Cohort analysis of older adults' travel patterns in Denmark



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DTU Transport
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1. INTRODUCTION

1.1 The implications of population ageing

The developed industrialized countries are undergoing a significant demographic change involving the ageing of the population. In Europe, the 'old-age dependency ratio' (those aged over 65 as a percentage of the population aged 20-64 years) is expected to double between 2000 and 2050 according to Eurostat projections (Lanzieri, 2011). In Denmark, the proportion of people 65+ is expected to be about 24 per cent in 2040 (Statistics Denmark, 2011). It can be expected that this population will be a heterogeneous group regarding both age and other characteristics.

The ageing of the population will have a variety of social implications, for example on care and health systems, labour market, and pensions, which has made the issue to enter the socio-political agendas. One, although often overlooked, aspect of this is the everyday mobility in the transport system of the ageing population. Nevertheless, ageing and transport has several important societal implications.

First, society will face a challenge of providing policies and plans that support the mobility needs of the senior population. Mobility is closely connected to well-being and health of older persons. Mobility and the ability to leave the home are among the essential aspects in the quality of life of older persons (Farquhar, 1995). Driving cessation has been found to be among the strongest predictors of increased depressive symptoms in older people (Marottoli et al., 1997), whereas car access is associated with better health and psychosocial benefits (Ellaway, Macintyre, Hiscock, & Kearns, 2003; Macintyre, Hiscock, Kearns, & Ellaway, 2001). An individual's ability to use the transportation system freely has long been defined as one of the seven important areas in the Instrumental Activities of Daily Living (IADL) of the elderly (Fillenbaum, 1985). Providing satisfactory opportunities for independent travel and mobility will support the older population in independent living and well-being, which in turn has positive implications on societal level.

Second, it is likely that the older population's travel will have an impact on the whole transport system; shaping the way transportation is planned, organized and managed (Coughlin, 2009). The older road users have somewhat different needs and preferences than younger adults, which will have an impact on traffic flows, safety, and infrastructural needs.

1.2 Aged road users' travel activity

Number of trips, travel times and distances

On average, older people travel less than younger persons in terms of trips per day, distance and travel time (e.g. BFS & ARE, 2007; DTU, 2011; OECD, 2001; INFAS & DLR, 2010; O'Fallon & Sullivan, 2009; TØI, 2011). The most marked decrease in trip number and travel time takes place after the age of 75. Regarding distances, there is a peak at the age of 30-39 years before the travel distances decrease more continuously until high age (INFAS & DLR, 2010). The general trend of decreasing travel activity with age is rather universal, but the specific parameters differ somewhat between European countries, indicating e.g. differences in license renewal policies, socio-economic or other background variables.

Modal choices

According to the OECD (2001, p. 32) in Europe about half of older people's trips are made by private car. With regard to public transport, the picture differs more significantly between different countries (e.g. higher use in Scandinavia and Great Britain, lower in the Netherlands). Trips on foot show a U-shaped curve with middle-aged people walking less than younger and older people. Depending on the country, 30-50% of the trips are made on foot. Finally, cycling is of minor relevance as a transport mode for older people, except in Denmark and the Netherlands. Compared to other adult age groups, older people have a higher share in walking and public transport use and drive a car less frequently (e.g. INFAS & DLR, 2010; OECD, 2001; TØI, 2011).

1.3 Recent trends in seniors' travel

Although there is a negative association between increasing age and trip-making frequency (e.g. Páez, Scott, Potoglou, Kanaroglou, & Newbold, 2007), previous research has indicated that older people are becoming more mobile (INFAS & DLR, 2010; Rosenbloom, 2001), especially in the social/leisure category (e.g. Arentze, Timmermanns, Jorritsma, Kalter, & Schoemakers, 2008; Hjorthol, Levin, & Siren, 2010) and with regard to car trips (e.g., Delbosc & Currie, 2011; Newbold, Scott, Spinney, Kanaroglou, & Páez, 2005; OECD, 2001; Rees & Lyth, 2004; Tacken, 1998).

Travel survey data from different countries show that the licensing rates of older age groups in the Western world have increased in the last 25 years, especially for women, who come from a much lower baseline (e.g. Ottman, 2010; Rees & Lyth, 2004). For 60-year-old German women, for example, the licensing rates increased from 30% in 1982 to 80% in 2002 (Ottman, 2010). Similar results exist for car availability, which is strongly connected with license holding (Ottman, 2010). Previous research indicates that these generations will most likely keep their licenses into old age (Hakamies-Blomqvist, Henriksson, Anund, & Sörensen, 2005; Hjorthol & Sagberg, 2000). In European countries, up to 79% increase is expected in licensing rates among population aged 65 and older (OECD, 2001).

With regard to kilometres travelled by car (driver and passenger) per day, people who were aged 40 to 49 during the mid 1970ies almost maintained their level of car travel twenty years later. Another ten years later (aged 70+), they reduced it by 5 km per day (from about 25 km to 20 km per day) (Germany & Great Britain: Zumkeller, 2011).

Improved health conditions, more active lifestyles, increased access to cars, and for some groups, higher income and education, create greater possibilities and needs for more varied activities and extended travelling than for the previous generations of seniors. These expectations are especially associated with the baby boomer generation, which is just starting to reach the age of retirement (Coughlin, 2009; Rees & Lyth, 2004). Making up a significant percentage of the population, a rapid growth of the total number of older drivers is expected in the upcoming years (Dobbs, 2008). In Denmark, the cohorts born in 1943-50 make up 44% of the population aged 60 and older (Statistics Denmark, 2011).

1.4 Increasing heterogeneity

Older road users are, as a group, highly heterogeneous in terms of age, gender, functionality, place of residence, experience as car drivers, and socioeconomic factors. With new successive cohorts entering the group of "older road users" and the older ones enjoying increased longevity, the group is likely to be even more varied.

New cohorts of seniors with their high car-reliance and active mobility patterns will shape future travel significantly. On the other hand, a growing proportion of "tomorrow's older population" will belong to the oldest group, those 85 years of age and older, who may have problems related to travelling, both walking and use of car or public transport.

The increasing heterogeneity of the older populations has recently been acknowledged and addressed by studies dividing the seniors into relevant subgroups (e.g. Haustein, 2012; Hildebrand, 2003; Mollenkopf et al., 2004). These segmentation studies contribute to a more comprehensive understanding of the diverse lifestyles, attitudes, travel patterns and needs of older people.

In the Danish context, knowledge on older persons' travel patterns is scarce. Very little is known about the general travel patterns of seniors, and knowledge on how age, cohort, gender, or place of residence influence this is practically non-existent. In order to understand the challenges population ageing will pose to the transport system, more detailed research is needed.

1.5 Aims of the present study

In the present study, data from the Danish national travel survey were analysed. The general purpose of this report was to provide a descriptive illustration of the travel patterns in different cohorts over time.

More specifically, the aim of the study was, first, to get a better understanding of the activity and travel patterns of different groups of older people and to scrutinize the distribution of transport resources and its impacts on these patterns.

Second, the aim is to examine travel and activity patterns during the life course; in other words, which activities cease with age and which ones remain or even increase?

Third, the aim is to identify the changes that have taken place over time – how do the "new" generations of older people act compared to the older ones?

2. MATERIALS AND METHODS

2.1 Data

To get a picture of the development of older people's mobility, an analysis of daily travel was carried out in a 25 years perspective. Data come from the Danish national travel survey carried out in 1981 (TU-81) and in 2006 (TU-06).

The data collection of the TU-81 nationwide study was carried out during three weeks in October 1981, as a part of a study by the Social Research Institute (Socialforskningsinstituttet) and Statistics Denmark (Danmarks Statistik). The material in TU-81 consists of 3619 interviews with persons aged 16-74. The response rate was 72%, as the original random sample was 5000 persons. The telephone interviews were done by Statistics Denmark.

The data collection of the TU-06 study was carried out between July 2006 and June 2007. The interviews were carried out every day. The random monthly sample was about 2100 persons aged 10-84. The interviewees had the option to submit their answers over internet, and 24% of the interviewees used this option. The response rate was 50%. The interviews were carried out by Synovate.

2.2 Cohort analysis

Given the availability of data from both 1981 and 2006, the data are suited for cohort analysis. In a cohort analysis a specific generation is followed during a period of time to study social changes. In a cohort analysis three effects can be observed: the cohort effect, the period effect and the age affect.

The cohort effect refers to the effects of being born at a specific time in history. Examining cohort effects can show how differences in socialisation and experiences between different generations can vary, and how specific characteristics will follow the cohort. Intra-cohort comparisons are made by following the same cohort at different points in time.

The period effect refers to effects limited to a specific period of time and applies to all cohorts. To investigate the period effect comparisons between the same age categories at two different times are done. In our example the economic situation can have had the same effect for all cohorts.

The age effect refers to the effects of growing older and is associated with the life span and the ageing process as such. Age effect is central in gerontology but can be hard to distinguish from the other effects, as they are always closely interrelated.

It can be difficult to distinguish between these three effects. In the present study, all three are of interest. Particular importance, however, is attached to the cohort and period effects. We can expect that when analysing the period from 1981 to 2006, all cohorts have experienced the same occurrences and external events, thus being subjected to the same period effect. What is then of interest is whether the various cohorts have been influenced by the period effect in the

same manner, or whether the cohort effect has had an influence. The age effects are also of interest: certain social and biological changes associated with ageing and their potential influence in transport patterns, as well as the cohort differences in these changes.

2.3 Data analysis

The data analysis was descriptive: the findings describe the study population with absolute and relative frequencies. For the analyses, age groups with five year intervals were used (see Table 2.1).

In addition, the following groupings and analytical categories were used to describe the material:

Gender
- Women
- Men

Residential location
- Copenhagen and Frederiksberg
- Copenhagen suburbs ("Region Hovedstaden", excluding Copenhagen and Frederiksberg)
- Six biggest towns, excluding Copenhagen (Aarhus, Odense, Aalborg, Esbjerg, Randers, Kolding)
- Rest of the country

Trip purpose
- Work and education related trips
- Trips related to shopping and services
- Leisure travel

Travel mode
- Car driver
- Car passenger
- Cyclist
- Pedestrian
- User of public transport

From the datasets TU-81 and TU-06, participants over 40 years of age at the time of observation were selected for the analyses. Table 1 gives an overview of the examined cohorts and their year of birth.

Table 2.1

Cohorts in the present study.

Age in 1981	Cohort (year of birth)	Age in 2006
15-19	1962-1966	40-44
20-24	1957-1961	45-49
25-29	1952-1956	50-54
30-34	1947-1951	55-59
35-39	1942-1946	60-64
40-44	**1937-1941**	**65-69**
45-49	**1932-1936**	**70-74**
50-54	**1927-1931**	**75-79**
55-59	**1922-1926**	**80-84**
60-64	1917-1921	85-89
65-69	1912-1916	90-94
70-74	1907-1911	95-99

NB: Those under 40 years old in 1981 and over 84 years old in 2006 were not included in the material.

3. RESULTS

3.1 Driver license and car availability

Changes in driver license holding among women and men

Overall, the licensing rates have increased in the 25 years period examined. Figure 1 shows the share of women and men in different cohorts with a driver license in 1981 and 2006. The share of both women and men with a driver license increased during these 25 years, although the development was more marked for women. For men, in age groups 40-44, 45-49, 50-55 and 55-59 the license holding was close to 100% already in 1981. In age groups 60-64, and 65-69 we can see an increase of about 15 percentage points and in age group 70-74 an increase of approximately 25 percentage points. The share of women holding a driver license has increased markedly in all the age groups. The increase has been especially strong in age groups 50+ (over 30% increase).

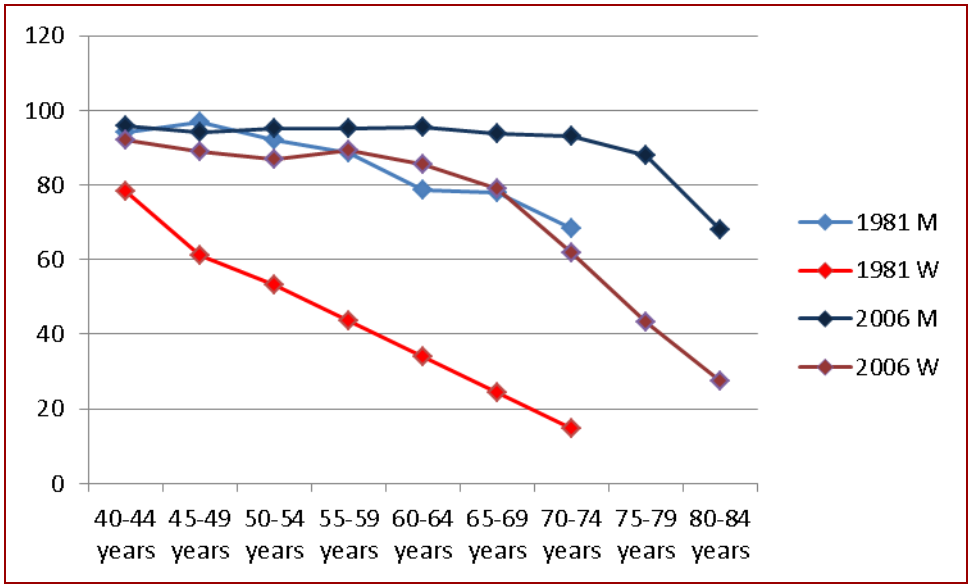


Figure 1. Relative driver license holding for women and men in different cohorts in 1981 (N=1703) and 2006 (N=7527).

Examining the data longitudinally and looking at the different cohorts, it can be seen that

- The youngest observed cohorts have maintained their relative license holding with increasing age. Both women and men who were 40-49 and 45-49 years old in 1981 (65-74 and 70-74 years old in 2006), have maintained their relative license holding.

- Men aged 50-54 years in 1981 (75-79 years in 2006) have maintained their relative license holding with only a slight decrease, whereas for women in this cohort, the relative licence holding has decreased from approximately 55% to 43%.

- For men 55-59 years in 1981 (80-84 in 2006), the driver license holding has decreased from approximately 89% to 68%. For women in this cohort, the decrease is larger, from approximately 45% to 28%.

- There seems to be a gender difference in maintaining the license: women start giving up their license at an earlier age. But whether this gendered pattern will change in the future with the next cohorts or whether it is a more persistent phenomenon is still to be seen.

The present data does not allow us to see how the "baby boom generations" of older women (those whose driver license holding is close to that of men's) will behave in relation to holding a driver license in old age.

In summary, it can be noted that the license holding rate increased in the 25 years period, especially for older women. The younger cohorts are more likely to have a driver license when entering old age.

Regional variations in license holding

There were marked regional variations in license holding. Both in 1981 and 2006, the driver license holding was lowest in Copenhagen (including Frederiksberg) in all the age groups 40+. It can also be observed that, in general, license holding increased in all the residential regions in the 25 years period (with the exception of the 40-44 years old age group in Copenhagen suburbs). (Figures 2 and 3).

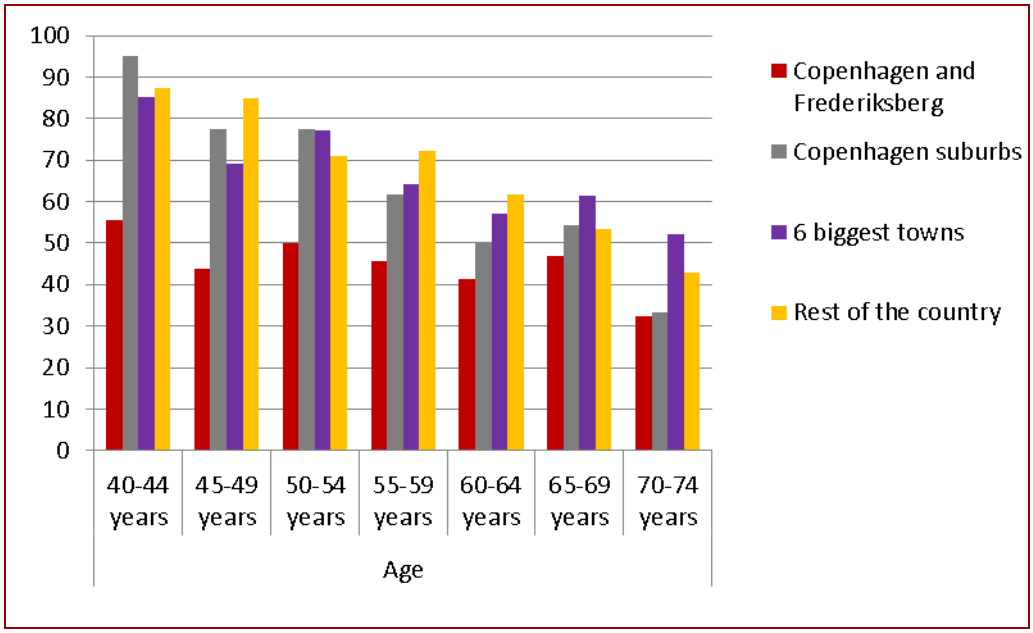


Figure 2. The share of license holders in different age groups and different residential regions in 1981(N=1703).

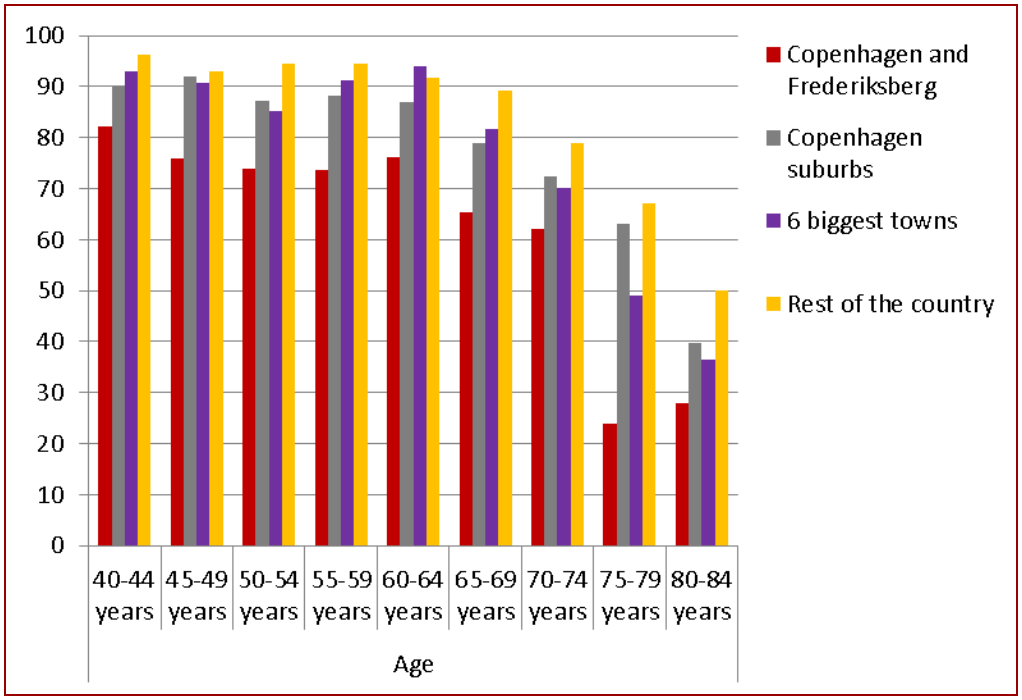


Figure 3. The share of license holders in different age groups and different residential regions in 2006 (N=7527).

Examining the data longitudinally and looking at the different cohorts, it can be seen that

- Those who were 40-44 and 45-49 years old in 1981 (65-69 and 70-74 years in 2006) and residing in Copenhagen or Frederiksberg have not only maintained their licenses but actually increased their license holding during the 25 years period (from approximately 55% to 75% and from approximately 42% to 65%.

- Among those aged 40-44 and 45-49 years in 1981 (65-69 and 70-74 years in 2006) and residing in the Copenhagen suburban area, the license holding decreased in the 25 years period. It is interesting that there is a decrease in the youngest cohorts, given that not all of them have yet reached the age of 70 and thereby the mandatory license renewal. The finding may be a result of people moving from one region to another.

- In the bigger towns (excluding Copenhagen), the license holding has maintained approximately the same in the first two cohorts and decreased in the older ones.

- For the rest of the country, license holding is high in all age groups and starts to decrease later in old age. There is a decrease after the age of 70 (the first license renewal milestone) but the license holding is still rather high in the age group 75-79 and 50% in the age group 80-84 years.

In summary, it can be noted that the residential area makes a difference in license holding. License holding in Copenhagen and Frederiksberg is lower than in the other areas. Older persons in rural areas are more likely to be licensed, also in the oldest age groups.

Car availability and gender

During the 25 years period, the availability of a car in a household increased among persons aged 50 and over. Figures 4 and 5 show the share of persons by age and gender that do not have a car available or have two or more cars in the household in 1981 and 2006.

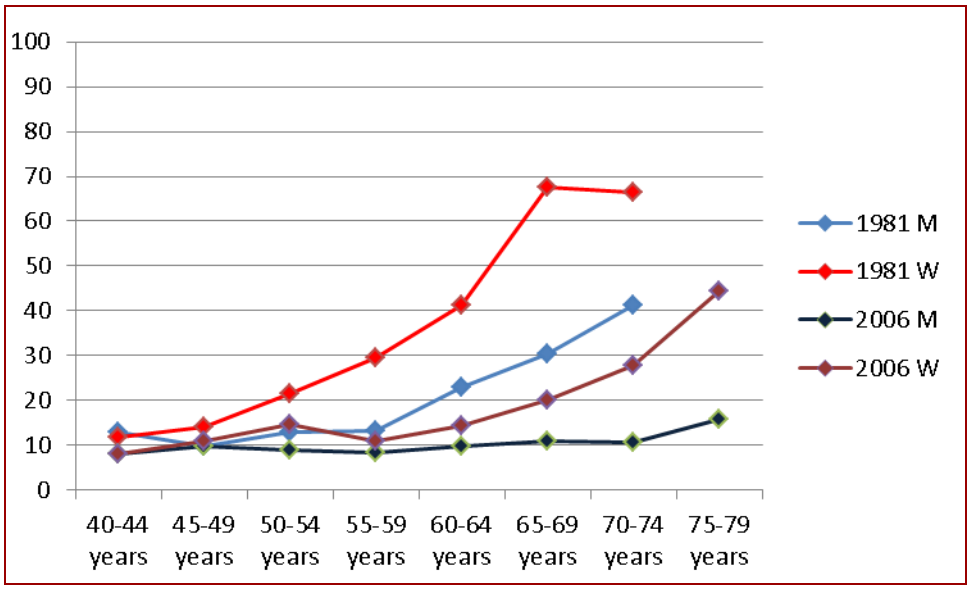


Figure 4. Share of women and men without a car in the household in 1981 (N=1703) and 2006 (N=7558).

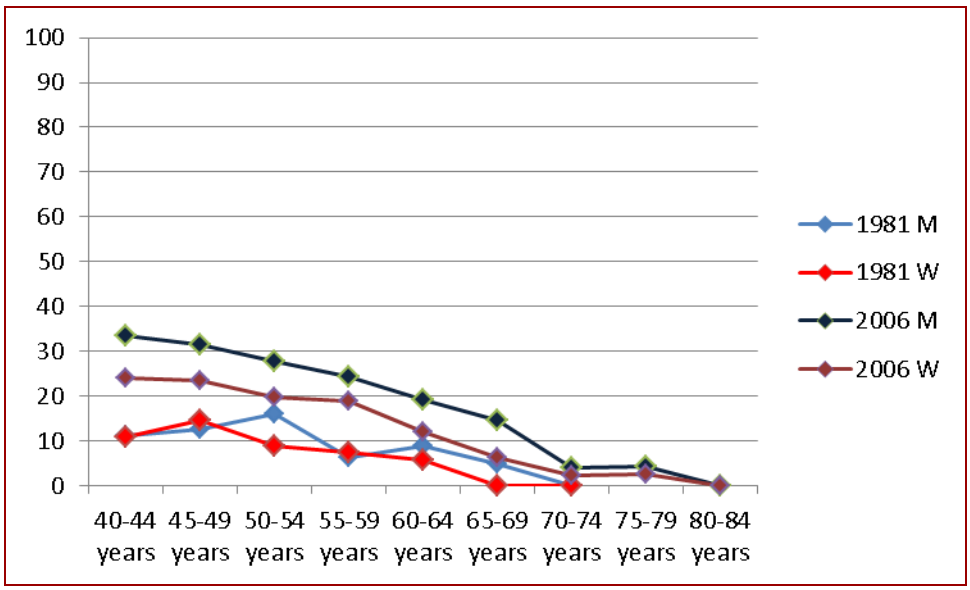


Figure 5. Share of women and men having two or more cars available in the household in 1981 (N=1703) and 2006 (N=7558).

As shown in Figure 4, in the older age groups women more often than men live in a household without a car. This is probably due to the fact that older women live alone more often than men, due to their longevity. The effect of an increasing number of driver licenses

among women can however be seen in the figure: the share of older women without a car in the household decreased during the 25 years period.

As shown in Figure 5, the share of persons with two or more cars in the Danish household is small in all age groups. In the youngest age groups (40-59 years) the increase during the 25 years period was rather marked, but not in the older age groups (although there is an increase). It seems that the cohorts aged 40-44 years that have had multiple cars in the household have maintained them until the retirement, but not longer.

In summary, it can be concluded that car availability has increased for all age groups, but especially so for the older persons. Many of those (then) middle-aged persons that had access to a car in the household 25 years ago have maintained car access also when growing old.

Car availability and residential region

The car availability in the household increased in all the residential regions between 1981 and 2006, although the percentage of people without a car is still high in some of the areas, mainly Copenhagen and other big towns (Figure 6). Having multiple cars is rare in all areas in Denmark, as illustrated in Figure 7. Two areas where having multiple cars has increased rather markedly are the suburbs around Copenhagen and the rural areas. Analysing this increase further, it can be seen that the increase in having multiple cars in the household applies mainly to those below 65 years old (Figures 8 and 9).

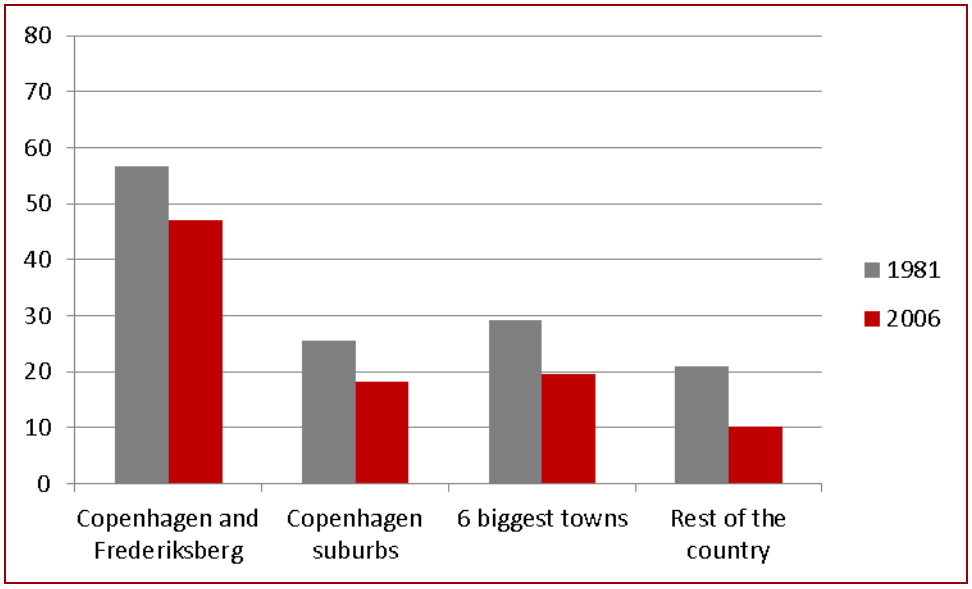


Figure 6. Pecentage of people aged 40+ without a car available in the household by residential region in 1981 (N=1703) and 2006 (N=7518).

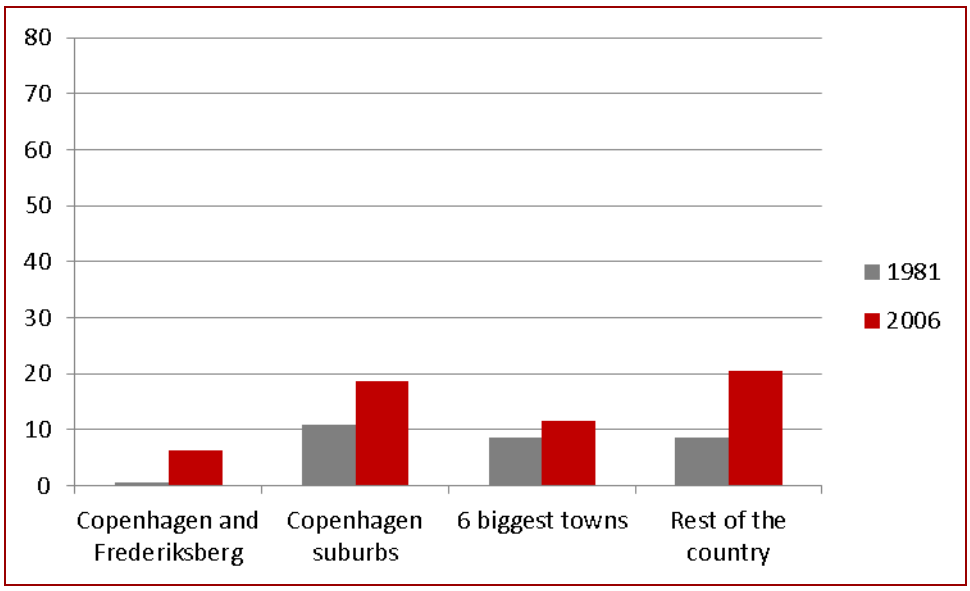


Figure 7. Percentage of people aged 40+ with two or more cars available in the household by residential region in 1981 (N=1703) and 2006 (N=7518).

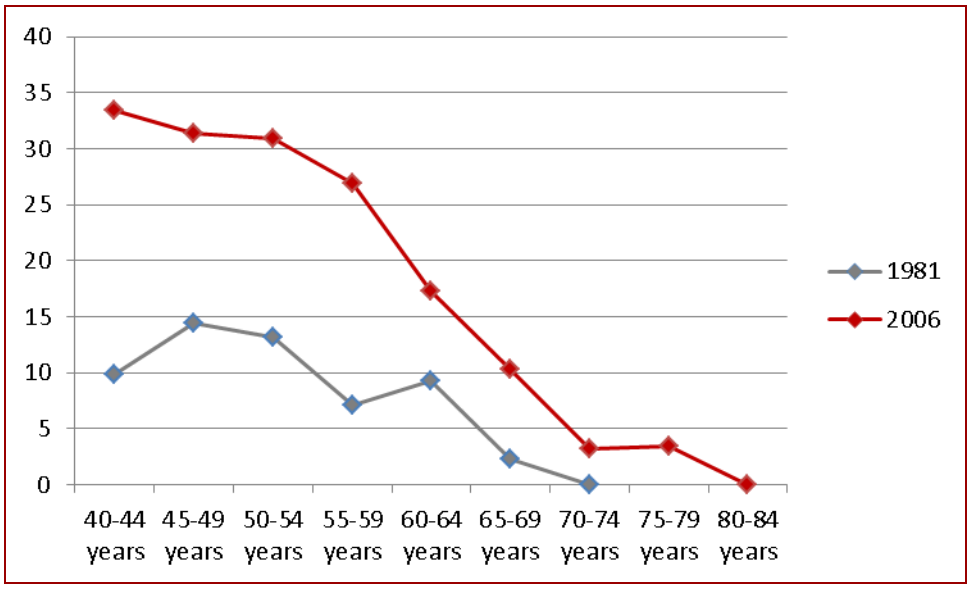


Figure 8. Share of persons living in the rural areas with minimum two cars in the household by age in 1981(N=1008) and 2006 (N=5154).

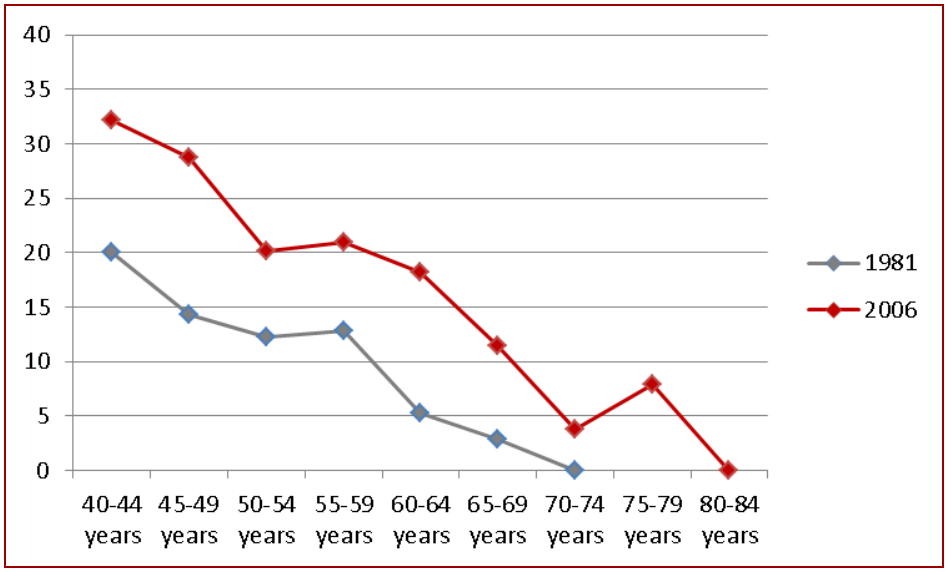


Figure 9. Share of persons living in Copenhagen suburbs with minimum two cars in the household by age in 1981 (N=279) and 2006 (N=1017).

In summary, it can be concluded that car access is relatively high for other areas than Copenhagen. Car access has increased in all areas, and in Copenhagen suburbs and rural areas, having multiple cars has become more common in the 25 years period.

3.2 Work /education related travel activity

Number of work and education related trips

As it can be expected, the number of work and education related (W/E) trips decreases strongly with age. The pattern is similar in 1981 and 2006, although with time, the number of W/E trips per day has increased in all age groups (Figures 10 and 11). Comparing men and women, it can be seen that while for both genders the number of W/E trips drops after the age of 55-59 years, for women, this decrease is larger, and at the age of 60-64, women only do half the number of W/E trips that men do.

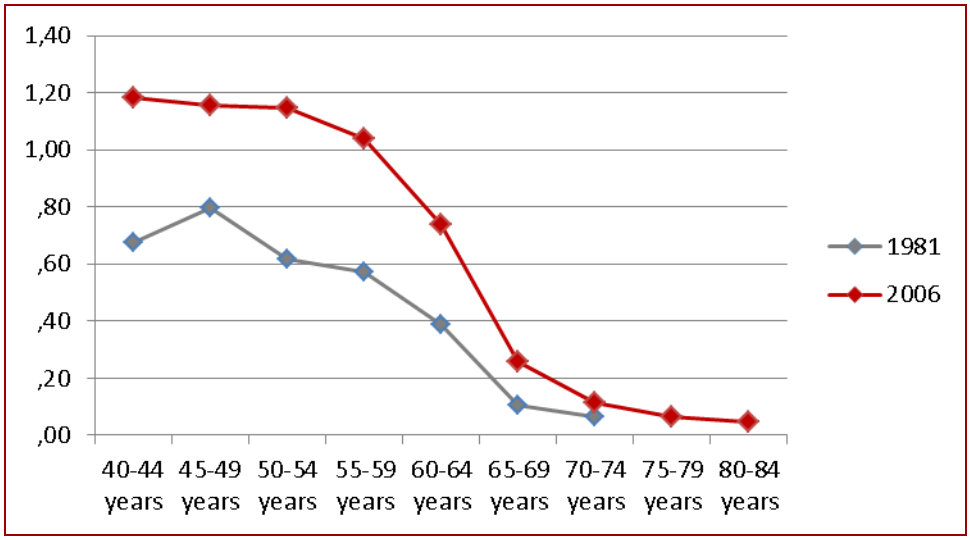


Figure 10. Number of work/education related trips per day by age in 1981 (N=1708) and 2006 (N=3545). Men only.

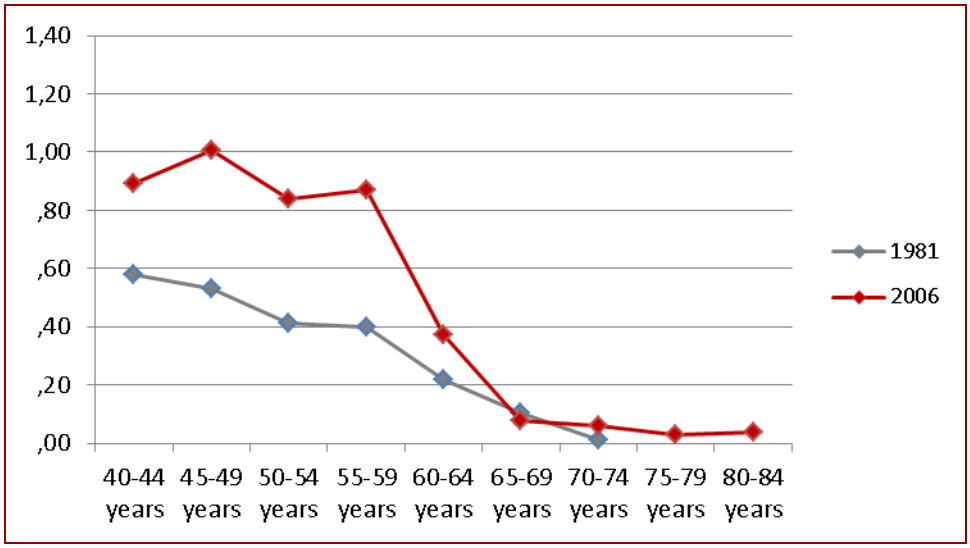


Figure 11. Number of work/education related trips per day by age in 1981 (N=1700) and 2006 (N=4022). Women only.

The average number of W/E trips has increased in all the different residential regions, except for the Copenhagen sub-urban areas, where the number of trips slightly decreased in the 25 years period. The increase was biggest in the rural areas (Figure 12).

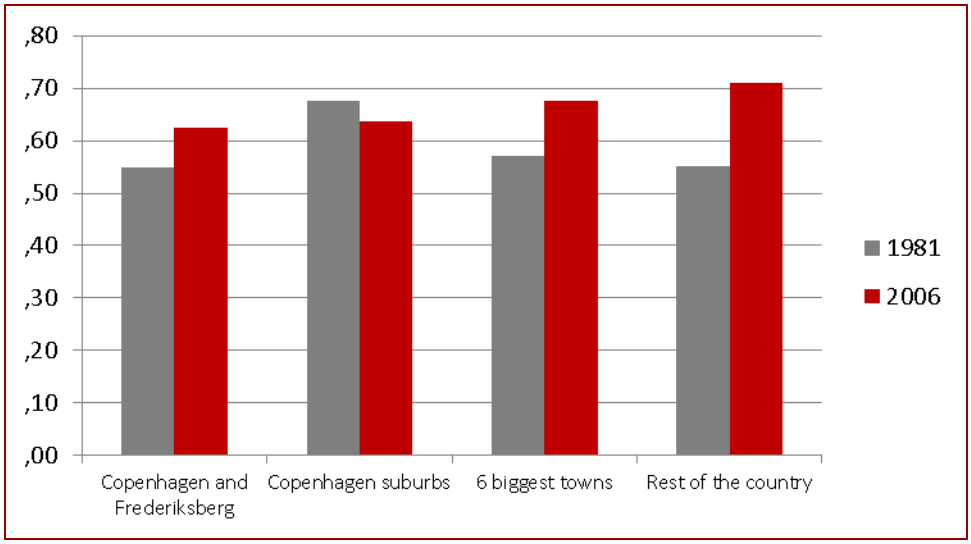


Figure 12. Number of work/education related trips per day by residential region in 1981 (N=6708) and 2006 (N=12811). All persons aged 40-74 years (1981) / 40-84 years (2006).

Work and education related trips and modal choices

Figure 13 illustrates the modal choices of men and women for W/E trips in the years 1981 and 2006. The most marked change is the increase in car use by women (from 27% to 43%). Among men, the increase in car use was much smaller.

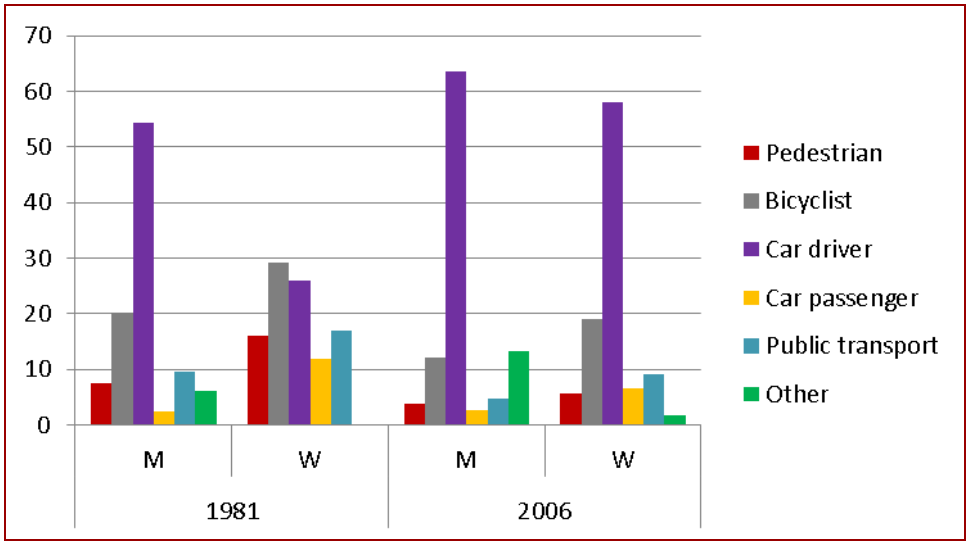


Figure 13. Modal choice in connection with work/education related trips in 1981(N=1406) and 2006 (N=5320) by gender. Ages 40-74 (1981) / 40-84 (2006). The figure illustrates the percentages of W/E trips conducted by each mode.

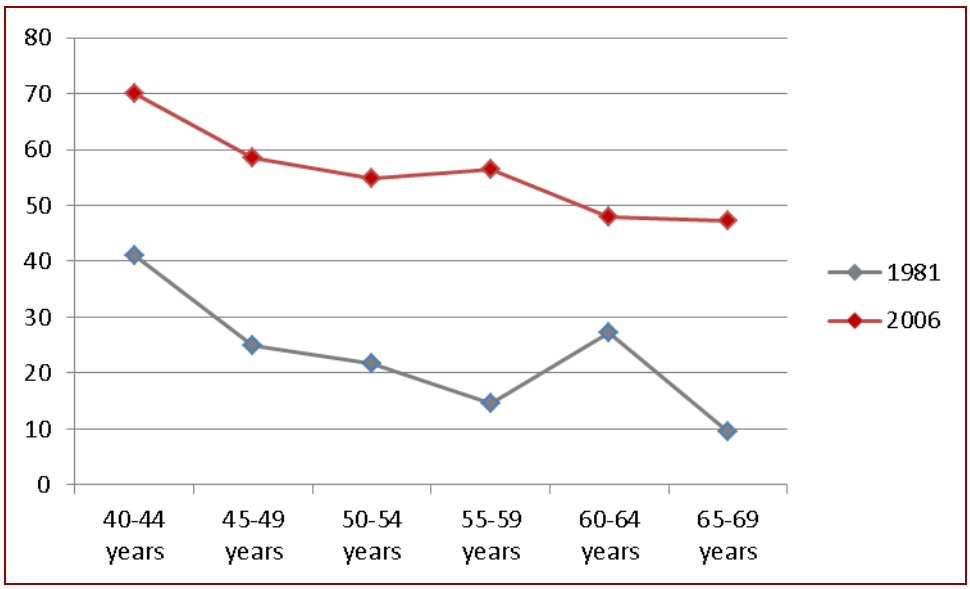


Figure 14. Percentage of work/education related trips done as a car driver by age in 1981 (N=584) and 2006 (N=1398). Women only.

In Figure 14, this development in car driving among women is broken down in age groups. There is an increase in all of the age groups. Only age groups up to 69 years are included, as the number of persons performing W/E trips was very marginal in the dataset after that age.

The average trip length of W/E trips also increased during the 25 years period, particularly for men. Figures 15 and 16 illustrate the average trip length for men and women in 1981 and 2006.

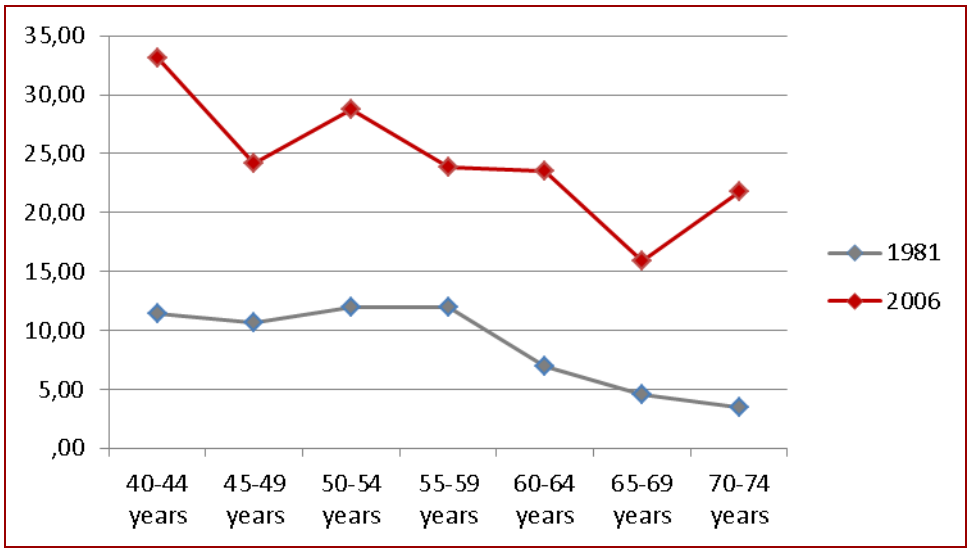


Figure 15. Average trip length in km per trip for work/education related trips in 1981 (N=822) and 2006 (N=2891). Men only. (NB: there are very few persons over 65+in the analysed material)

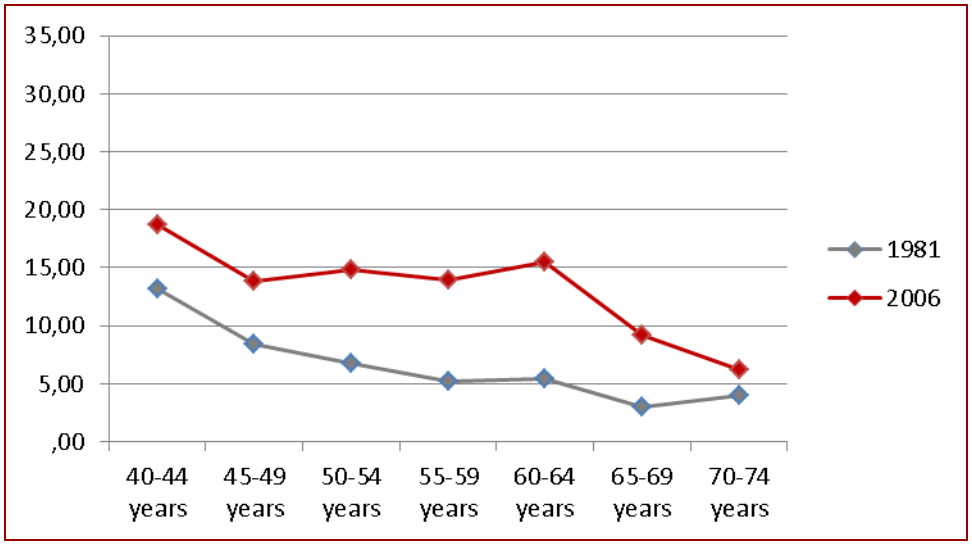


Figure 16. Average trip length in km per trip for work/education related trips in 1981 (N=584) and 2006 (N=2390). Women only. (NB: there were very few persons over 65+ in the analysed material)

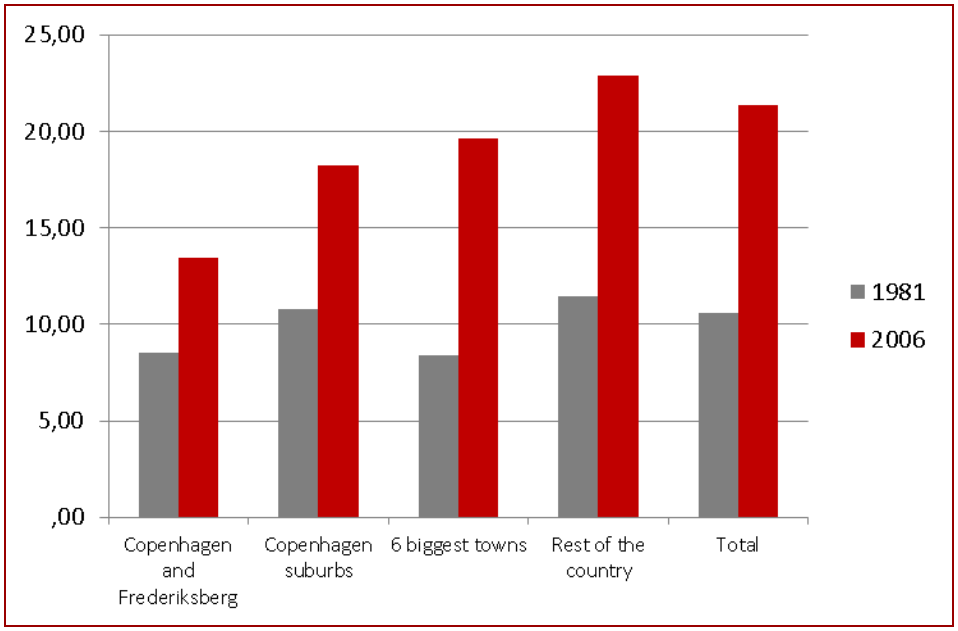


Figure 17. Average trip length for work/education related trips by residential region in 1981(N=3865) and 2006 (N=5298). All persons aged 40+.

It appears from Figure 17 that the trip length of W/E trips has increased, especially in the other bigger towns and the rural areas. The increase is rather small for persons residing in Copenhagen. (NB: It made no sense to break this down by gender and age, as the number of older persons doing work /education related trips is very small.)

3.3 Trips related to shopping and services

Number of daily trips related to shopping and services

In the 25 years period the number of trips related to shopping and services increased for both genders and all age groups. The number of trips is also rather constant across the different age groups. Women do more shopping and service-related trips in the younger age groups, but after 50 years of age, the difference is smaller.

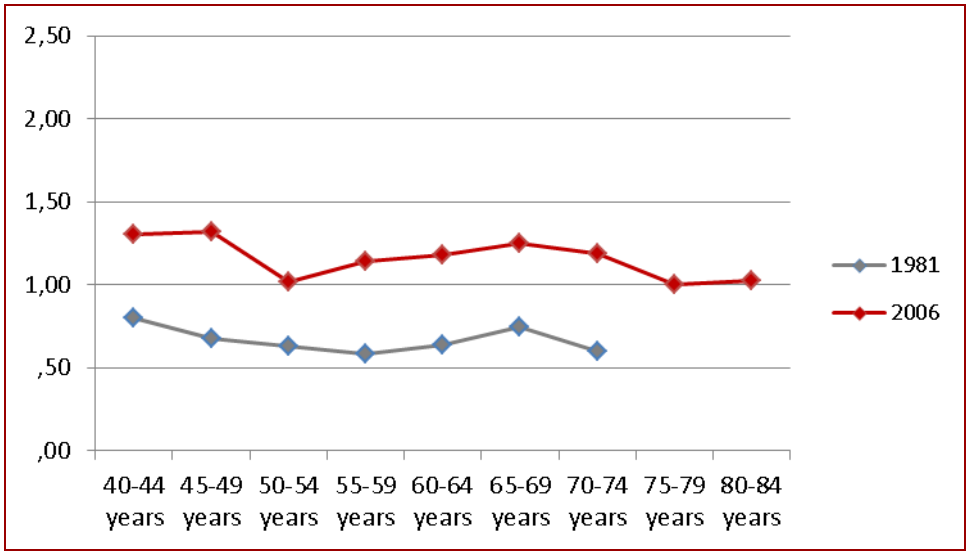


Figure 18. Number of shopping and service-related trips per day by age in 1981 (N=1708) and 2006 (N=3545). Men only.

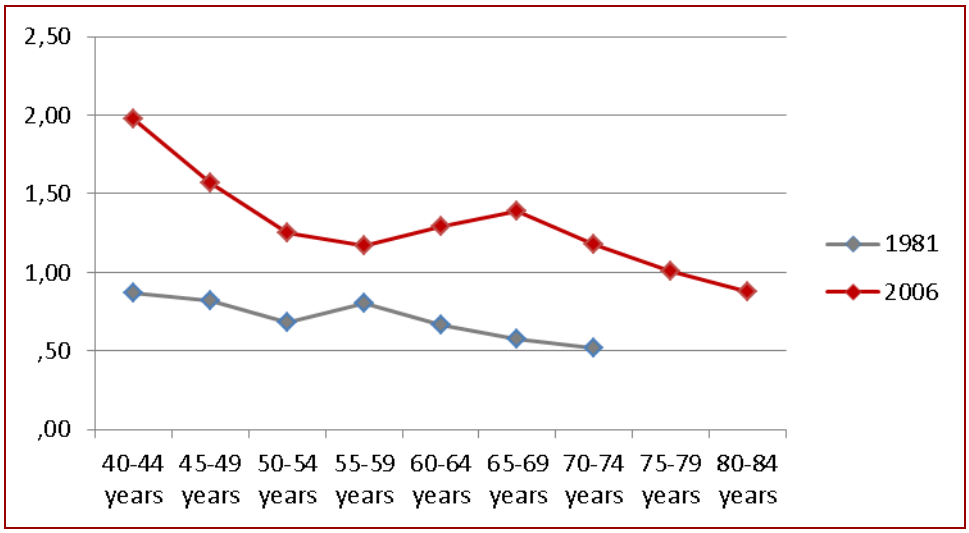


Figure 19. Number of shopping and service-related trips per day by age in 1981 (N=1700) and 2006 (N=4022). Women only.

Number of trips related to shopping and services has increased in all the residential regions and the increase is quite similar in all regions (Figure 20).

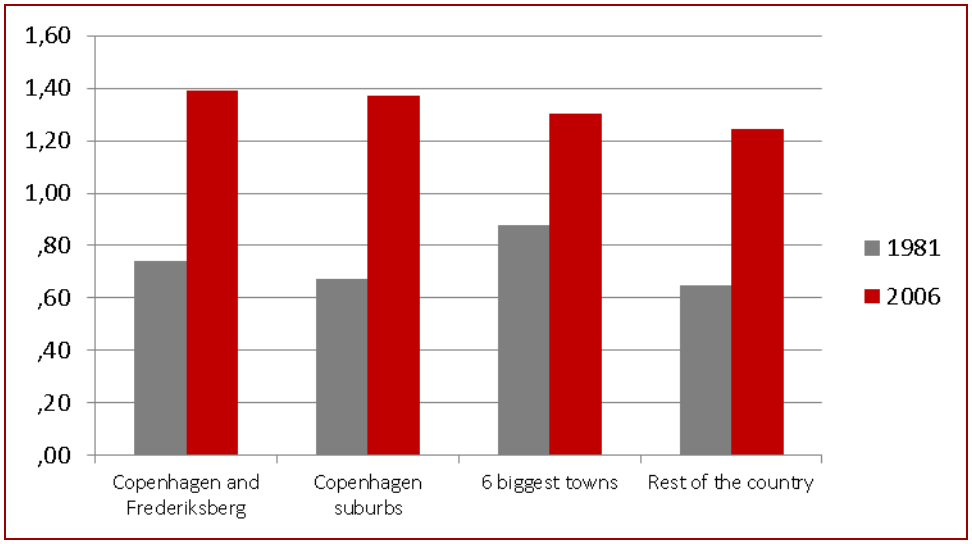


Figure 20. Number of shopping and service-related trips per day by residential region in 1981 (N=4989) and 2006 (N=9622). Persons aged 40+.

Shopping and service-related trips and modal choices

Comparing modal choices for shopping and service-related trips in 1981 and 2006, it can be seen that car use has increased dramatically, at the expense of mainly walking, especially among women. This might reflect the emergence of the bigger shopping malls and the decrease in the number of local shops. A gender difference can be observed both in 1981 and 2006; women used a wider array of transport modes for these trips, whereas men predominately used a car (as a driver). The most marked change during the 25 years period is that women increased their use of car (as a driver) from approximately 20% to 50% of the trips. (Figure 21).

Using a car (as a driver) for shopping and service-related trips has however also increased among men in the older age groups, i.e., those aged 60+ (Figure 22). The biggest increase is however found among women, in all age groups.

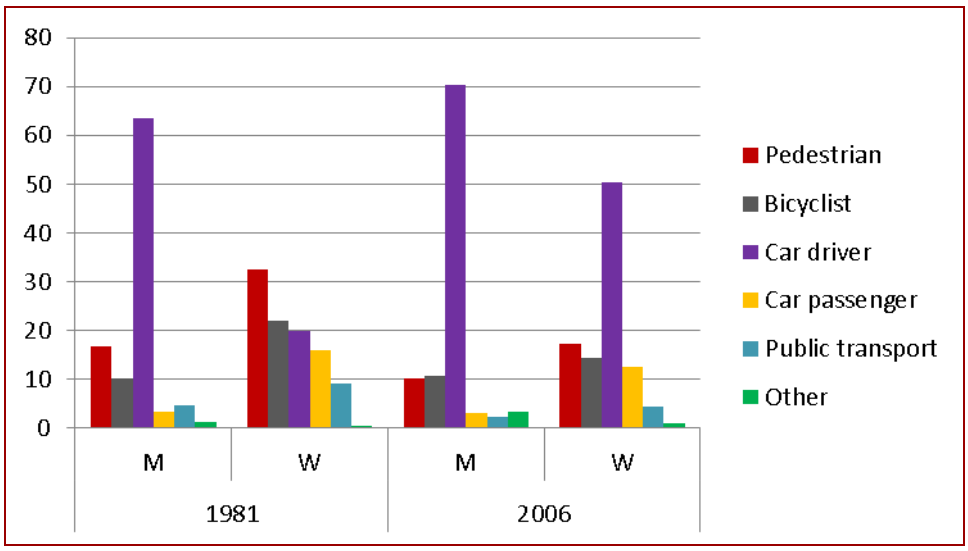


Figure 21. Modal choice for shopping and service-related trips in 1981 (N=2359) and 2006 (N=7636) by gender. Age groups 40+.

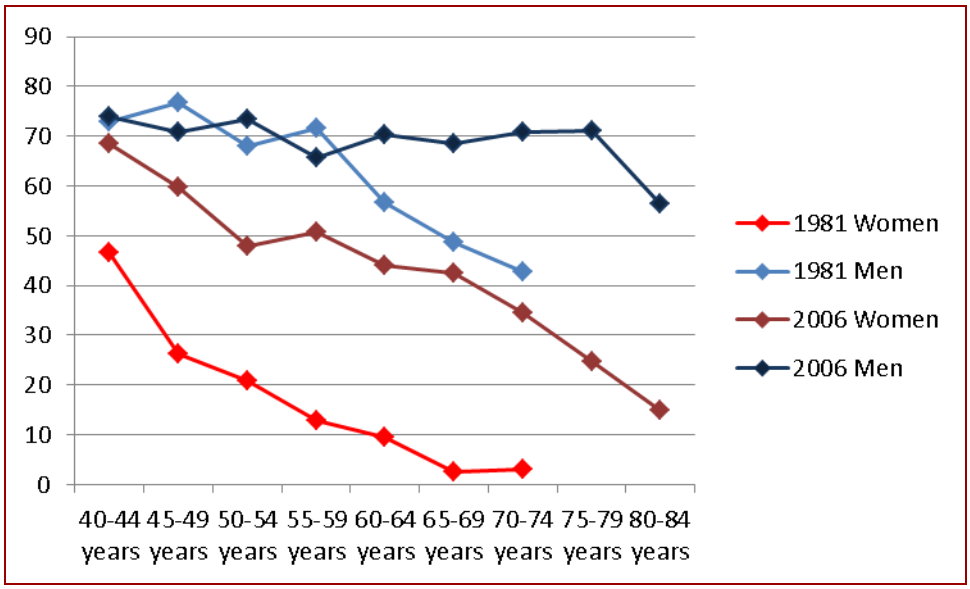


Figure 22. Percentage of shopping and service-related trips made as a car driver by age in 1981 (N= 2359) and 2006 (N=5715).

Figures 23 and 24 illustrate the average trip length of shopping and service-related trips by gender and age in 1981 and 2006. There has been an increase in all age groups and for both genders. For women, the increase has been somewhat larger and reflects the change in modal choices for this type of trips.

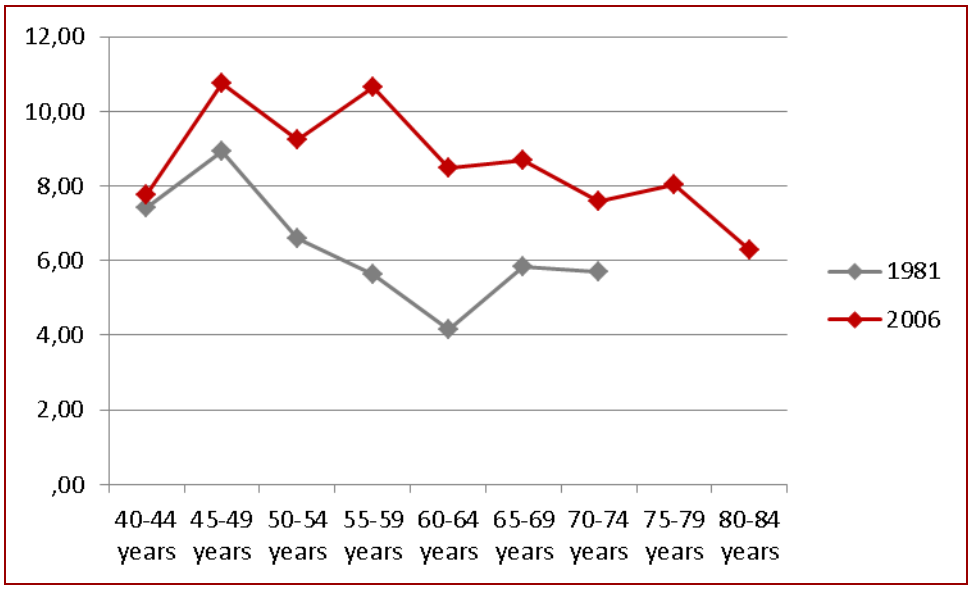


Figure 23. Average trip length in km of shopping and service-related trips by age in 1981 (N=1141) and 2006 (N=4195). Men only.

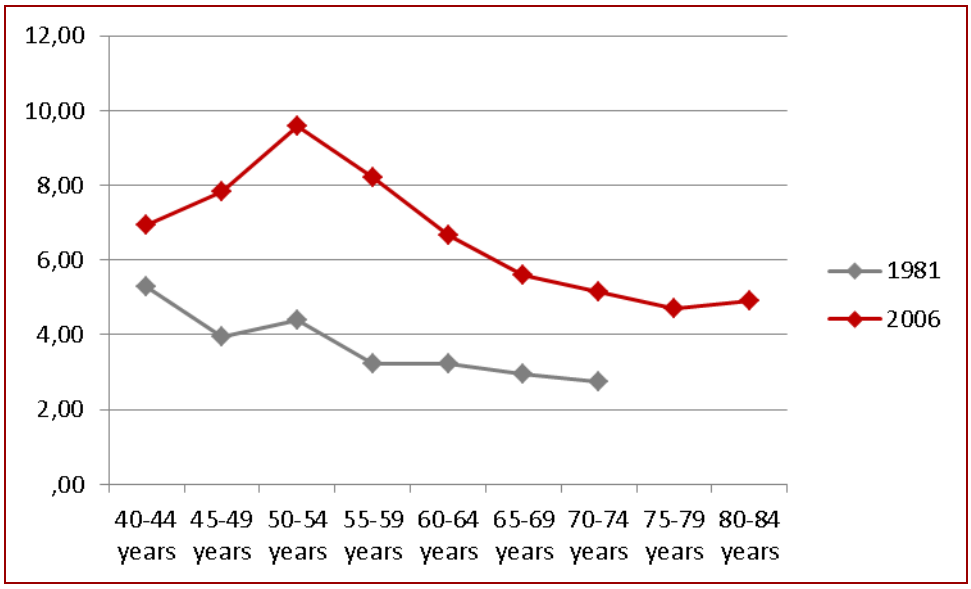


Figure 24. Average trip length of shopping and service-related trips by age in 1981 (N=1218) and 2006 (N=5502). Women only.

As regards the regional development in trip lengths, as shown in Figure 25, the increase has taken place in all areas, but especially so in the six biggest towns and in the rural areas. This probably reflects the development of concentrating shopping and services to places requiring the use of a private car (or at least a motored vehicle, including public transport) and shutting down the local shops and markets.

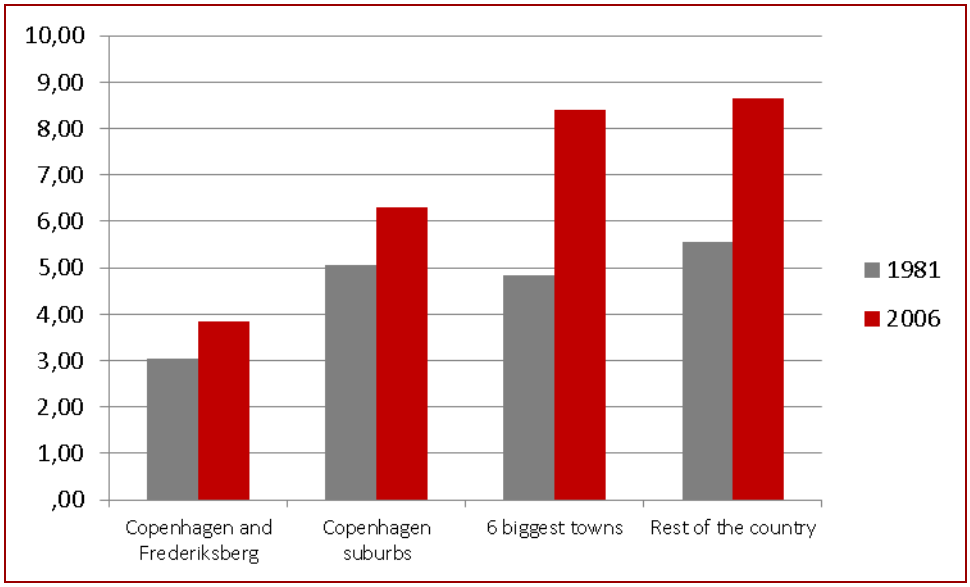


Figure 25. Average length of shopping and service-related trips by residential region in 1981 (N=2359) and 2006 (N=9622). Age groups 40+.

3.4 Leisure travel

Number of daily leisure trips

In general, while the number of other types of trips increased during the 25 years period, the number of leisure trips has remained somewhat the same. The number of leisure trips has actually decreased for men in the younger age groups (40-55 years). Figures 26 and 27 illustrate the number of leisure trips per day for different age groups and genders. Figure 28 shows the number of leisure trips in different regions, and it can be seen that the number of trips has remained constant in Copenhagen, Copenhagen suburbs, and rural areas while for bigger towns there is a more marked decrease in number of trips.

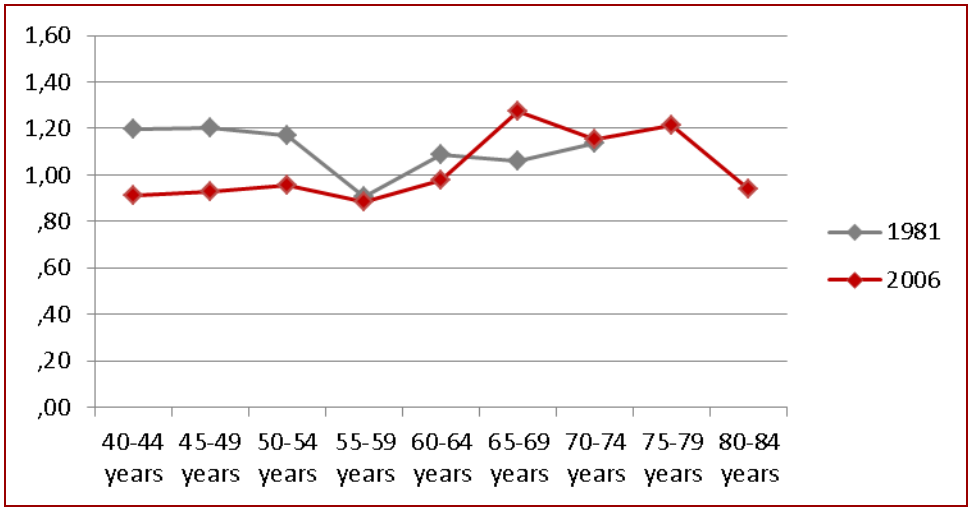


Figure 26. Number of leisure trips per day by age in 1981 (N=1708) and 2006 (N=3545). Men only.

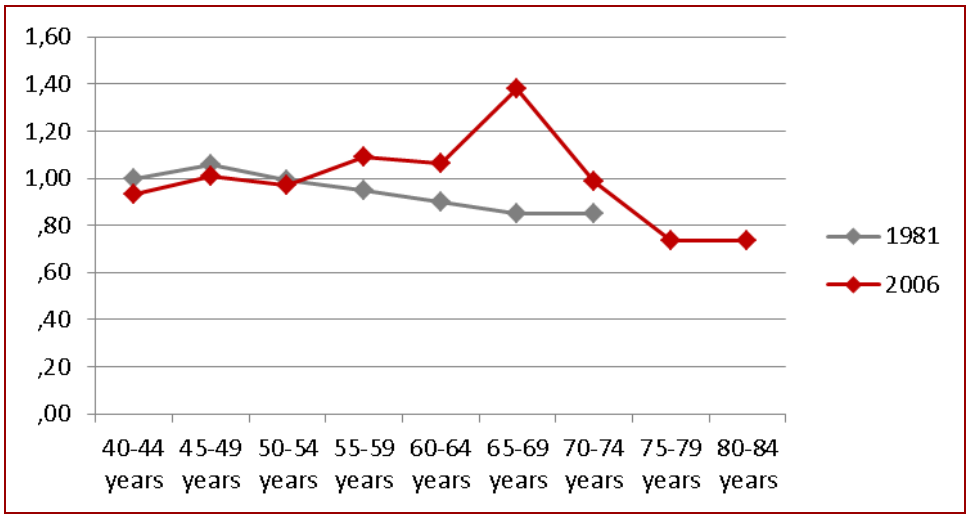


Figure 27. Number of leisure trips per day by age in 1981 (N=1700) and 2006 (N=4022). Women only.

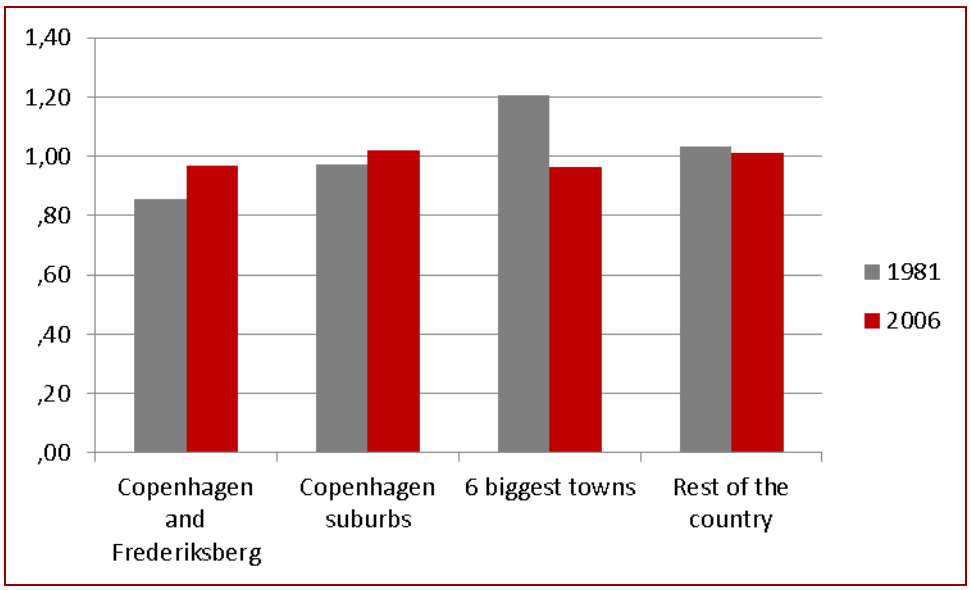


Figure 28. Number of leisure trips by residential region in 1981 (N=3408) and 2006 (N=7527). Persons aged 40+.

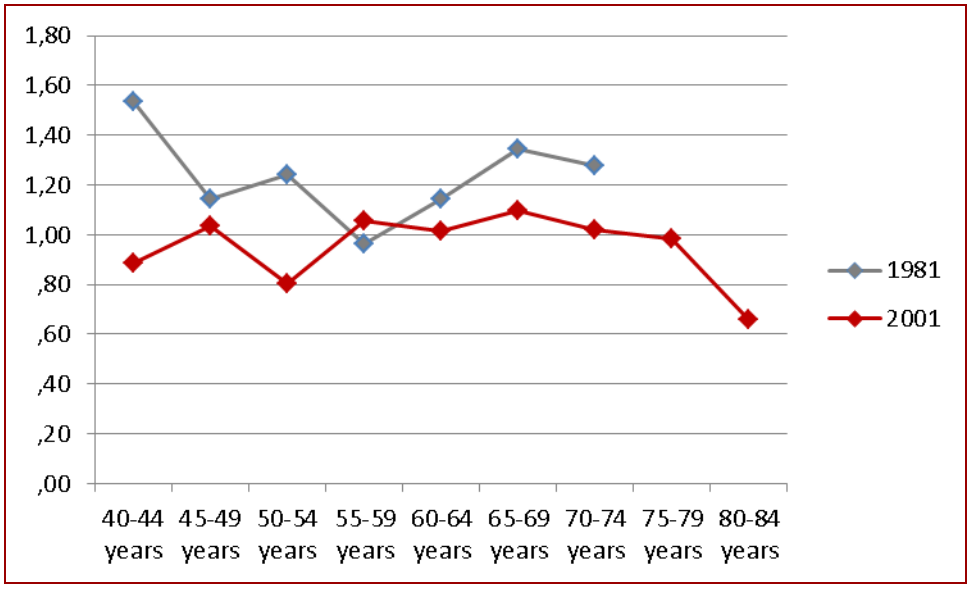


Figure 29. Number of leisure trips in 6 biggest towns (excluding Copenhagen) in 1981 (N=4014) and 2006 (N=8402). Both genders.

Due to the decrease in leisure trips in the biggest towns (after Copenhagen), the number of trips in this region was broken down by age. As seen in Figure 29, the decrease in leisure trips is mostly due to a decrease in trips among those younger than 55 years, but there is also a decrease in age groups 65-74.

Leisure trips and modal choices

For leisure trips, people tend to use a wider array of transport modes than for other types of trips. There are not many marked changes in the 25 years period, but the use of cars among

women has increased and their travel as car passengers has consequently decreased. For both men and women, walking has increased, and for men, cycling has slightly increased. The use of public transport has decreased for both genders. This development is illustrated in Figure 30. Broken down by age and gender, we can see that the increase in car driving has taken place especially in the group of women over 55 years (Figure 31).

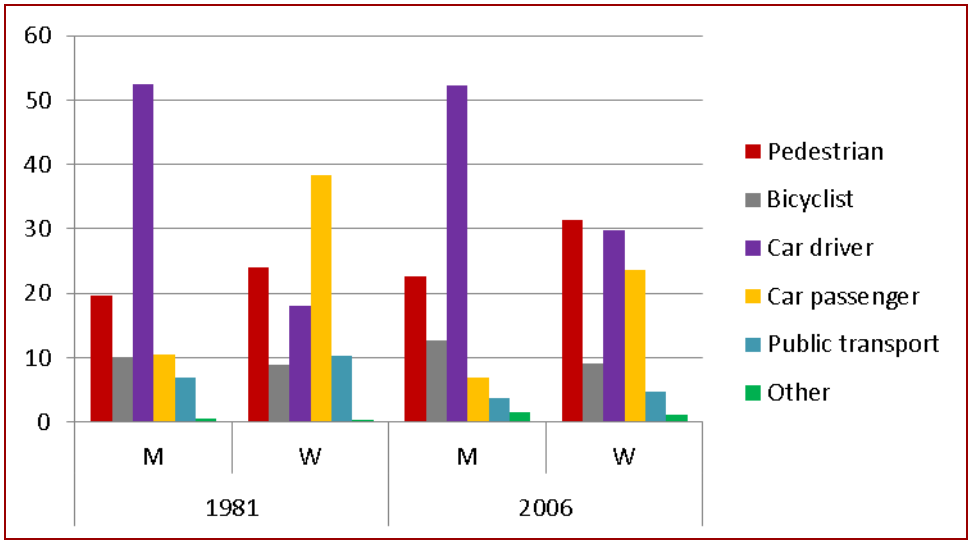


Figure 30. Modal choice for leisure trips in 1981 (N=3503) and 2006 (N=7636) by gender. Age groups 40+.

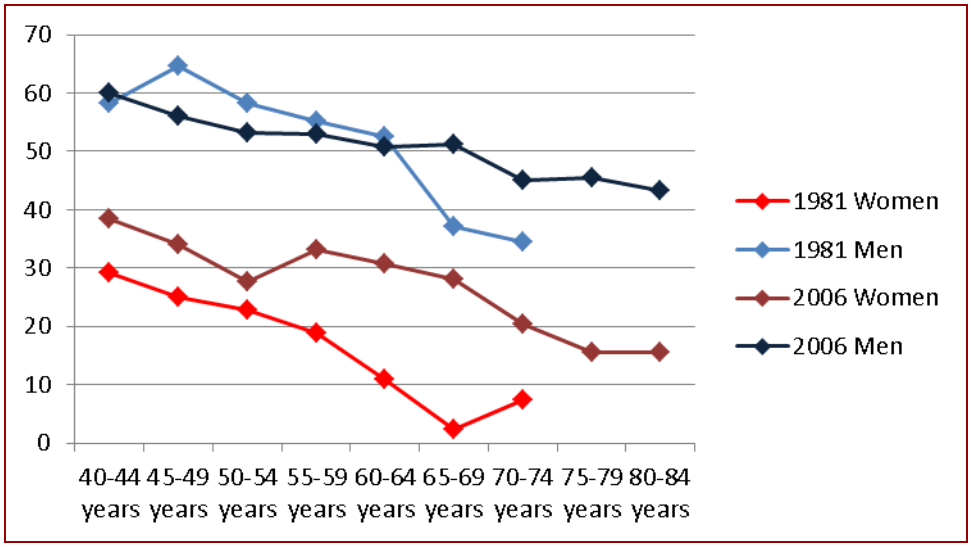


Figure 31. Percentage of leisure trips done as a car driver by age and gender in 1981 (N=3503) and 2006 (N=7636).

While work and education related trips and shopping and service-related trips became longer in the 25 years period, there has not been a marked increase in trip lengths for leisure trips. There is no notable difference or a constant pattern between the genders, except that men's leisure trips are on average longer than those of women (Figures 32 and 33). This probably reflects the modal choices (or modal resources).

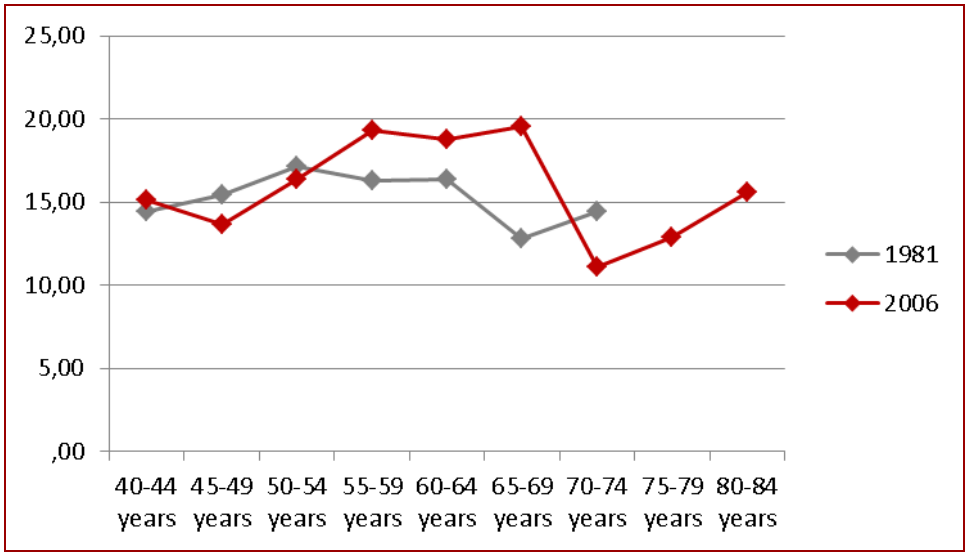


Figure 32. Average trip length in km on leisure trips by age in 1981 (N=1889) and 2006 (N=3540). Men only.

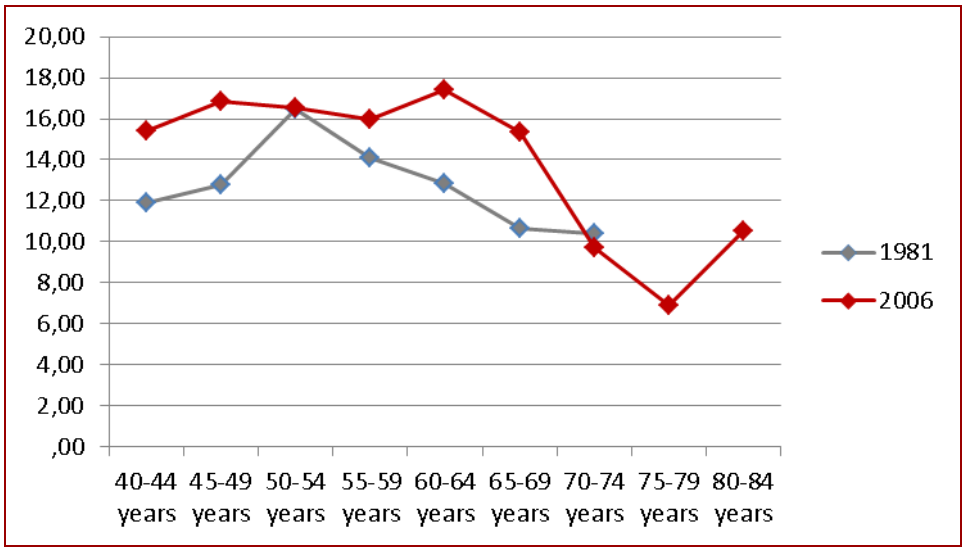


Figure 33. Average trip length in km on leisure trips by age in 1981 (N=1612) and 2006 (N=4096). Women only.

The length of leisure trips has remained rather constant in the 25 years period. The length of leisure trips does not differ markedly between the different residential regions. The only notable change is that in Copenhagen, the average length of leisure trips has decreased, while in the rural areas it has increased (Figure 34).

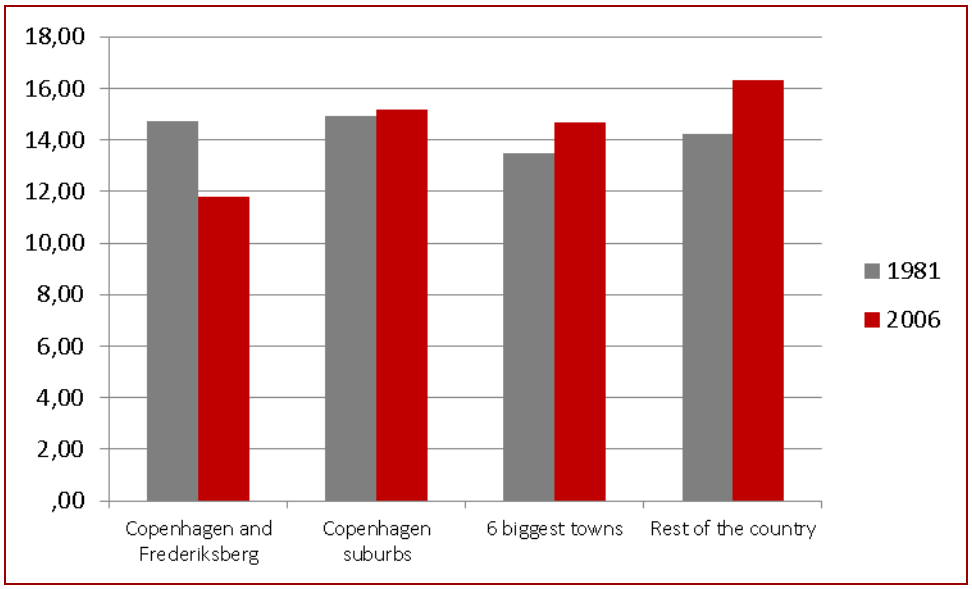


Figure 34. Average length of leisure trips in km by residential region in 1981 (N=3501) and 2006 (N=7559). Age groups 40+.

3.5 Daily travel, all purposes

Number and length of daily trips

The number of daily trips in the different age groups changed only a little during the 25 years period. Also the gender differences are small, and the age trend is similar for men and women, as seen in Figure 35. When it comes to the regional differences, it can be seen that the pattern is somewhat similar for almost all regions: the daily number of trips has increased. The only exception from the pattern is the slight decrease in the number of trips in bigger towns (excluding Copenhagen) (Figure 36).

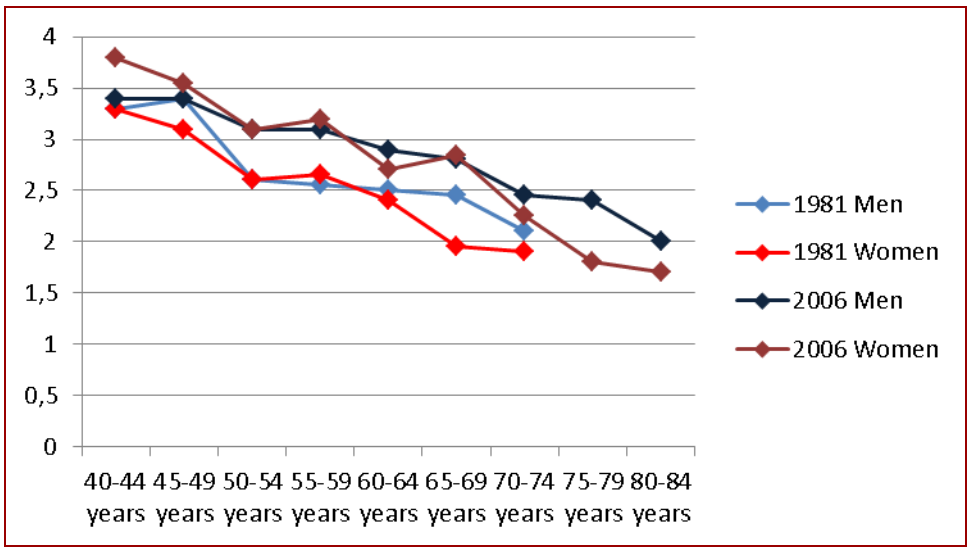


Figure 35. Number of trips per day (all purposes) by gender in 1981 (N=3354) and 2006 (N=12874).

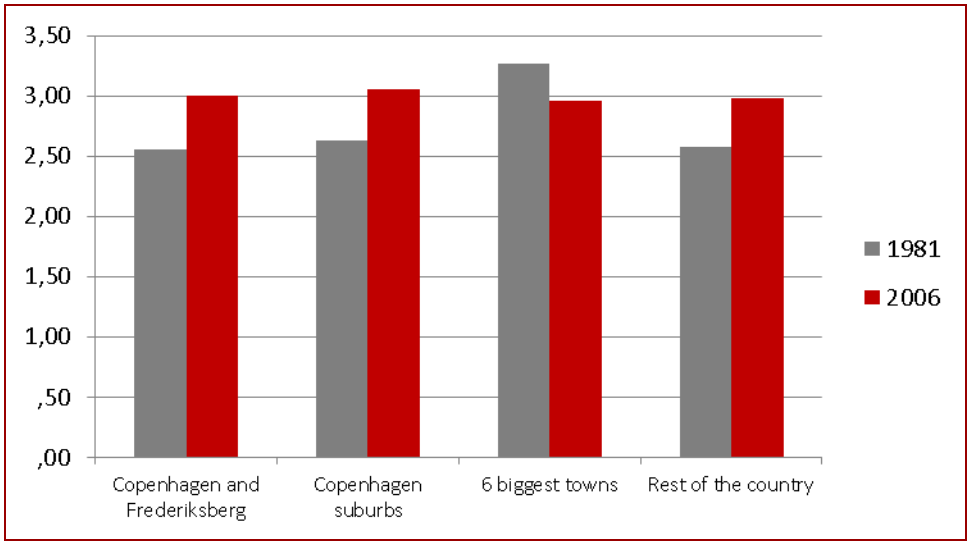


Figure 36. Number of trips per day (all purposes) by residential region in 1981 (N=3354) and 2006 (N=12811). Age groups 40+.

The daily travelled kilometres increased during the 25 years period for all age groups 40 years and above, whereas the general age and gender-related patterns remained similar: men travel more than women and the number of kilometres starts to decrease after 55 years of age (Figure 37). It should however be noted that the difference between the genders has somewhat increased in the age groups 40-64, i.e. men's daily travelled kilometres have increased more than women's.

Looking at the Figure 37 longitudinally, it can be seen that

- Those aged 40-44 in 1981 (65-69 years old in 2006), both men and women, have increased their number of daily kilometres
- Those aged 45 and over in 1981 (70+ in 2006), both men and women, have decreased their number of daily kilometres.

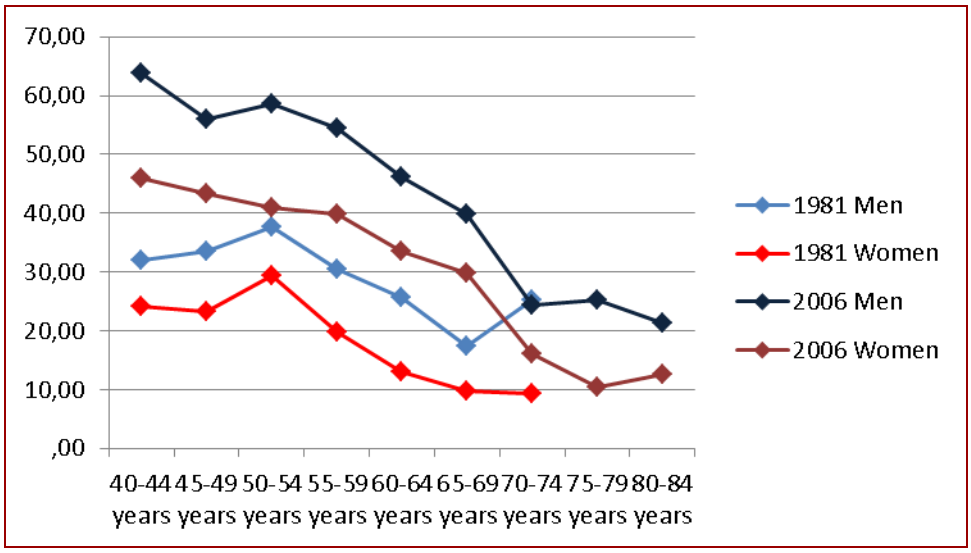


Figure 37. Number of kilometres travelled per day by women and men in 1981(N=1704) and 2006 (N=7567).

Number of trips as car drivers

Overall, the number of daily trips as a car driver increased in the 25 years period in all age groups. Both in 1981 and 2006 the number of trips as a driver decreased steadily with age (Figure 38). Comparing women and men, it can be seen that the increase in the number of trips as a car driver has been more marked for women. In 2006, in the age group 40-44 years, women and men made the same number of trips as a car driver (Figure 39).

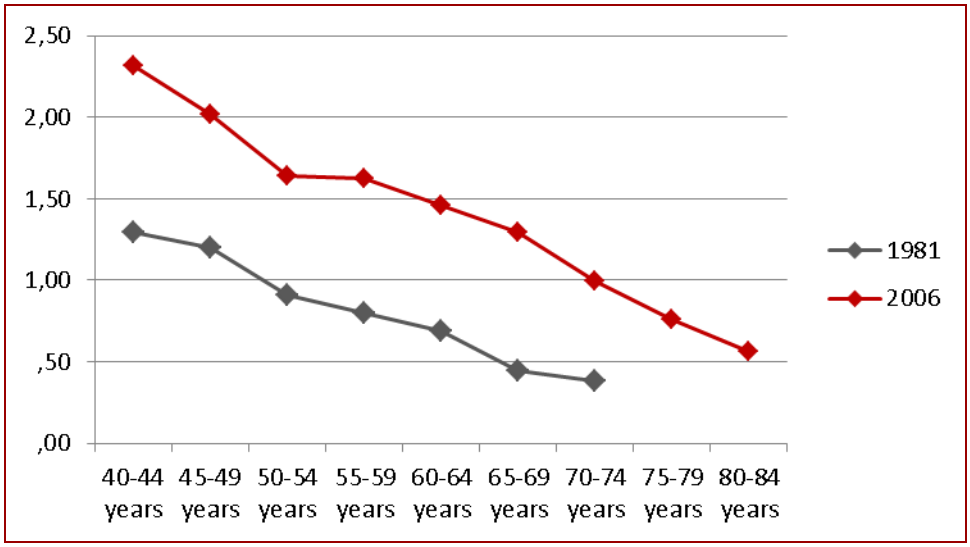


Figure 38. Number of trips as a car driver by age in 1981 (N=3408) and 2006 (N=7567). Both genders.

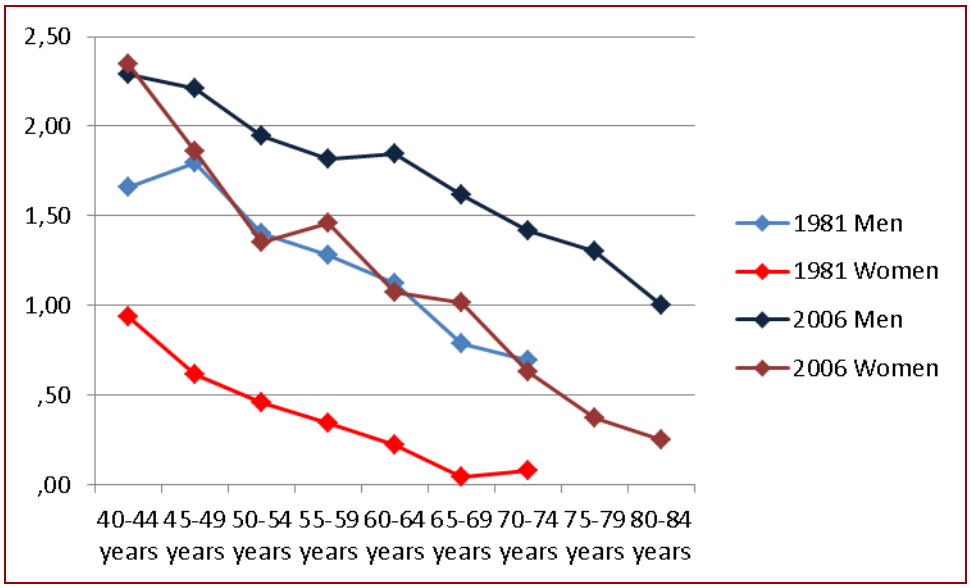


Figure 39. Number of trips as a car driver by age and gender in 1981 (N=3408) and 2006 (N=7567).

Number of trips as pedestrian

Between the years 1981 and 2006 there was a general increase in the number of daily trips as pedestrians. Among men, the only increase seems to have taken place in the older age groups, though (Figure 40). Among women, there is an increase in the older age groups as well, but also in age groups 40-44 and 50-54. There has been a slight decrease in the age groups 45-49 and 55-59 (Figure 41). Persons in all the residential regions, but especially in Copenhagen, increased their number of trips as pedestrians (Figure 42). As the shares of trips made as pedestrians did not increase (cf. Figures 13, 21, and 30), the increase reflects the fact that the overall number of trips has increased and hence also the number of pedestrian trips.

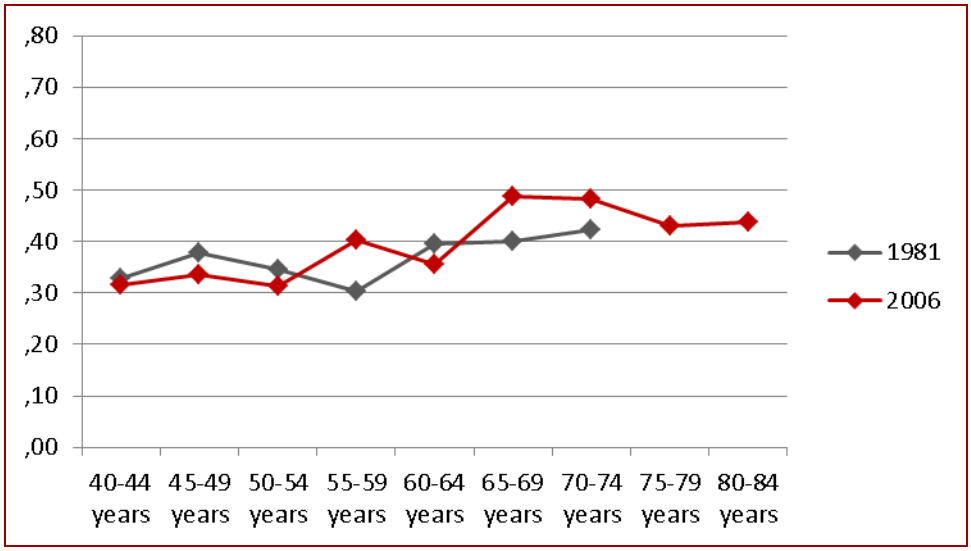


Figure 40. Number of trips per day as pedestrians by age in 1981 (N=1708) and 2006 (N=3545). Men only.

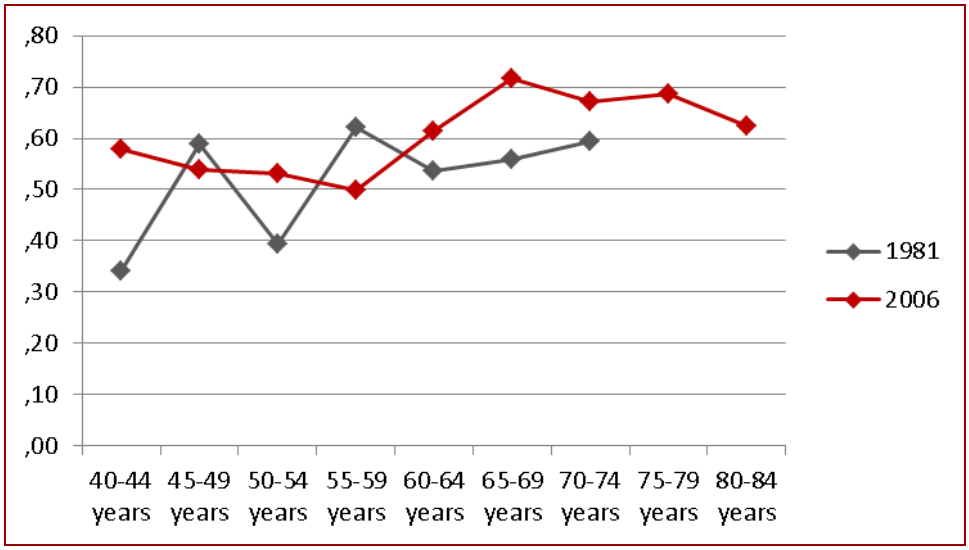


Figure 41. Number of trips per day as pedestrians by age in 1981 (N=1700) and 2006 (N=4022). Women only.

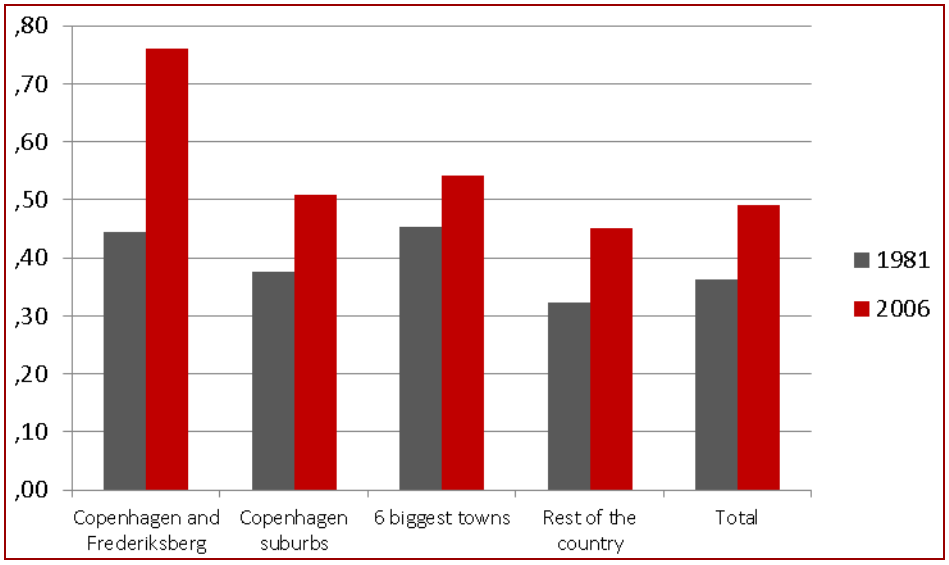


Figure 42. Number of trips as pedestrians by residential region 1981 (N=1704) and 2006 (N=7527). Persons aged 40+.

Number of trips as cyclists

Overall, the number of trips made as a cyclist increased in the 25 years period. Among men, the increase can be observed in almost all age groups (Figure 43). Among women, the increase has been more subtle in the age groups 40-64, but in the age groups 65+ the increase is marked, and in 2006 the number of trips as a cyclist start to decrease at a later age than in 1981 (Figure 44).

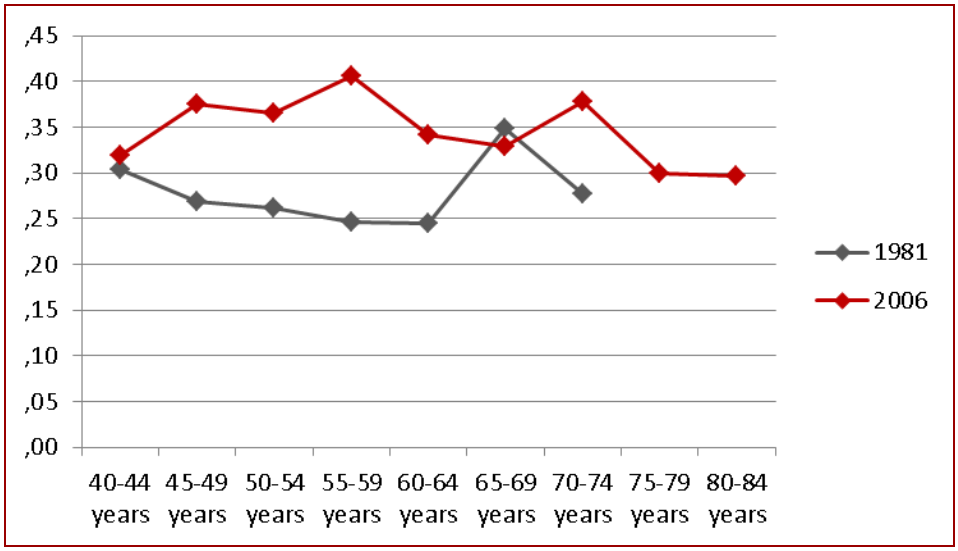


Figure 43. Average number of trips per person per day as a cyclist by age in 1981 (N=1708) and 2006 (N=3545). Men only.

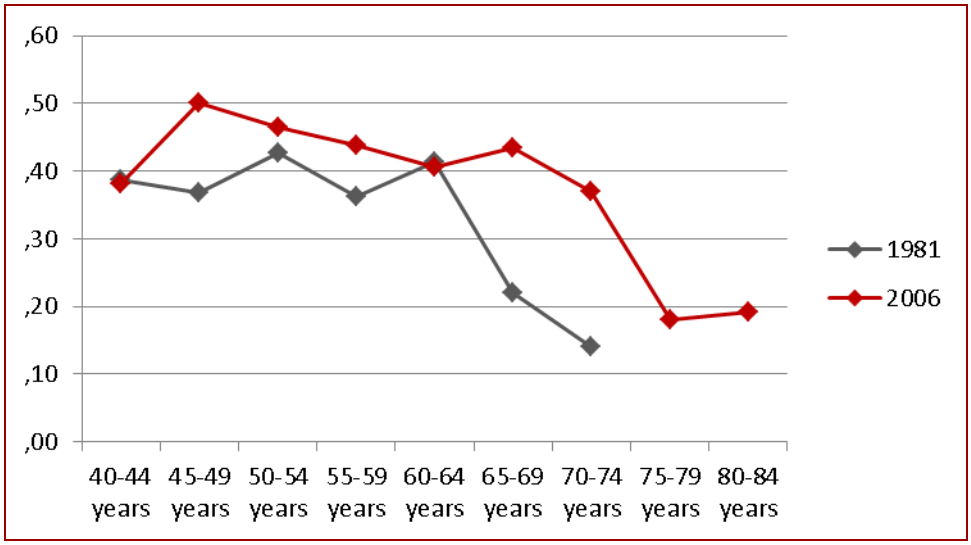


Figure 44. Average number of trips per person per day as a cyclist by age in 1981 (N=1700) and 2006 (N=4022). Women only.

As seen in Figure 45, there is an overall increase from 1981 to 2006 in the number of cyclist trips in Denmark, in all regions, among persons aged 40 and over. There are however some regional differences. The number of trips as a cyclist increased the most in Copenhagen.

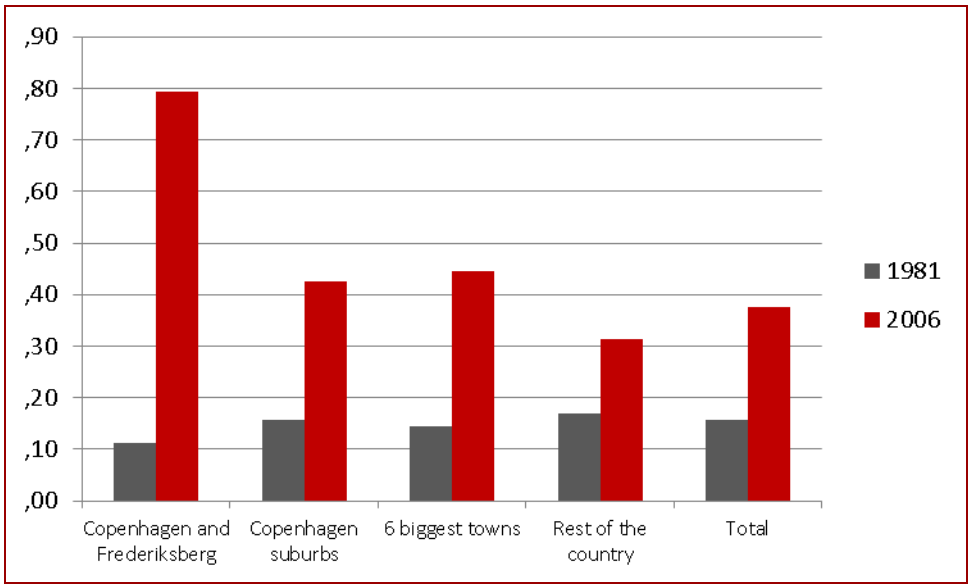


Figure 45. Average number of trips as a cyclist per day per person by residential region 1981 (N=1704) and 2006 (N=7527). Age groups 40+.

Number of trips as car passengers

Travelling as a passenger in a car has slightly decreased in Denmark (cf. Figures 13, 21, and 30). This is also reflected in the number of trips by this mode. There has been an increase only for women in the older age groups (Figure 46). In all age groups, women travel more as a passenger than men.

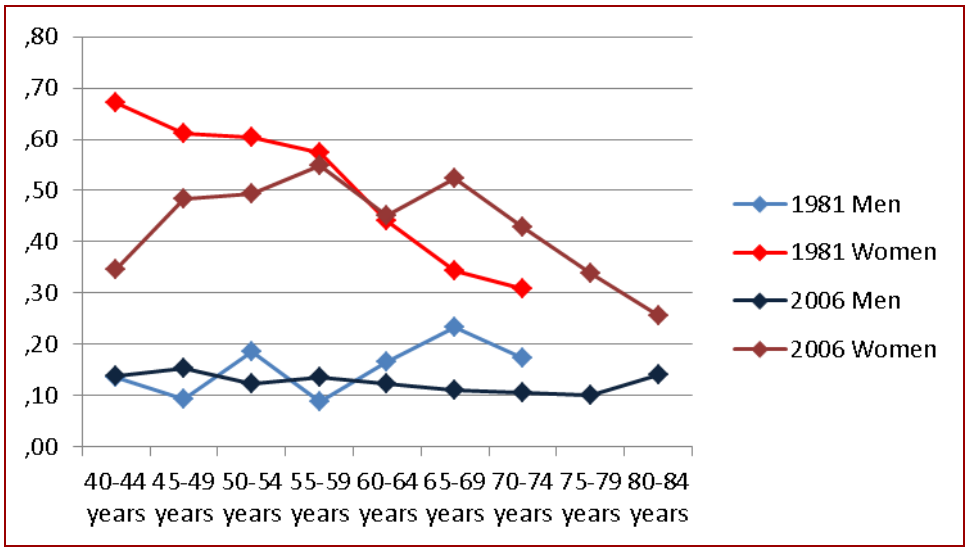


Figure 46. Number of trips as a car passenger by age and gender in 1981 (N=3408) and 2006 (N=7567).

There is a marked overall reduction in trips made as a car passenger. The difference in Copenhagen and Copenhagen suburbs stands out with a larger decrease in the 25 years period than rest of the country (Figure 47).

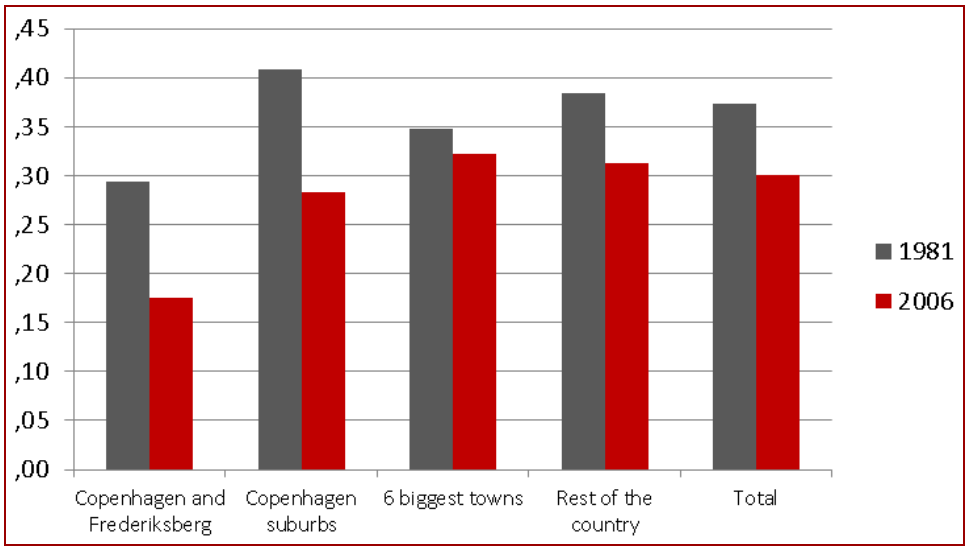


Figure 47. Average number of trips as a car passenger per person per day by residential region 1981 (N=1704) and 2006 (N=7527). Persons aged 40+.

Number of trips in public transport

As it has been shown earlier, the share of trips made by public transport has decreased. There is however an increase in the number of trips made by public transport in all age groups and for both genders (Figure 48). Women make more trips with public transport than men in all age groups, and older persons make more trips than younger persons. The number of trips by public transport has increased in all regions with the biggest increase in Copenhagen. In 1981 the average number of trips by public transport was about the same for residents in Copenhagen and residents in Copenhagen suburbs, but in 2006 the number of trips made in Copenhagen was markedly higher (Figure 50). As the share of all trips made by public transport decreased during the period, the increase in the number of trips has to reflect the overall increase in daily trips.

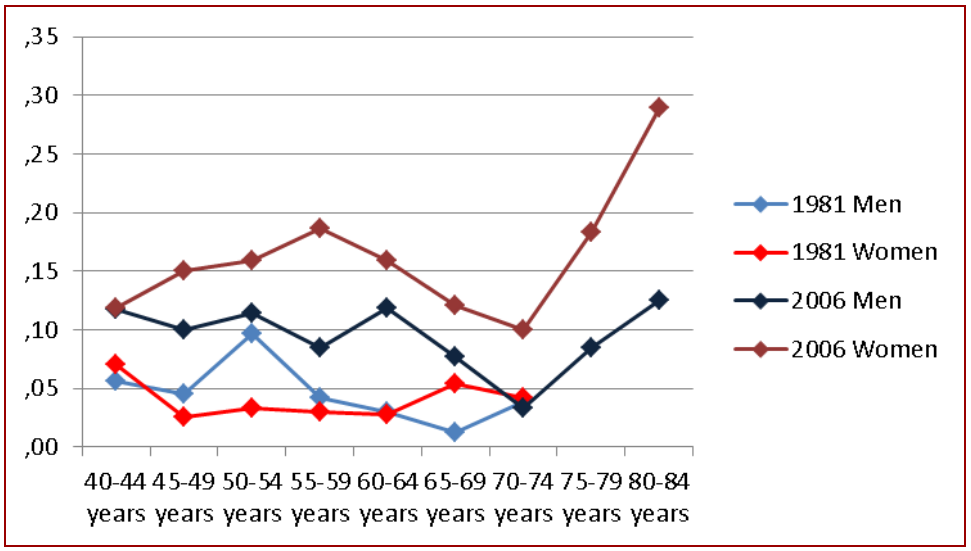


Figure 48. Number of trips by public transport by age and gender in 1981 (N=3408) and 2006 (N=7567).

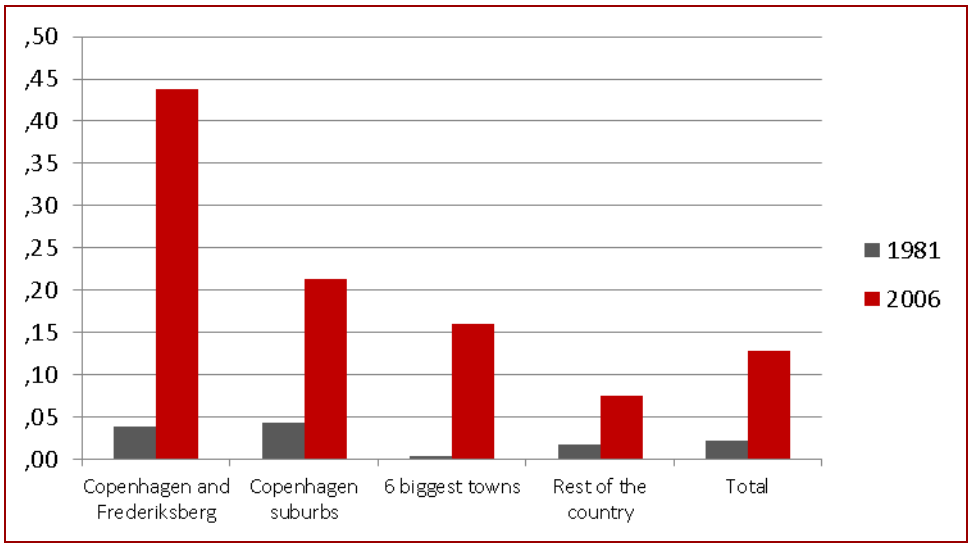


Figure 49. Average number of trips by public transport per person per day by residential region 1981 (N=1704) and 2006 (N=7527). Persons aged 40+.

4. DISCUSSION AND CONCLUSIONS

In the present study, data from the Danish national travel survey were analysed. The general purpose of this report was to provide a descriptive illustration of the travel patterns in different cohorts over time.

First, we aimed at getting a better understanding of the activity and travel patterns of different groups of older people. Second, we aimed at examining travel and activity patterns during the life course. Third, we aimed at identifying the changes that have taken place over time, especially as regards the differences between different cohorts.

The results are comparable to many of the previous findings from other studies. Like in other countries (e.g. Ottman, 2010; Rees & Lyth, 2004), also in Denmark the license holding rates have increased during the last 25 years, especially for older women and people living in urban areas (here Copenhagen). Both women in general and people in Copenhagen originally came from a much lower level compared to men and people in less urban areas, respectively.

Older people are most likely to keep their license until high age when they live in rural areas, which can be explained with higher car dependence. As seen in other studies (e.g. Bauer, Adler, Kuskowski, & Rottunda, 2003; Siren, Hakamies-Blomqvist, & Lindeman, 2004), women tend to give up driving earlier than men.

The number of work related trips and shopping trips has increased during the 25 years period, for both older men and women. Especially women are more likely to use the car than they were 25 years ago. The trip length for both trip purposes has also increased, however, especially for men with regard to work trips and for women with regard to shopping trips. This is in line with previous literature. However, in contrast to the results from other countries (e.g. Arentze et al., 2008; Hjorthol et al., 2010), the increase in leisure trips is less pronounced in Denmark.

There was a notable gender difference in travel, both in 1981 and 2006, comparable to what has been reported by other studies (e.g., Rosenbloom, 2006; Siren, Heikkinen, & Hakamies-Blomqvist, 2001). While women in each successive cohort are catching up with men and the differences in licensing rates are about to disappear, they still travel less, especially by car as a driver.

4.1 Age, cohort and period effects

The results showed considerable changes when comparing the two periods of observation. It was possible to identify cohort, period and age effects in the changes that have taken place in the 25 years period.

The results showed a general age effect in travel patterns, i.e. the travel activities, licensing rates and car use decrease with increasing age. However, a clear cohort effect could also be identified. The younger cohorts tend to maintain their level of activities into old age. This applies to car travel, driving license holding, and number of trips.

Finally, a general period effect can also be observed with a general increase in travel activity, trip lengths and car access. The travel among older adults in Denmark has in general increased, and especially the use of car has increased. A larger proportion of these elderly has a car in the household and uses it actively.

4.2 The implications on future travel

The results suggest that the travel activities of seniors are likely to increase in future as new cohorts enter the group. Future travel will be highly influenced by the travel behaviour of the baby boomer cohort, which is just about to retire. The data used in the present study did not allow analysing the changes in baby boomers' travel patterns with increasing age, as these cohorts were under 40 years of age at 1981 (and thus not part of the study population) and still less than 60 years old at the latter observation point (in 2006).

It is still unclear if baby boomers' travel habits will change as much as those of earlier generations with retirement or if this highly car-oriented generation will keep on driving until high age. Joseph Coughlin (2009) has identified four factors that are likely to play a significant role in baby boomers' future travel pattern. These are baby boomer women's behaviour, the caregiving provided by the boomers, extended work life, and future fun and leisure activities.

There are still notable gender differences in travel among younger cohorts. It is unlikely that retirement/old age would change these as they do not only reflect differences in labour market integration. They also reflect persistent gendered, cultural meanings attached to cars and driving, as well as the qualitatively and quantitatively different driving experience women and men gain throughout their life course (cf. Hakamies-Blomqvist et al., 2005; Rosenbloom, 2007; Rosenbloom & Herbel, 2009; Siren, 2005; Siren & Hakamies-Blomqvist, 2005). It may be that also women in younger cohorts are more prone to premature driving cessation than their male counterparts.

The informal care-giving baby boomers are likely to provide may however keep these women continue driving. Previous studies have suggested that women who choose to drive tend to justify their driving with practical reasons (relating especially to family and friends) as opposed to the pleasure of driving (Rosenbloom, 2007; Siren & Hakamies-Blomqvist, 2005). Female baby boomers often provide care to both their (grand) children and their aged parents and are therefore sometimes referred to as the "sandwich generation" (Rosenbloom & Fielding, 1998, p. 91). This may influence women's car usage in their old age and may be an important factor influencing future travel.

To what extent baby boomers want to extend work life is still to be seen. On the other hand, many wish to retire in order to pursue leisure activities in the third age (and also have the economic resources to do it), but as Coughlin (ibid.) points out, many baby boomers may choose to opt for work opportunities that are not strictly 9-5. This flexibility in work arrangements would place new transportation demands on the system that traditionally serves travel occurring in the traditional "journey-to-work" hours.

The characteristics of baby boomers in terms of physical activity, education level, and economic resources will most probably have an impact on future leisure activities. While the results of this

study indicated no notable change in frequency of leisure activities, there was an increase in car use related to leisure activities. It is also likely that seniors' long distance travel will increase as the boomers age.

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