit in a model compared to a perfect (saturated) model. Hu and Bentler (1999) indicate values of .06 or less as representing a good-fitting model. Taken together, results indicate that the overall model fit is adequate.

Confirmatory factor analyses (CFA) of the single measurement model (work-family balance) specifying the hypothesized relationships of the observed variables to the latent construct were run. Results showed that each of the loadings was significant at the .001 level. Squared multiple correlation coefficients ranging from .708 to .884 indicate satisfactory convergent validity of the measurement scale.

Hypotheses testing

Table 3 provide results from the hypotheses testing. The estimation results correspond to the structural parameters of the research model outlined in Figure 1.

Satisfaction with work family balance: The main objective of this study was to estimate the impact of commute satisfaction on satisfaction with work-family balance, controlling for "general" work-family balance predictors. Supporting the underlying proposition on the causes of satisfaction with work-family balance, the impact of commute satisfaction is highly significant and positive. Thus, estimation results confirm the strong bivariate relationship demonstrated in Figure 4 indicating that work commute is a significant cause of peoples' ability to balance the needs of their job with those of their personal/family life. H1 is supported. Two control variables, i.e., "general" predictors of work-family balance, display significant impact and with expected signs: (i) number of hours worked per week is negatively related to satisfaction with work-family balance, and (ii) workplace flexibility, in the sense of possibilities for home based work, is positively associated with satisfaction with work-family balance.

Commute satisfaction: The research model outlined five predictors of commute satisfaction (H2-H6); commute time, perceived stress, work opportunities, travel costs, and perceived eco-friendliness of the commute. Table 3 shows that all signs are in the expected direction, and all variables display statistical significant impact on the 5 % level. H2-H6 are thus supported. Results indicate that perceived stress have the greatest impact on satisfaction level, followed by commuting time. The negative impact of commuting time supports the conventional assumption that travel time is wasted time producing negative utility. However, the significant and positive impact of "opportunities to work" indicate that utilizing travel time for work-related or other productive tasks to some degree compensate for the negative impacts of travel time. Results in table 3 shows that travellers who are able to convert travel time to productive time are more satisfied commuters. As suggested in H5, travel costs are negatively related to commute satisfaction. Here, travel costs relate to the commuters' satisfaction (or dissatisfaction) with work commuting expenditures, and not actual expenditures (cf., Table 1). Finally, results suggest that

environmental friendly travel modes give the traveller a better commuting experience. Again, this relate to relates to the commuter's perception of the eco-friendliness of the transport mode, not the actual emissions caused by the mode.

Commute stress: Determinants of commuting stress were tested in H7-H10. Results in table 3 display expected signs for the regression weights. With one exception, results support the proposed relationships. Longer travel time (H7), low predictability. i.e., risk for delays or other unforeseen incidents (H8), and parental duties (dropping off/collecting children) (H9) increases commuting stress. Moreover, results give partial support for differences across transport modes: Car users experience higher levels of commuting stress than do users of non-motorized travel modes (cycling and walking). However, no significant differences are revealed with respect to public transport users.

Table 3: Structural model estimation results

	Standardized regression weight	Critical ratio	Hypothesis
Satisfaction with work-family balance			
Commute satisfaction	.637	11.646***	H1
Hours worked per week	-.200	-5.504***	
Manager	.001	.038	
Flex time	-.024	-.716	
Homebased work	.076	2.145*	
Children < 18 years	-.046	-1.333	
Two income household	-.001	-.024	
Gender (female)	-.064	-1.846	
Age	-.025	-.718	
Commute satisfaction			
Commute time	-.162	-6.087***	H2
Perceived stress	-.504	-17.555***	H3
Opportunities to work	.122	4.546***	H4
Travel costs	.165	5.837***	H5
Environmental consequences	.067	2.473*	H6
Commute stress			
Commute time	.247	7.149***	H7
Commute predictability	-.241	-7.092***	H8
Dropping off/collecting children	.118	3.573***	H9
Mode			
Walking/cycling (dummy)	-.167	-4.358**	H10
Public transport (dummy)	-,052	-1.326	H10

***p<.001; **p<.01; *p<.05

Discussion

There is currently much evidence to indicate that commuting long hours may be a threat for workers' psycho-social health, in particular when there is a lack of control, low predictability and a high level of stress involved. Increasingly, studies have also indicated that long-distance commuting may interfere negatively with family lives and possibilities for engagement in social activities outside the home. The present work contributes to the above stream of research by introducing the term work-family balance as a way of developing a better understanding of how daily commuting activities influence individuals' ability to cope with family- and work-related roles. To the best of our knowledge, this relationship has previously not been investigated.

Results from the present study, based on a sample of employees in a larger Norwegian insurance company, reveals that satisfaction with the work commute is of vital importance for the individual's satisfaction with work-family balance. (To test the relationships between commuting and work travel balance we developed a model that first tested the general impact of satisfaction for commuting, controlling for traditional factors in the work-family balance literature related to work, family and individual traits. Secondly, key factors influencing satisfaction with work commute where investigated, and thirdly four key predictors of commute stress.) The standardized regression weights in Table 3 shows that commute satisfaction is more influential than any of the seven "general" predictors of work-family balance (e.g., hours worked per week working and work flexibility), which previous research has highlighted as key determinants for individuals' satisfaction with work-family balance. Thus, study findings strongly indicate that different factors related to the daily work commute is likely to influence how individuals cope with their responsibilities at work and home. More generally, this suggests that scientific and political based studies of the implications of commuting must take in to consideration not only the psycho-social health of the traveller, but also aspects related to quality of work and family life.

Increasing travellers' satisfaction with the work commute means reducing their stress level. Much research cited above has documented that commuting can elevate high levels of stress. Results reported in the present study adds to this research by showing that perceived stress is more influential than other predictors of commute satisfaction, e.g., time spent on commuting. Stress-inducing factors include longer travel time, low predictability, parental duties (here: dropping off/collecting children), and to some extent transport mode. Car users experience higher levels of stress compared to pedestrians and cyclists, but, as opposed to other studies, car commuters

do not report significantly higher stress levels than public transport users. This may be due to the study context in the sense that car commuters in the case enterprise can leave their car in private parking garages nearby the office building and therefore avoid the hassle of searching for a vacant parking lot. Moreover, commuting is valued when there are few interruptions and concerns for unexpected changes and/or interruptions, emphasising that a reliable transport system is vital for reducing commuters' stress levels. In a wider sense, stressful work trips may inhibit people from moving from cars to more sustainable modes, if the former appear to be less burdensome.

Rapid uptake of mobile communication media has enhanced the opportunities for performing work- and/or family-related activities while commuting. Recent in-depth studies of commuters have documented that mobile media are frequently used to conduct work related tasks and organize private activities en route (Guell, Panter, Jones, & Ogilvie, 2012; Jain & Lyons, 2008; Julsrud, Denstadli, & Herstad, 2014; Line, Jain, & Lyons, 2012), and according to results above, facilitating productive time use increases travellers satisfaction with the commute. In the context of this study, it could be argued that communication media seem to be used as tools to "re-establish" a balance between home and work.

Research has documented that sustainable consumption and green purchase is positively related to factors connected with happiness and satisfaction (Xiao & Li, 2011). Results above suggest that these mechanisms are also manifest in the context of work commuting, i.e., commuters who perceive their travel as eco-friendly report higher levels of commute satisfaction. This suggest that promotions of eco-friendly commuting (i.e., reduced car use) should be framed positively and linked to goals such as happiness and satisfaction, rather than negatively by normative arguments.

As pointed out above, results indicate that commute satisfaction is more influential in predicting individuals' work-family balance than hours worked per week and other "general" predictors reported in the literature. The "general" predictors were included as control variables to examine the relative impact of commuting. Six control variables display non-significant effects, including gender which previously has been reported to be a key determinant for work-family balance, i.e., women report lower levels of satisfaction with their work-family balance than do men (e.g., McNamara et al., 2013). This is explained by women's time-space commitment, which is often more complex compared to men's due to their greater involvement in domestic responsibilities (Jain, Line & Lyons, 2011). The non-significant impact of gender found in the present study suggest that commuting satisfaction mediates the impact of gender on work-family balance.

Previous research supports this assumption. For instance, Roberts, Hodgson and Dolan (2011) found that women in general experience the work commute more negatively than men.

Implications

The findings reported here suggest that work commuting should be included in discussions of knowledge-workers' challenges to balance work and family life. So far this question has mainly been addressed through organisational policies (i.e., managerial support, flexi-time). Moreover, it is evident that policies to promote longer commuting from a regional and economic perspective must take into consideration its effects on health and family issues. However, facilitating productive time en route may mitigate some of the well-known negative effects of commuting for psychosocial health and family life. Opportunities to conduct work- and/or family-related tasks during the commute may be positive for knowledge workers' efforts to meet demands from these two social spheres. This is probably even more critical for longer commuting journeys, and for employees who works long hours. Organisations that are in the process of relocating, or recruiting new employees located in significant distance to the headquarter, should take these issues in to consideration. Recommended locations are those close to junctions where there is good access to public transport and infrastructure for walking and cycling. Human resource managers should be aware of the potential importance of commute satisfaction for the wellbeing of employees, and one need to consider if employees who use commute time for work should be compensated.

The benefits of attracting knowledge workers for cities and urban areas is much discussed, and it is often claimed that cities that attracts and retains creative professionals (residents) will prosper, while those that do not will stagnate (Florida, 2002). Recent studies have documented that the "creative class" of knowledge workers not primarily live in city centres, but in suburbs and use much of their time is used on commuting (Frenkel, Bendit, & Kaplan, 2013; Lawton, Murphy, & Redmond, 2011). Investments in high quality infrastructure for public transport services may be an important element in a policy to promote regions as attractive for new generations of knowledge workers.

Initiative to improve work-family balance then, should not be an issue just for organizations; also, governmental organizations responsible for transportation infrastructure and public transport providers should be involved. Developing facilities that help knowledge workers to improve their quality of travel time, for instance with better spaces for working and

communicating, may be an undervalued strategy by which to strengthen public transport in urban areas.

Further work

Results from the present work are based on a case-study of knowledge-workers in a Norwegian finance and insurance company. Although knowledge workers constitute an increasing share of the workforce, one should be careful to generalize results to other labour groups. Likewise, the geographical context may have influenced results. The location of the workplace studied was in the inner-city area of Oslo, which is an area characterized by a high share of public transport commuters, congested streets during rush hours and poor parking facilities. Thus, future research should investigate these relationships in more diverse samples and geographical contexts. Moreover, longitudinal data of the impact of work commute satisfaction on satisfaction with work-family balance is warranted in order to investigate if the relationships identified here are stable or developing over time. To our knowledge, no longitudinal study has addressed these issues. Likewise, one need more knowledge on these relationships in the context of relocations of enterprises.

References

Alexander, B., Ettema, D., & Dijst, M. (2010). Fragmentation of work activity as a multi-dimensional construct and its association with ICT, employment and sociodemographic characteristics. *Journal of Transport Geography, 18*, 55-64.

Allen, T. (2012). Trait mindfulness and work-family balance among working parents: The mediating effects of vitality and sleep quality. *Journal of Vocational Behavior, 80*, 372-379.

Alvesson, M. (2004). *Knowledge Work and Knowledge-intensive Firms*. Oxford: Oxford University Press.

Bergstad, C. J., Gamble, A., Gärling, T., Hagman, O., Polk, M., Ettema, D., . . . Olsson, L. E. (2011). Subjective well-being related to satisfaction with daily travel. *Transportation, 38*, 2-25.

Besser, L. M., Marcus, M., & Frumkin, H. (2007). Commute Time and Social Capital in the U.S. *American Journal of Preventive Medicine, 24*(3), 3.

Bhat, C. R., & Sardesai, R. (2006). The impact of stop-making and travel time reliability on commute mode choice. . *Transportation Research Part B, 40*(9), 709-730.

Carlson, D. S., Grzywachs, J., & Zivnuska, S. (2009). Work-family balance: Is balance more than conflict and enrichment? *Human Relations, 20*, 1-28.

Chi, C. G. Q., & Qu, H. (2008). Examining the structural relationships of destination image, tourist satisfaction and destination loyalty: an integrated approach. Tourism Management, 29(4), 624-636.

Christian, T. J. (2012). Automobile commuting duration and the quantity of time spent with spouse, children, and friends. . *Preventive Medicine, 55*, 215-218.

Christiansen, P., Engebretsen, Ø., Fearnley, N., & Hanssen, J. U. (2017). Parking facilities and the built environment: Impacts on travel behaviour. *Transportation Research Part A: Policy and Practice*, 198–206.

Currie, J., & Eveline, J. (2010). E-technology and work/life balance for academics with young children. *Higher Education*(62), 533-550.

Delmelle, E. C., Haslauer, E., & Prinz, T. (2013). Social satisfaction, commuting and neighborhoods. *Journal of Transport Geography, 30*, 110–116.

Duncan, K. A., & Pettigrew, R. N. (2012). The effect of work arrangements on perception of work-family balance. *Community, Work, Family, 15*.

Eckstein, H. (1975). Case studies and theory in political science. In F. Greenstein & N. Polsby (Eds.), *Handbook of political science* (Vol. 7, pp. 79-138). Reading, Mass.: Addison-Wesley.

Evans, G. W., Wener, R. E., & Phillips, D. (2002). The morning rush hour: predictability abd commuter stress. *Environment and Behavior, 34*, 521-530.

Fine-Davis, M., Fagnani, J., Giovanni, D., Højgaard, L., & Clarke, H. (2004). *Fathers and mothers: Dillemas of the work-life balance*. New York: Kluwer.

Florida, R. (2002). *The Rise of The Creative Class*. New York: Basic Books.

Frenkel, A., Bendit, E., & Kaplan, S. (2013). Residential location choice of knowledge-workers: The role of amenities, workplace and lifestyle. *Cities, 35*, 33-41.

Frone, M. R. (2003). Work-family balance. In J. C. Quick & L. E. Tetrick (Eds.), *Handbook of occupational health psychology* (pp. 143-162). Washington: APA.

Frändberg, L., & Vilhelmson, B. (2011). More or less travel: personal mobility trends in the Swedish population focusing gender and cohort. *Journal of Transport Geography, 19*(6), 1235-1244.

Gatersleben, B., & Uzzel, D. (2007). Affective Appraisals of the Daily Commute. Comparing Perceptions of Drivers, Cyclists, Walkers, and Users of Public Transport. *Environment & Behavior, 39*(3), 416-431.

Green, A. E., Hogarth, T., & Shackleton, R. E. (1999). Longer Distance Commuting as a Substitute for Migration in Britain: A review of Trends, Issues and Implications. *International Journal of Population Geography, 5*, 49-67.

Greenhaus, J. H., & Allen, T. (2010). Work-family balance: A review and extention of the literature. In L. Tetrick & J. C. Quick (Eds.), *Handbook of occupational health psychology* (2nd ed.): American Psychology Association.

Greenhaus, J. H., Collins, K. M., & Shaw, J. D. (2003). The relation between work-family balance and quality of life. *Journal of Vocational Behavior, 63*, 510-531.

Guell, C., Panter, J., Jones, N. R., & Ogilvie, D. (2012). Towards a differentiated understanding of active travel behaviour: Using social theory to explore everyday commuting. *Social Science & Medicine, 75*(1), 233-239.

Guo, Z., Derian, A., & Zhao, J. (2015). Smart Devices and Travel Time Use by Bus Passengers in Vancouver, Canada. *International Journal of Sustainable Transportation, 9*, 335-347.

Gustafson, P. (2013). Business Travel from the Traveller's Perspective: Stress, Stimulation and Normalization. *Mobilities, 9*(2014), 68-83.

Heijstra, T. M., & Rafnsdottir, G. L. (2010). The Internet and academics´workload and work-family balance. *Internet and Higher Education, 13*, 158-163.

Henscher, D. A., Stopher, P., & Bullock, P. (2003). Service quality – developing a service quality index in the provision of commercial bus contracts. Transportation Research Part A. *Transportation Research Part A, 37*, 499-517.

Hu, L., & Bentler, P. (1999). Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives. . *Structural Equation Modelling, 6*(1), 1-55.

Jain, J., Line, T., & Lyons, G. (2011). A troublesome transport challenge? Working round the school run. *Journal of Transport Geography, 19*, 1608-1615.

Jain, J., & Lyons, G. (2008). The Gift of Travel Time. *Journal of Transport Geography, 16*(2), 81-89.

Jensen, M. (2013). Exploring business travel with work-family conflic and the emotional exhaution component of burnout as outcome variable: The job demands-resource perspective. . *European Journal of Work and Organizational Psychology, 4*, 497-510.

Julsrud, T. E., & Denstadli, J. M. (2017). Smartphones, travel time-use and attitudes to public transport services. Insights from a study of urban dwellers in two Norwegian cities. *International Journal of Sustainable Transportation, Forthcoming*.

Julsrud, T. E., Denstadli, J. M., & Herstad, J. (2014). *Bruk av mobilt kommunikasjonsutstyr underveis. Hva skjer med reiseopplevelsen?* Retrieved from Oslo:

Kahneman, D., Krueger, A. B., D.A Schkade, Schwarz, N., & Stone, N. (2004). Kahneman, D., Krueger, A.B., Schkade, D.A., Schwarz, N. and Stone, A.A. 2004. A survey method for characterizing daily life experience: The day reconstruction method. . *Science, 306*, 1776-1780. .

Kenyon, S., & Lyons, G. (2007). Introducing multitasking to the study of travel and ICT: examining its extent and assesing its potential importance. *Transportation Research Part A, 41*(2), 161-175.

Klis, M. V. d., & Karsten, L. (2009). The commuter family as a geographical adaptive strategy for the work-family balance. *Community, Work & Family, 12*(3), 339-354.

Kossek, E. E., & Lautsch, B. A. (2012). Work-family boundary management styles in organizations: A cross-level model. *Organizataional Psychology Review, 2*(2), 152-171.

Lawrence, X. D., Sallis, F., Conway, T. L., Chapman, J. E., Saelens, B. E., & Bachman, W. (2006). Many pathways from land use to health: Associations between neighborhood walkability and active transportation, body mass index, and air quality. *Journal of American Planning Association, 72*(1), 75-87.

Lawton, P., Murphy, E., & Redmond, D. (2011). Residential Preferences of the 'Creative Class'? *Cities, 31* (2), 47-56.

Legrain, A., Eluru, N., & El-Geneidy, A. M. (2015). Am stressed, must travel: The relationship between mode choice and commuting stress. *Transportation Review Part F, 34*, 141-151.

Lenz, B., & Nobis, C. (2007). The changing allocation of activities in space and time by the use of ICT - "Fragmentation" as a new concept and empirical results. *Transportation Research Part A, 41*(2), 190-204.

Line, T., Jain, J., & Lyons, G. (2012). The role of ICTs in everyday mobile lives. *Journal of Transport Geography, 19*(6), 1490-1499.

Lyons, G., & Chatterjee, K. (2012). A Human Perspective on the Daily Commute: Costs, Benefits and Trade-offs. *Transportation Reviews, 28*(2), 181-198.

Marks, S. R., & McDermid, S. M. (1996). Multiple roles and the self: a theory of balance. *Journal of Marriage and the Family, 63*, 1083-1098.

Mattisson, K., Hakansson, C., & Jakobsson, K. (2015). Relationships Between Commuting and Social Capital Among Men and Women in Southern Sweden. *Environment & Behavior, 47*(7), 734-753.

McNamara, T. K., Pitt-Catsouphes, M., Matz-Costa, C., Brown, M., & Valcour, M. (2013). Across the continuum of satisfaction with work-family balance: Work hours, flexibility-fit, and work-family culture. *Social Science Research, 42*, 283-298.

Meil, G. (2009). *Balancing Job Mobility and Family Life: Effects on household division of labour*. Paper presented at the The IX ESA Congress Lisbon

Milkie, M., Bierman, A., & Schieman, S. (2008). How adult children influence older parents' mental health: Integrating stress-process and life-course perspectives. . *Social Psychology Quarterly, 71*, 86-105.

Mokhtarian, P. L., & Salomon, I. (2001). How derived is the demand for travel? Some conceptual and measurement considerations. *Transportation Research Part A: Policy and Practice, 35*(8), 695-719. doi:10.1016/s0965-8564(00)00013-6

Newman, B. J., Johnson, J., & Lown, P. L. (2014). The "Daily Grind": Work, Commuting and Their Impact on Political Participation. *American Politics Research, 42*(1), 141-170.

Olsson, L. E., Gärling, T., Ettema, D., Friman, M., & Fujii, S. (2013). Happiness and Satisfaction with Work Commute. *Social Indicators Research, 111*, 255–263.

Putnam, R. (2000). *Bowling Alone: The Collapse and Revival of American Community*. New York: Simon Schuster.

Rissel, C., Petrunoff, N., Wen, L. M., & Crane, M. (2014). Travel to work and self-reported stress: Findings from a workplace survey in south west Sydney, Australia. *Journal of Transport & Health, 1*, 50-53.

Roberts, J., Hodgson, R., & Dolan, P. (2011). "Its driving her mad": Gender differences in the effects of commuting on psychological health. *Journal og Health Economics, 30*, 1064-1076.

Robertson, M., & Swan, J. (2003). "Control - what control?"Culture and ambiguity within a knowledge-intensive firm. *journal of Management Studies, 40*, 831-858.

Sandow, E. (2008). Commuting behaviour in sparsely populated areas: evidence from northern Sweden. *Journal of Transport Geography, 16*, 14-27.

Sandow, E. (2014). Til Work Do Us Part: The Social Fallacy of Long-distance Commuting. *Urban studies, 51*(3), 526-543.

Singer, J., Lundberg, U., & Frankenhauser, M. (1978). Stress on the train: A study of urban commuting. In A. Baum, J. Singer, & S. Valins (Eds.), *Advances in Environmental Psychology: Volume I, The Urban Environment.* . Hillsdale, NJ: Lawrence Erlbaum Associates.

Tyrinopoulos, Y., & Antoniou, C. (2008). 2008. Public transit user satisfaction: Variability and policy implications *Transport Policy, 15*, 260-272.

Ullman, J. B. (2007). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (Eds.), *Using multivariate statistics* (pp. 676-780). Boston: Pearson.

Valcour, M. (2007). Work-based resources as moderators of the relationship betweenwork hours and satisfaction with work-family balance. *Journal of Applied Psychology, 92*, 1512-1523.

Viry, G., Ravalet, E., & Kaufmann, V. (2015). High Mobility in Europe: An Overview. In G. Viry & V. Kaufmann (Eds.), *High Mobility in Europe. Work and Personal Life* (pp. 29-58). New york: Palgrave Macmillan.

Wener, R., Evans, G. W., & Boately, P. (2005). Commuting stress. Psychophysiological effects of a trip and spillover into the workplace. . *Transportation Research Record,*(1924), 112-117.

Xiao, J. J., & Li, H. (2011). Sustainable consumption and life satisfaction. . *Social Indicators Research, 104*(2), 323-329. .