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Seniors' unmet mobility needs – how important is a driving licence?

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Seniors' unmet mobility needs – how important is a driving licence?

Abstract

Previous studies have come to different conclusions regarding how important a driving licence is for seniors to fulfil their mobility needs. We investigated this question based on three groups of Danish seniors: persons who were licensed as drivers ("drivers"); persons who have never been licensed drivers ("never-drivers"); and persons who recently gave up their licence ("ex-drivers"). Data were collected via standardised telephone interviews in 2012 among 863 individuals born in 1939/40. The three groups differed significantly in socio-demographics and health; never-drivers had the least resources, and ex-drivers the poorest health. Moreover, the two unlicensed groups had more unmet mobility needs than drivers. In ordinal regression models, both never having had a licence and having given up a licence significantly affected unmet mobility needs. Among the background variables, which were successively added to the models, health variables were most relevant, while socio-demographics and infrastructure played a minor role. When entering the health variables to the models, the effect of giving up a licence decreased but remained significant for unmet leisure needs, while it became insignificant for unmet shopping needs. The effect of never having had a licence was hardly affected by the inclusion of control variables. The results emphasise the importance of a driving licence in fulfilling seniors' mobility needs. Contrary to our hypotheses, more experience with, and better access to alternative transport modes cannot sufficiently compensate for mobility problems due to lack of the option to drive.

Keywords: driving cessation, older drivers, mobility needs, senior mobility, car availability, license renewal

1. Introduction

1.1 Mobility and well-being in old age

Mobility and the ability to leave the home are essential aspects of the quality of life of older persons and often connected to psychological well-being, independence, and the sense of being empowered in old age (e.g., Adler & Rottunda, 2006; Farquhar, 1995; Ragland et al., 2005; Schwanen et al., 2012; Spinney et al., 2009; Ziegler & Schwanen, 2011). The ability to leave the home is a means to maintain social and physical activities, and thus important for maintaining functional capability in old age (e.g., Avlund et al., 2004; Everard et al., 2000; Fratiglioni et al., 2004).

Nevertheless, with increasing age, travel activities outside home decrease and unfulfilled mobility needs increase (Siren & Hakamies-Blomqvist, 2004), in particular with regard to leisure and social trips such as visiting friends (Hjorthol, 2013; Siren & Hakamies-Blomqvist, 2004). Leisure trip patterns tend to be more complex and individualised and thus more dependent on car availability (Scheiner, 2010). In addition, for these "discretionary" trips, older people without a car are less willing to ask others for a lift or cannot justify the cost of a taxi as compared to "necessary" trips, such as grocery shopping and health care related trips (Ahern & Hine, 2012; Davey, 2007).

1.2 The role of a car in maintaining mobility

Having access to a car is associated with better health and well-being (Banister & Bowling, 2004; Ellaway et al., 2003; Macintyre et al., 2001). It enables older people with physical limitations to still live independently and participate in normal daily activities, and as such the car can compensate for functional limitations (Siren & Hakamies-Blomqvist, 2004, 2009). According to Köpke et al. (1999) car access and car use are related to positive self-perception in older persons.

Several studies have found a negative impact of driving cessation. Giving up driving has been found to be related to: a decrease in activity engagement (e.g., Davey, 2007; Harrison &

Ragland, 2003; Marottoli et al., 2000); a perceived loss of independence (Adler & Rottunda, 2006; Davey, 2007; Siren & Hakamies-Blomqvist, 2009; Ziegler & Schwanen, 2011) and the development of depression (e.g., Fonda et al., 2001; Marottoli et al., 1997). However, it has also been shown that the extent of the reduced mobility varies widely depending on access to alternative forms of transport, perceived ability to use them and previous knowledge and experience in using them (Knight et al., 2007). In addition, Ziegler and Schwanen (2011) have suggested that restricted physical mobility does not necessarily lead to decreased well-being but can to some extent be compensated for by other dimensions of mobility, for instance imaginary or electronic mobility.

Scheiner (2006) has further questioned the cause-effect chain of driving cessation leading to a negative effect on mobility and well-being by arguing that it is not a car that keeps people healthy, mobile and satisfied; instead it is healthier, more mobile and more satisfied seniors who more often use a car. His main criticisms of previous studies are first, that people with or without a car are often compared without controlling for relevant background variables such as health; second, that non-drivers are often not included in the examinations; and finally, that mostly realised mobility is considered instead of unrealised mobility. The importance of his final point is supported by recent findings showing that unfulfilled travel demand is related to quality of life, while number of trips is not (Kolodinsky et al., 2013).

Predicting unfulfilled mobility needs of older adults in Germany, Scheiner (2006) has shown that while health status, employment, and gender has a significant impact on unmet mobility needs, having a car in the household, the spatial context and living in a partnership does not play a role. In contrast, a recent Norwegian study (Hjorthol, 2013) predicting unfulfilled mobility needs by similar factors, has demonstrated a significant impact of having a driving licence and having a car in the household, along with the impact of health status. Being licensed or not was not included in Scheiner's (2006) analysis, which may explain why gender was significant in his analysis but not in

Hjorthol's. The different role played by car availability remains however unclear and may be related to the different study samples. While Hjorthol used a population-based sample, Scheiner's study sample comprised participants from three areas: an urban, a suburban and a rural area. The range from high- to low-density areas was higher in the Norwegian sample, where "rural" has different implications in terms of local supply, infrastructure and car dependency compared to the German rural area. Differences in spatial conditions of the samples may further explain why residing in an urban location decreased the unmet mobility needs in the Norwegian but not in the German study.

In summary, the importance a car and being a licensed driver have in fulfilling mobility needs remains unclear. In addition, no systematic knowledge exists on the role habits, attitudes and previous experience with other forms of transport play in mediating the effects of not having a car or being licensed have on unfulfilled mobility needs. Given this, the present study investigates the impact of being a licensed driver on mobility in old age, taking into account the previous driver status of people.

1.3 The present study

In this study we compare three groups of older persons in terms of demographics, health, realised and unrealised mobility, and transport-related attitudes. These three groups are persons licensed as drivers ("drivers"); persons who have never been licensed drivers ("never-drivers"); and persons who recently gave up their licence ("ex-drivers"). We differentiate between never-drivers and ex-drivers because we expect never-drivers to be less affected by not having a licence because of the knowledge and experience they gained from life-long use of other forms of transport. Compared to drivers they probably have more often chosen to live in areas that support car-free living. Also, ex-drivers are more likely to live in urban areas as persons in rural areas have been found to keep their

licence longer (Siren & Haustein, 2014). Urbanity and access to alternative modes of transport should decrease the amount of unmet mobility needs of both never- and ex-drivers. This anticipated effect applies especially to unmet shopping needs as they are more closely related to spatial and infrastructural variables than leisure activities (Hjorthol, 2013; Scheiner, 2010).

Furthermore, we expect health problems to be especially related to unmet mobility needs of ex-drivers as previous studies have shown that never-drivers tend to be in better health than ex-drivers (Choi & Mezuk, 2013) and that, especially for male drivers, the decision to cease driving is often related to health-problems (Hakamies-Blomqvist & Siren, 2003; Hjorthol, 2013; Siren & Haustein, 2014).

The hypotheses of the present study are as follows. **Hypothesis 1**: When background variables are controlled for, *not renewing* a licence has a significant impact on unmet mobility needs while *never having* a licence does not; **Hypothesis 2**: The impact of not renewing a licence decreases when health variables are controlled for; **Hypothesis 3**: The influence of both *not renewing* and *never having* a licence decreases when spatial variables and the perceived ability to use alternative modes (public transport, bicycle) are included in the analysis.

2. Materials and methods

2.1 Procedure

Data for this study were collected by standardised computer-assisted telephone interviews (CATI) carried out by Ipsos Marketing (at the time Synovate Denmark A/S). The interviews took an average of 25 minutes to complete. The interviews providing data for the present study belonged to the second wave of a survey with a baseline in 2009. At the baseline, a random sample of 3962

citizens who turned 70[1] between November 2009 and February 2010 (belonging to cohorts 1939 and 1940) was drawn from the Danish civil registration system. Of these, 2735 persons were called for an interview after having received a letter announcing the survey (for 436 no telephone number could be identified, 133 numbers turned out to be not valid/wrong, 658 persons were not called because the intended number of interviews had already been reached). The overall response rate in 2009 was 65.5% as 382 persons (14.0%) declined, 370 persons (13.5%) could not be reached, and 191 persons (7.0%) could not be interviewed due to language problems, cognitive impairment, or intoxication.

In 2012, a random sample of 1255 respondents from the participants in 2009 was drawn and 1161 of these persons were contacted for a follow-up interview after an announcement letter (89 no/wrong telephone nr; 5 not called). The overall response rate in 2012 was 74.3% (3.8% not reached, 19.0% declined, 2.8% not able to carry out an interview).

2.2 Measures

In the following section, the parts of the questionnaire that were analyzed in the present article are described in detail.

Background information: this included gender, education, family status (married/living with a partner, single, widowed), personal income, place of residence and driving licence status (licensed, had a licence before, never had a licence). Current drivers were also asked if they intended to renew the licence again the next time (at the age of 74).

Health and well-being: Participants were asked to rate their overall health on a four-point rating scale (1 = “excellent”, 2 = “good”, 3 = “fair”, 4 = “poor”). As an objective measure of health status, participants were presented with a list of 20 symptoms and illnesses and asked to indicate

[1] In Denmark, a driving licence is valid until the driver reaches the age of 70. Thereafter, it needs to be renewed in decreasing intervals.

whether they suffered from these as confirmed by a physician. This list was derived from previous studies with a similar setting and subjects (e.g., Siren et al., 2004). In addition, individual well-being was measured by the CES-D depression scale (e.g., Radloff, 1977) and the Pearlin mastery scale (Pearlin & Schooler, 1978). The CES-D scale is a short self-report scale designed to measure depressive symptomatology in the general population. The Pearlin mastery scale measures the extent to which a person perceives her/himself to be in control of events and ongoing situations. Both scales showed acceptable internal consistencies (Cronbach's alpha) at both survey times (CES-D depression scale: α (2009) = .67; α (2012) = .68; Pearlin mastery scale α (2009) = .79; α (2012) = .77).

Realised and unrealised mobility: Participants were asked how often they participated in different everyday activities (using a scale from 1 = "[almost] never" to 6 = "[almost] every day"). To obtain information about unmet mobility needs, they were asked if they wished to perform the activities more often (1 = "a lot more often"; 2 = "somewhat more often"; 3 = "not more often"). For the present study this variable was dichotomised (1 = "more often"; 0 = "not more often").

Dependency on others: this was assessed by asking how dependent participants were on other people for their transportation when leaving home (1 = "to a high degree"; 2 = "to some degree"; 3 = "only a little"; 4 = "not at all").

Transport-related attitudes: Attitudes were measured as an evaluation of the symbolic dimensions of different modes of transportation (Haustein, 2012; Hunecke et al., 2010). All responses were provided on a five-point agreement scale from 1 = "not agree at all" to 5 = "agree totally". The statements were presented in random order. *Public transport autonomy* measures the perceived ability to use public transport in everyday life and the perceived ability to cope without a car. *Public transport excitement* assesses how far positive aspects are associated with public transport use, such as relaxation or social communication. *Cycling autonomy* measures perceived

ease or difficulty in reaching important destinations by bike and *cycling excitement* assesses how much people like to cycle. *Car attitude* summarizes aspects concerning excitement, autonomy and privacy with regard to driving. As in previous studies (Haustein, 2012; Hunecke et al., 2007; 2010), for a car different dimensions were integrated in one scale – indicating that driving a car is either evaluated positively or negatively, without differentiation between sub-dimensions. *Walking attitude* comprises two aspects: general walking excitement and health-related motives for walking.

Table 1 displays means, standard deviations and internal consistencies (Cronbach's alpha) for the resulting mean scales.

Table 1: Description of transport-related attitudes

Scale	**Construct (Number of Items)**	***N***	***M***	***STD***	**Cronbach's α**
Public transport autonomy	– Using public transportation I can do everything I want to do. – I can deal with my everyday life without a private car. – Using public transportation instead of a private car is easy for me if I want to.	863	3.08	1.32	.73
Public transport excitement	– I like public transportation because there are a lot of interesting things to see. – For me using public transportation is relaxing. – I like public transportation because I don't have to pay attention to traffic myself. – I like public transportation because I can have a conversation with other passengers.	863	3.06	1.18	.80
Cycling autonomy	– I can reach many of my important destinations by bike. – By bike I can get anywhere.	863	3.14	1.54	.81
Cycling excitement	– I ride my bike because I enjoy the exercise. – For me cycling is relaxing.	863	3.41	1.55	.83
Car attitude	– Driving a car means fun and passion to me. – I enjoy applying my driving competence. – In my private car I feel safe and secure. – I like driving a car because I can decide whom to drive with.	863	3.63	1.02	.70
Walking attitude	– I like to walk. – Walking is good for me. – I often walk to do something for my health. – I do make trips by foot to stay physically fit.	863	4.25	0.89	.77

2.3 Respondents and analysis

Respondents (n = 863) consisted of 456 women (52.8%) and 407 men (47.2%), aged 71 (75.0%)

and 72 (25.0%) in 2012. Most of them had a partner (72.0%), while 17.3 per cent were widowed and 10.8 per cent single. Almost all respondents were retired (96.1%). The average personal annual income was approximately €25,600. Regarding education, 27.4 per cent had a basic school education, 46.2 per cent a medium education, and 26.2 per cent had completed university education. The sample was representative in terms of gender and percentage of widowed persons. However, the income was somewhat below average, whereas the educational level of the sample was above average. The lower income might be due to a high number of missing values regarding income (32.4%). It is possible that people with higher incomes in particular refused to answer this question. The higher education status of the sample may be due to a higher willingness to participate among people with higher education.

People who participated both at the baseline and at the follow up did not differ significantly from people who only took part at the baseline with regard to all background variables described earlier (gender: $\chi^2(1,1792) = 0.72$, $p > .10$; family status: $\chi^2(2,1792) = 0.32$, $p > .10$; income: $F(1,1501) = 0.10$, $p > .10$; education: $\chi^2(6,1785) = 8.21$, $p > .10$). They also did not differ significantly with regard to their subjective health status ($U = 392402.00$, $p > .10$).

Of the 771 respondents who reported to be licensed in the first survey, 80 people (9.4%) did not renew their licence and 691 (81.4%) did. In addition, 78 people (9.2%) who were never licensed are included in the sample[2]. These three groups ("drivers"; "ex-drivers"; "never-drivers") were first compared by background variables and their activity engagement by Pearson's χ^2 test, K-W H-test, and ANOVAs, depending on the scales of measurement (see Section 3.1). Second, ordinal regression models were used to test the effect of never having a licence vs giving up the licence on unmet mobility needs by successively controlling for different categories of background variables in line with the hypotheses postulated in Section 1.1 (see Section 3.2).

[2] Fourteen people were excluded from the analyses due to missing or inconsistent data.

3. Results

3.1 Differences between never-drivers, ex-drivers and drivers

In the following, never-drivers, ex-drivers, and drivers are compared with regard to demographics, health, mobility, as well as transport-related attitudes. This overview provides relevant background information to interpret the results of the regression analyses presented in Section 3.2.

3.1.1 Demographics

The groups differed in their socio-demographics (see Table 2): More than 90% of never-drivers were female and they had lower resources in terms of personal income (including pension) and education than drivers. In that respect, ex-drivers lay in-between these two groups. Moreover, ex-drivers were most likely to live without a partner. Both unlicensed groups were more likely to live in Copenhagen, the capital of Denmark.

Table 2: Differences in demographics of never-drivers, ex-drivers and drivers

	Never-drivers	Ex-drivers	Drivers	All	Test results
Women	91.0%	77.5%	45.4%	52.7%	χ^2 (2,849) = 80.3***
Personal income above median	20.4%	40.4%	54.2%	50.2%	χ^2 (2,570) = 22.3***
Still working >= 20 hours	1.3%	2.5%	5.8%	5.1%	χ^2 (2, 849) = 4.2
University education	7.8%	26.3%	28.0%	26.0%	χ^2 (2, 846) = 14.7***
Living in partnership	61.5%	48.8%	76.1%	72.2%	χ^2 (2, 849) = 31.6***
Copenhagen	7.7%	10.0%	2.7%	3.9%	χ^2 (2, 849) = 13.4**
Three largest cities after Copenhagen (Odense, Aalborg, Aarhus)	3.8%	2.5%	5.6%	5.2%	χ^2 (2, 849) = 1.8

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

3.1.2 Health, well-being and dependency on others

The majority of respondents in all groups assessed their health as "good" or "excellent". Yet, the groups differed in terms of the health-related variables (Table 3). We found that ex-drivers had the poorest health, while drivers had the best health-state and never-drivers lay in-between. The

comparably poor health of ex-drivers probably played a role in the decision to not renew their licence. Compared to drivers both unlicensed groups showed a high level of dependency for transport.

Table 3: Health differences of never-drivers, ex-drivers and drivers

	Never-drivers	Ex-drivers	Drivers	All	Test results
Subjective health (% in good or excellent health)	87.2	78.8	92.7	90.9	$H(2,849) = 16.26^{***}$
Number of symptoms (Mean)	1.88	2.60	1.79	1.88	$F(2,846) = 9.36^{***}$
Depression (Mean)	13.78	14.58	12.88	13.12	$F(2,846) = 9.35^{***}$
Mastery (Mean)	21.27	21.48	22.08	21.95	$F(2,846) = 3.29^{*}$
Dependency (% not dependent at all)	56.4	55.0	92.6	85.7	$H(2,849) = 147.22^{***}$

$^{*}p < .05$; $^{***}p < .001$

3.1.3 Mobility

Respondents indicated how often they conducted eight everyday activities. As Figure 1 illustrates, differences between the three groups were not very pronounced and appear rather random. Ex-drivers' higher amount of private errands (bank, post, etc.) might be in direct relation to giving up their licence (e.g., to take the car off the road).

In line with previous studies, trips to visit friends particularly remained unrealised, especially for those without a licence (see Figure 2). The unlicensed groups did not differ significantly from each other with regard to unmet mobility needs (M-W *U*-test, $p > .10$ for all purposes) probably partly related to the small sample sizes.

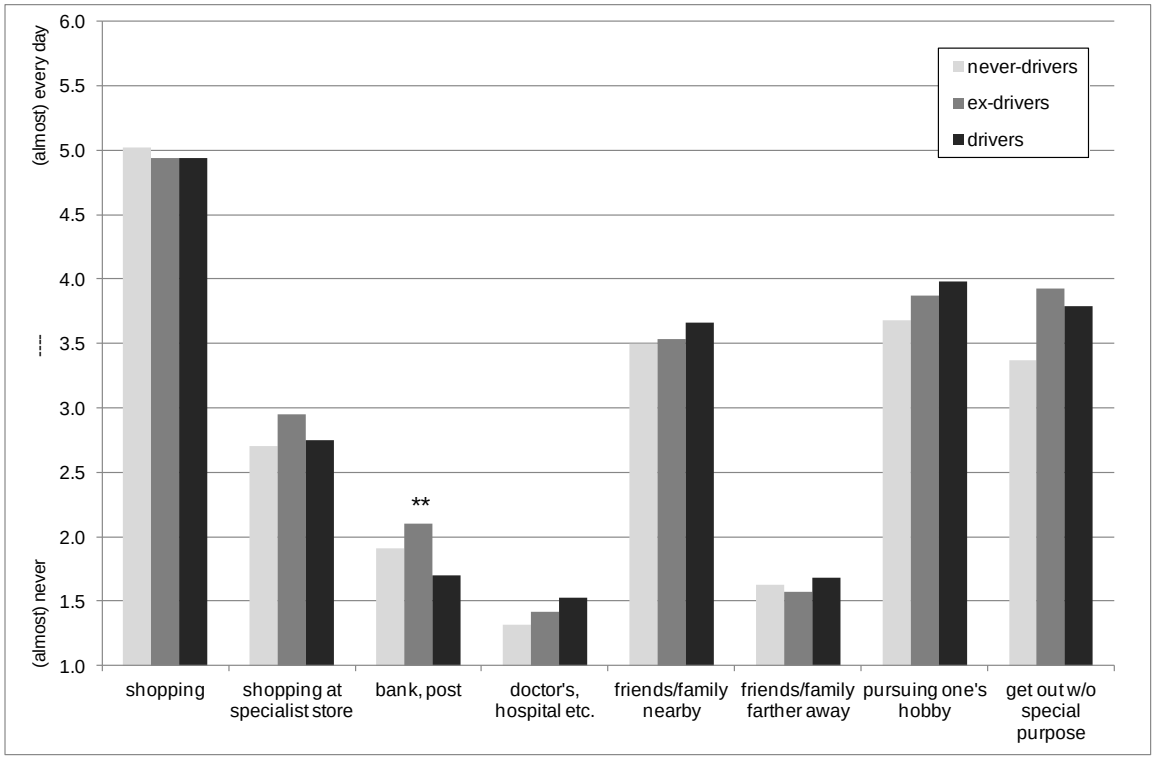

*Figure 1: Frequency of different activities, group differences; **p < .01 (ANOVAs)*

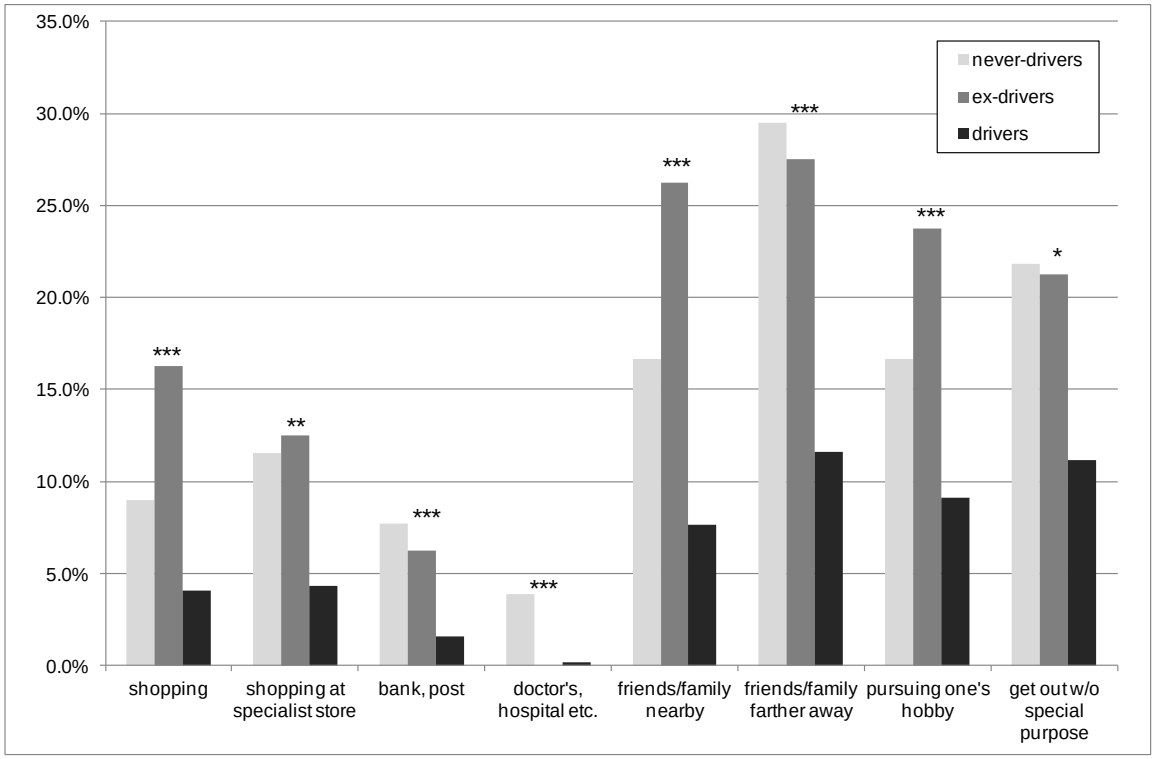

*Figure 2: Percentage of persons who wished to do the respective activity more often, group differences; *p < .05; **p < .01; ***p < .001 (K-W H-test)*

3.1.4 Transport-related attitudes

With regard to attitudes towards transport modes, never-drivers showed a similar profile to ex-drivers (see Figure 3). However, their attitudes towards all modes were more positive than those of ex-drivers (statistically significant for car attitude and public transport excitement, $p < .05$, Bonferroni). In post-hoc tests both groups differed significantly from drivers by more positive attitudes towards public transport and more negative attitudes towards cars ($p < .001$, Bonferroni), indicating that they can better get along without a car and like travelling by public transport more. These attitudes might have played a role in ex-drivers' choice of ceasing driving. Ex-drivers might also have further adjusted their attitudes after not renewing their license. With regard to cycling, ex-drivers differed significantly from drivers by more negative attitudes ($p < .05$ for autonomy and excitement), which might reflect their poorer health status. Drivers were positive about both, the car and cycling, indicating a preference (and/or need) for more individual modes. Walking was popular in all three groups.

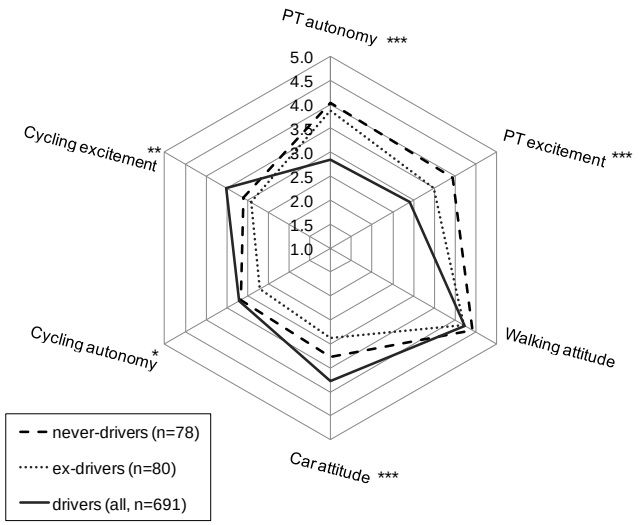

Figure 3: Transport-related attitudes of never-drivers, ex-drivers and drivers;
**p < .05; **p < .01; ***p < .001 (ANOVAs)*

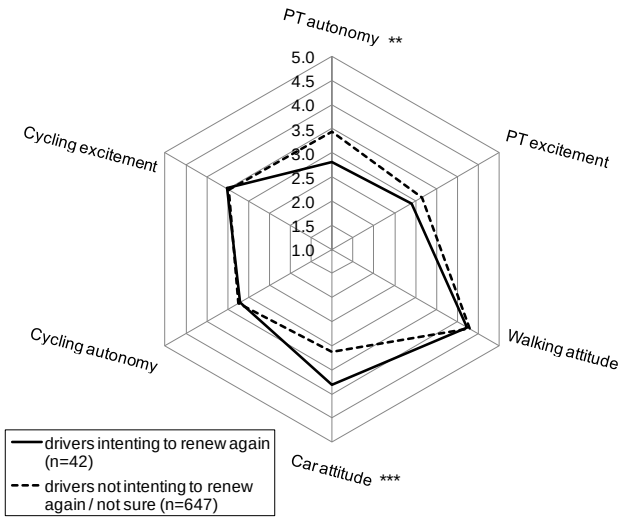

Figure 4: Transport-related attitudes of drivers intending to renew the licence again vs. drivers intending not to renew/not sure;
***p < .01; ***p < .001 (ANOVAs)*

The assumption that ex-drivers already differed in their car and public transport attitudes before not renewing their license is supported when asking current drivers if they intended to renew their licence the next time (see Figure 4).

Those who did not intent to renew or were not sure about it yet, differed significantly in their public transport autonomy and car attitude from the majority who was sure about renewing again. With regard to cycling attitudes both sub-groups of drivers, however, did not differ, which supports that health constraints were the main cause of ex-drivers' more negative cycling attitudes.

3.2 What role does a driving licence play for unmet mobility needs?

So far, we have demonstrated that the three groups differed significantly with regard to socio-demographics, health, unmet mobility needs, and transport-related attitudes. However, it remains unclear if group differences with regard to unmet mobility needs are due to the different driving status or due to the different composition of the groups in terms of the other variables. Hence, we conducted two sets of ordinal regression analyses, one predicting the amount of unmet mobility needs with regard to shopping (sum score of binary variables: shopping; shopping in specialist store; post/bank) and one predicting the amount of unmet leisure needs (sum score: trips to friends [close/far]; hobbies; getting out w/o special purpose). In both cases, we first entered the different driving licence statuses (Model 1) and then successively demographic variables (Model 2), health-related variables (Model 3), and finally variables related to the possible use of alternative transport modes (Model 4). As the "proportionality of odds" assumption (Garson, 2014) was not met when simply summing up the number of unmet shopping/leisure needs, some categories were merged to adapt the distribution of the dependent variables (see Tables 4 and 5). With the new dependent variables, the proportionality of odds assumption was met in all cases as demonstrated by non-significant parallel lines tests ($p > .05$) for all models included in Tables 4 and 5.

Table 4: Ordinal regression analyses to explain the amount of unmet shopping needs

	Model 1		Model 2		Model 3		Model 4	
	Estimate	*p*-value	*Estimate*	*p*-value	*Estimate*	*p*-value	*Estimate*	*p*-value
Never licensed	0.836	0.009	0.757	0.028	0.719	0.032	0.768	0.032
Licence not renewed	0.985	0.001	0.882	0.005	0.558	0.078	0.532	0.112
Male			-0.077	0.768	0.110	0.674	0.162	0.541
Still working			-0.514	0.477	-0.857	0.273	-0.874	0.265
University education			-0.068	0.807	0.091	0.749	0.057	0.843
Living in partnership			-0.319	0.201	-0.278	0.274	-0.275	0.285
Subjective health (dummy)					-1.147	0.000	-1.094	0.000
Number of symptoms					0.144	0.025	0.121	0.068
Depression					0.038	0.142	0.043	0.105
Mastery					-0.118	0.003	-0.108	0.007
PT autonomy							0.001	0.989
Cycling autonomy							-0.119	0.173
Population density within 500m (Ln)							-0.034	0.713
Copenhagen (Place dummy)							0.137	0.804
Parallel lines test *(p*-value*)*		0.068		0.307		0.301		0.946
Nagelkerke's pseudo R^2		0.029		0.035		0.164		0.169

Link function: negative log-log; Categories of the dependent variable (unmet shopping needs): 0 = no unmet shopping needs; 1 = unmet shopping needs in one category; 2 = unmet shopping needs in two or three categories

Table 5: Ordinal regression analyses to explain the amount of unmet leisure needs

	Model 1		Model 2		Model 3		Model 4	
	Estimate	*p*-value	*Estimate*	*p*-value	*Estimate*	*p*-value	*Estimate*	*p*-value
Never licensed	0.529	0.010	0.497	0.023	0.496	0.022	0.537	0.018
Licence not renewed	0.915	0.000	0.863	0.000	0.677	0.000	0.753	0.000
Male			0.077	0.601	0.165	0.264	0.114	0.448
Still working			-0.091	0.780	-0.142	0.672	-0.070	0.835
University education			-0.070	0.655	-0.046	0.771	-0.034	0.830
Living in partnership			-0.308	0.034	-0.296	0.045	-0.267	0.076
Subjective health (dummy)					-0.814	0.000	-0.813	0.000
Number of symptoms					0.054	0.194	0.064	0.132
Depression					0.022	0.232	0.020	0.264
Mastery					-0.016	0.472	-0.016	0.472
PT autonomy							-0.102	0.096
Cycling autonomy							0.067	0.167
Population density within 500m (Ln)							0.156	0.008
Copenhagen (Place dummy)							-0.702	0.065
Parallel lines test *(p*-value*)*	0.075		0.414		0.217		0.163	
Nagelkerke's pseudo R^2	0.037		0.044		0.091		0.107	

Link function: negative log-log; Categories of the dependent variable (unmet leisure needs): 0 = no unmet leisure needs; 1 = unmet leisure needs in one or two categories; 2 = unmet leisure needs in three or four categories

While we expected that - when background factors are controlled for - *not renewing* a licence had a significant impact on unmet mobility needs while *never having* a licence did not (Hypothesis 1), we actually found the opposite - at least in the case of unmet *shopping* needs: here never having a licence remained a significant predictor, while giving up the licence lost its significance when health variables were controlled for (see Table 4). In case of unmet *leisure* needs both licence-related variables remained significant throughout the inclusion of the different sets of control variables.

The inclusion of demographic variables had no relevant effect with one exception: living together with a partner decreased unmet leisure needs. In line with Hypothesis 2, the inclusion of health variables weakened the effect of not renewing a licence, while the effect of never having a licence remained rather unchanged. While unmet leisure needs were mainly influenced by subjective health status, for unmet shopping needs also mastery had a significant effect. A possible explanation is that mastery – the experience of being in control of life circumstances – is more closely related to managing the practical aspects of life, such as shopping, than to leisure activities. Contrary to Hypothesis 3, the inclusion of spatial variables and perceived ability to use alternative modes did not weaken the effect of not renewing or not having a licence. Nevertheless, both aspects showed an effect on unmet leisure needs: while population density significantly increased the amount of unmet leisure needs ($p < .001$), living in Copenhagen and perceiving it easy to use public transport tendentiously reduced it ($p < .10$).

4. Discussion and conclusions

The present study investigated the impact of driving licence status on mobility in old age, with a particular focus on differentiating sub-groups of non-drivers, namely never-drivers and ex-drivers. We expected that never-drivers were better adapted to a life without a licence due to their life-long

experiences with other transport modes than driving a car. The transport-related attitudes to a certain degree indeed support this hypothesis, showing that never-drivers evaluate all transport modes more positively than ex-drivers. On the other hand, attitude profiles of both unlicensed groups are quite similar when compared with drivers. Driving cessation is a gradual process (e.g., Rosenbloom, 2001) and ex-drivers seemed to be already used to using alternative modes and were less positive about cars compared to drivers - probably already before not renewing the licence. This is reflected in the attitude profile of current drivers who are considering not to renew their licence the next time. Another reason for not renewing a licence is most likely related to the poorer health of ex-drivers. In line with previous research, ex-drivers showed poorer health, while never-drivers had more limited socio-economic resources (Choi & Mezuk, 2013).

With regard to travel frequency, differences between the three groups were not very pronounced. However, both unlicensed groups were more dependent on others for travel and reported more unmet mobility needs, especially in relation to leisure activities. Our main research question was whether unmet mobility needs were related to licence status or if they could be explained by other associated variables, such as demographics, health, and access to other modes. Contrary to our hypothesis, *both* never having had a licence and having given up a licence were significantly related to unmet leisure needs, also when other relevant variables were controlled for. In case of unmet shopping needs, not-renewing a licence was no longer significant when health variables were controlled for, while it remained significant in case of unmet leisure needs. This indicates that people who cannot satisfy their shopping needs without a car may not voluntarily give up their licence but only when they are forced to do so due to health restrictions. By contrast, leisure needs may not to the same extent be taken into account when considering to renew a licence or not, resulting in a higher amount of unfulfilled leisure needs after giving up the licence, which may come as a negative surprise.

With regard to socio-demographic variables, living with a partner decreased the amount of unmet leisure needs. We see two possible explanations for that: First, living with a partner increases the chances of getting a lift. Second, older people living alone are more compelled to satisfy their needs for social contact outside the home (cf. Scheiner, 2006; Schwanen et al., 2001). Thus, they might – on the same activity level – have more mobility needs than remain unfulfilled. This may also explain why both unlicensed groups, who live more often alone than drivers, differ from drivers by a higher level of unmet mobility needs while having a similar level of activities. Additionally, these groups consist mainly of women, for whom social participation seems to be more relevant for health and well-being as compared to men (e.g. Rennemark & Hagberg, 1999) and they may thus have higher expectations in that regard.

The role of infrastructural variables in predicting unmet mobility needs is ambiguous and weaker than expected. In contrast to previous studies, we found that living in a big city tendentiously decreases unmet leisure needs but not unmet shopping needs, while general population density significantly increases the amount of unmet leisure needs. In addition, perceiving it easy to use public transport to reach important destinations tendentiously reduces the amount of unmet leisure needs. A possible explanation for this result might be that density in general, associated with a high amount of traffic and related safety and security issues, is a barrier to older people's out of home mobility, while easy access to public transport and the cultural possibilities that a large city (Copenhagen) offers, might have a positive effect.

The present study has the advantage of a representative sample of people born in 1939/40. However, the number of never-drivers and ex-drivers in the sample was small, especially the number of males without a licence, illustrating the growing car reliance of the current cohort of older drivers who mostly wish to keep their licence (Siren & Haustein, 2014). When interpreting the descriptive results, it is necessary to keep in mind that three quarters of ex-drivers and 90% of

never-drivers were women. Gender was probably not significant in the regression analyses as it was captured by the licence status. This is in line with our interpretation of the gender effects in Scheiner (2006) and Hjorthol (2013), being significant or not depending on the inclusion of the licence status in the analyses.

While the youngest cohorts of older women have almost caught up with men's licensing rates and there will be a lower share of non-licensed older people in the future (Hjorthol et al., 2010), recent research from the US has shown that the remaining unlicensed older people are a specifically disadvantaged group of which a high share are ethnic minority women (Choi & Mezuk, 2013). While these results cannot be directly transferred to a European context due to lower car dependence compared to the US, we expect a similar development even if less pronounced. However, even if most future older women will be licensed, gender differences with regard to car usage are likely to remain significant (Siren & Haustein, 2013). Due to their lower car use and higher risk of premature driving cessation older women especially should be encouraged to keep on driving to prevent unwarranted mobility loss.

Recently, research has increasingly focussed on transitioning from driver to ex-driver. Planning ahead and receiving information about alternative modes have been proposed as being important factors in successful transition (Musselwhite, 2010; Musselwhite & Shergold, 2013). However, the results from the present study indicate that, contrary to what we expected, more positive attitudes towards, more experience with, and better access to alternative transport modes cannot sufficiently compensate for mobility problems due to lack of the option to drive.

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