Functional disability and ability 75-year-olds: a comparison of two Swedish cohorts born 30 years apart

HANNA FALK1, LENA JOHANSSON1, SVANTE ÖSTLING1, KATJA THØGERSEN AGERHOLM2, MORTEN STAUN2, LIV HØST DØRFINGER2, INGMAR SKOOG1

1Neuropsychiatric Epidemiology, Sahlgrenska Academy at University of Gothenburg, Institute of Neuroscience and Physiology, Gothenburg, Sweden
2Department of Public Health, University of Copenhagen, Copenhagen, Denmark

Address correspondence to: H. Falk. Tel: +(46) 760476888; Email: hanna.falk@neuro.gu.se

Abstract

Objective: to compare the level of functional disability and involvement in leisure activities between two birth cohorts of Swedish 75-year-olds examined in 1976–77 and 2005–06.

Design: cohort comparison.

Setting and participants: representative data from the general population in Gothenburg, Sweden, examined at the age of 75 in 1976–77 (n = 744), and in 2005–06 (n = 731) with comprehensive somatic and psychiatric examinations.

Measurements: activities of daily living (ADL); instrumental activities of daily living (IADL); a battery of self-report measures, including involvement in leisure activities, satisfaction with home-environment, social networks and self-rated health.

Results: functional disability in ADL decreased between the cohorts (13.9 versus 5.6%, P < 0.001). Functional disability in IADL also decreased between the cohorts (33.4 versus 13.0%, P < 0.001). Combining ADL and IADL resulted in an overall decreased dependency, with the largest decrease seen in women (42.3 versus 15.1%, P < 0.001). Involvement in leisure activities increased between the cohorts. For example, the proportion going on international and domestic holiday travels increased (6.3 versus 16.2%, P < 0.001), and the proportion who independently drove their own car also increased (10.0 versus 53.0%, P < 0.001).

Conclusion: later born cohorts of 75-year-olds are less dependent in ADL and more engaged in leisure activities compared with earlier cohorts. Later born cohorts of 75-year-olds are thus better equipped to maintain a non-age-related identity compared with earlier cohorts. Our findings might serve as a reason to adopt a more positive view to ageing in a world with an increasing number of older people.

Keywords: functional disability, activities of daily living, leisure activities, cohort comparison, older people

Introduction

Life expectancy has increased by ~30 years in the western world during the last century [1–3]. However, there is much debate about the well-being of older people accompanying these additional years. Late-life activity limitations are of particular interest due to the economic costs of functional disability or dependency [3–5]. Approximately 20–30% of community-dwelling older adults report difficulty in self-care tasks (activities of daily living, ADL) and/or tasks related to household management (instrumental activities of daily living, IADL). It has been suggested that the proportion of older adults who are disabled is decreasing, while the chronological age at which the majority in a cohort suffer multiple functional impairments is increasing [2, 6–8]. Although this might reflect true differences between cohorts, age-variations within study populations and different modes of assessing the level of difficulty also needs consideration [6, 9, 10].

Disability can be alleviated by either increasing the capability of the individual or reducing the stress posed by the environment [11, 12]. For example, there is a strong relationship between the home-environment, such as bathroom modifications, and disability [13, 14]. Furthermore, disability...
can be a function of the psychosocial characteristic of the older person, e.g. perception of ‘difficulty’ [15, 16]. For most people, well-being requires more than just fulfilment of basic personal needs. Engagement in leisure activities, i.e. activities freely chosen, meaningful and enjoyable, has long been recognised as an essential component of well-being. Leisure activities have also been associated with reduced levels of functional disability in older adults, although the causality of this relation can be argued [11, 17].

In a time faced with increased life expectancy, a crucial public health issue is to prevent or postpone the onset of functional disability, since this is one of the central components fuelling cost increase. It has been proposed that secular changes resulting in improved functional ability may reduce the negative effects of a growing number of older people. Studying disability and ability in Swedish older adults has a particular relevance as the proportion of this age group is already very large compared with most other Western countries [18]. Thus, the aim of this study was to examine the level of disability and involvement in leisure activities in Swedish 75-year-olds using data from two cohorts born 30 years apart and examined in 1976–77 and 2005–06.

**Methods**

**Study participants**

The multidisciplinary H70 studies started in the 1970s with the aim to study health and health-related factors in older populations living both in the community and in institutions in Gothenburg, Sweden [19]. All samples were systematically obtained, based on birth dates, from the Swedish Population Register.

Cohort 1901–02 comprised 75-year-olds living in Gothenburg and born between 1 July 1901 and 30 June 1902 on days of the month ending with 2, 5 or 8. Of 953 people invited, 744 (response rate 78%) participated. The examinations took place 1976–77.

Cohort 1930 comprised 75-year-olds living in Gothenburg and born during 1930 on Days 3, 6, 12, 18, 21, 24 or 30 of each month. Of 1,250 selected, 10 died before they could be examined, 2 had emigrated outside Sweden, 32 could not speak Swedish and 18 could not be traced, leaving an effective sample of 1,188 individuals. Among those, 766 (response rate 64%) participated, of which 731 responded to questions about functional disability. The examinations took place 2005–06 [20].

For a more detailed description of the responders and non-responder, Supplementary data available in *Age and Ageing* online in Appendix S1.

**Measures**

Examinations were nearly identical in 1976–77 and 2005–06 and included psychiatric and physical examinations, structured health interviews, assessments of activities and functional disability, key informant interviews, examinations by physiotherapists [22, 23], extensive laboratory examinations and psychometric testing.

For a more detailed description of the measures used in this study, Supplementary data available in *Age and Ageing* online in Appendix S2.

**Data analysis**

A more detailed description of the data analysis used in this study, Supplementary data available in *Age and Ageing* online in Appendix S2.

**Results**

**Description of cohorts**

Demographic characteristics are presented in Table 1. Women outnumbered men in both cohorts. Both men and
women were more often unmarried (i.e. never married, widowed or divorced), in cohort 1901–02 compared with the 1930 cohort (49.8 versus 23.4%, \( P < 0.001 \)). The proportion that felt healthy on the day of the examination (64.1 versus 66.6%, \( P < 0.05 \)) increased between the cohorts. The proportion with more than compulsory education also increased between the cohorts (16.1 versus 45.8%, \( P < 0.001 \)). Both men and women reported to be more satisfied with their social contacts with children, neighbours and with others in the later born cohort compared with the earlier born cohort. In terms of housing, apartments were the most common type in both cohorts (77.9% in 1901–02 cohort and 54.3% in the 1930 cohort, \( P < 0.001 \)), although the proportion living in single family homes increased between the cohorts (16.6 versus 28.6%, \( P < 0.001 \)). Also, a larger proportion in the later born cohort had access to shower (9.9 versus 66.3%, \( P < 0.05 \)) compared with the earlier born cohort. However, there was no difference between the cohorts in terms of their personal satisfaction with the home-environment.

### Functional disability

The prevalence of ADL and IADL disability is presented in Table 2. Dependence in at least one ADL item according to the Katz scale decreased between the cohorts (13.9–5.6%, \( P < 0.001 \)). This change was driven by a decreased dependency in bathing (11.3–5.2%, \( P < 0.001 \)). Dependence in at least one IADL item according to Lawton’s IADL scale also decreased between the cohorts (33.4–13.0%, \( P < 0.001 \)). This change was driven by a decreased dependency in cleaning (25.0–10.3%, \( P < 0.001 \)), and transportation (18.5–11.5%, \( P < 0.001 \)). Combining the ADL/IADL items resulted in an overall decreased dependency between the cohorts (37.5–13.0%, \( P < 0.001 \)), with the largest decrease seen in women (42.3–15.1%, \( P < 0.001 \)).

### Leisure activities

Differences between the cohorts in reported leisure activities are shown in Table 3. Involvement in all studied leisure activities for men decreased between cohorts, whereas for women there were no differences except for visiting church regularly, which increased in the later born cohort.

### Table 2. Dependence in ADL and IADL

<table>
<thead>
<tr>
<th>Dependent in ADL</th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1901–02, ( n = 331 ) (%)</td>
<td>1930, ( n = 315 ) (%)</td>
<td>1901–02, ( n = 413 ) (%)</td>
<td>1930, ( n = 393 ) (%)</td>
<td>1901–02, ( n = 744 ) (%)</td>
</tr>
<tr>
<td>Cleaning</td>
<td>64 (19.3)</td>
<td>29 (9.2)**</td>
<td>121 (29.6)</td>
<td>46 (11.1)**</td>
<td>185 (25.0)</td>
</tr>
<tr>
<td>Shopping</td>
<td>17 (5.1)</td>
<td>25 (7.9)</td>
<td>52 (12.7)</td>
<td>49 (11.8)</td>
<td>69 (9.3)</td>
</tr>
<tr>
<td>Transport</td>
<td>43 (13.0)</td>
<td>28 (8.9)</td>
<td>93 (23.0)</td>
<td>56 (13.8)**</td>
<td>136 (18.5)</td>
</tr>
<tr>
<td>Cooking</td>
<td>17 (5.1)</td>
<td>22 (7.0)</td>
<td>16 (3.9)</td>
<td>26 (6.3)</td>
<td>33 (4.5)</td>
</tr>
<tr>
<td>Bathing</td>
<td>51 (15.4)</td>
<td>15 (4.8)**</td>
<td>52 (12.8)</td>
<td>23 (5.5)**</td>
<td>83 (11.3)</td>
</tr>
<tr>
<td>Dressing</td>
<td>16 (4.8)</td>
<td>12 (3.8)</td>
<td>15 (3.7)</td>
<td>17 (4.1)</td>
<td>31 (4.2)</td>
</tr>
<tr>
<td>Toileting</td>
<td>7 (2.1)</td>
<td>10 (3.2)</td>
<td>12 (2.9)</td>
<td>15 (3.6)</td>
<td>19 (2.6)</td>
</tr>
<tr>
<td>Transfer</td>
<td>3 (0.9)</td>
<td>7 (2.2)</td>
<td>6 (1.5)</td>
<td>13 (3.1)</td>
<td>9 (1.2)</td>
</tr>
<tr>
<td>Feeding</td>
<td>7 (2.1)</td>
<td>5 (1.6)</td>
<td>8 (2.0)</td>
<td>8 (1.9)</td>
<td>15 (2.1)</td>
</tr>
<tr>
<td>Any ADL</td>
<td>40 (12.1)</td>
<td>15 (4.8)**</td>
<td>63 (15.3)</td>
<td>26 (6.2)**</td>
<td>103 (13.9)</td>
</tr>
<tr>
<td>Any IADL</td>
<td>91 (27.5)</td>
<td>32 (10.2)**</td>
<td>156 (38.1)</td>
<td>63 (15.1)**</td>
<td>247 (33.4)</td>
</tr>
<tr>
<td>Any ADL/IADL</td>
<td>104 (31.4)</td>
<td>32 (10.2)**</td>
<td>174 (42.3)</td>
<td>63 (15.1)**</td>
<td>278 (37.5)</td>
</tr>
</tbody>
</table>

Pearson’s Chi-square test for differences between gender and cohorts.

**\( P < 0.001 \).  
***\( P < 0.05 \). 

### Table 3. Leisure activities

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1901–02, ( n = 331 ) (%)</td>
<td>1930, ( n = 315 ) (%)</td>
<td>1901–02, ( n = 413 ) (%)</td>
<td>1930, ( n = 393 ) (%)</td>
<td>1901–02, ( n = 744 ) (%)</td>
</tr>
<tr>
<td>International holiday travels</td>
<td>37 (11.2)</td>
<td>91 (28.6)**</td>
<td>47 (11.4)</td>
<td>125 (31.8)**</td>
<td>84 (11.3)</td>
</tr>
<tr>
<td>Domestic holiday travels</td>
<td>112 (33.8)</td>
<td>164 (52.1)**</td>
<td>180 (43.6)</td>
<td>194 (49.4)</td>
<td>292 (39.3)</td>
</tr>
<tr>
<td>International AND domestic holiday travels</td>
<td>17 (5.2)</td>
<td>52 (16.5)**</td>
<td>30 (7.3)</td>
<td>66 (16.8)**</td>
<td>47 (6.3)</td>
</tr>
<tr>
<td>Visiting church regularly</td>
<td>128 (39.3)</td>
<td>156 (59.3)**</td>
<td>233 (59.3)</td>
<td>195 (62.3)**</td>
<td>361 (50.2)</td>
</tr>
<tr>
<td>Seniors associations</td>
<td>113 (34.2)</td>
<td>145 (50.5)**</td>
<td>215 (53.6)</td>
<td>180 (51.6)</td>
<td>328 (44.9)</td>
</tr>
<tr>
<td>Driving car independently</td>
<td>65 (19.6)</td>
<td>193 (61.3)**</td>
<td>9 (2.2)</td>
<td>120 (30.3)**</td>
<td>74 (10.0)</td>
</tr>
<tr>
<td>Access to car through spouse</td>
<td>80 (24.3)</td>
<td>209 (81.4)**</td>
<td>35 (8.6)</td>
<td>187 (55.7)**</td>
<td>115 (15.6)</td>
</tr>
<tr>
<td>Listening to the radio daily</td>
<td>278 (84.2)</td>
<td>252 (93.0)**</td>
<td>332 (83.0)</td>
<td>322 (89.0)**</td>
<td>610 (83.3)</td>
</tr>
<tr>
<td>Watching TV daily</td>
<td>304 (92.0)</td>
<td>268 (98.0)**</td>
<td>373 (92.0)</td>
<td>357 (99.0)**</td>
<td>677 (92.1)</td>
</tr>
</tbody>
</table>

Pearson’s Chi-square test for differences between gender and cohorts.

**\( P < 0.001 \). 
***\( P < 0.05 \).
activities increased between the cohorts. For example, the proportion going on international holiday travels increased from 11.3% in cohort 1901–02 to 29.5% in cohort 1930 ($P < 0.001$). The proportion going on both international and domestic holiday travels increased from 6.3% in cohort 1901–02 to 16.2% in cohort 1930 ($P < 0.001$).

Visiting church regularly (50.2 versus 60.8%, $P < 0.05$) or taking part in different seniors associations or clubs (44.9 versus 51.1%, $P < 0.05$) also increased between the cohorts. The largest difference was found in the proportion who independently drove their own car, which increased from 10.0% in cohort 1901–02 to 53.0% in cohort 1930 ($P < 0.001$), with the largest increase seen among men (19.8 versus 61.3%, $P < 0.001$, followed by women 2.2 versus 35.7%, $P < 0.001$). In those having regular access to a car through their spouse, an even larger increase was noted, from 15.6% cohort 1901–02 to 67.0% in cohort 1930 ($P < 0.001$). Other leisure activities, such as listening to the radio (83.3 versus 91.0%, $P < 0.001$), and watching TV (92.1 versus 98.6%, $P < 0.001$) also increased between the cohorts.

Discussion

Our results suggest that disability in ADL/IADL has decreased and the level of engagement in valued leisure activities has increased among 75-year-olds between the 1970s and 2000s, which confirm results from other population studies in older people conducted with shorter time span between examinations [6–8, 24, 25]. Also in parallel with other studies, we found that women experienced a larger decrease in disability than men [8].

In our study, the decreased disability was driven by a decreased dependency in bathing, cleaning and transportation. Bathing disability is a powerful determinant of morbidity, mortality, and need of home help services in older people, and serves as a ‘gateway’ to accelerated disablement [8, 26, 27, 28, 29]. Bathing typically involves multiple sub-tasks, with the most common being getting into and out of the bathing position. The shift from using bath-tubs in 1976–77 to use walk-in showers in 2005–06 can be an example of a period effect that improved the ability to bathe independently in the later born cohort. Although there might be several explanations pertaining to both age and cohort trends, the finding can be used as one example of how technological and assistive design solutions might influence human functioning. Only four IADL items were comparable between the cohorts and changes were driven by a decreased dependency in cleaning. Albeit insufficient as a reflection of total IADL ability, cleaning can be regarded as a complex task, unavoidably linked to the characteristics of the home-environment and to the physical ability of the individual. Improved living standard, and extended use of home appliances that make household cleaning easier, might be one explanation for the decreased disability. Furthermore, the definition of what constitutes cleaning has changed tremendously during the last decades in Sweden.

In most places, no mode of transportation rivals the convenience of the automobile. The use of cars has increased substantially in this age group, improving the mobility of older people, permitting them to maintain a more non-age-related identity [30, 31]. Driving is a critical component of autonomy, freedom of choice, and engagement for older people, just as it is for younger people [32]. In older people, driving cessation predicts poor outcomes, such as an increased prevalence of depression and institutionalisation, even when controlling for health status [33, 34]. Thus, the evidence suggests that driving cessation itself leads to challenges in later life rather than those experiencing challenges are simply more likely to cease driving [32]. In our study, the proportion that drove independently increased from 10.0% in 1976–77 to 53.0% in 2005–06, with the largest change found among women (2.2% in 1976–77 versus 35.7% in 2005–06). One plausible explanation to this dramatic increase is that the earlier born cohort was in their 50s when automobiles became a common commodity in Sweden, whereas the later cohort was in their 20s, a time when most people get a driving license. This is also reflected by the fact that the number of registered cars in Sweden almost doubled between the years 1976–77 and 2005–06.

In this study, engagement in leisure activities was used as a measure of ability beyond basic personal needs and household tasks. We found that the proportion going on international and domestic holiday travels, listening to radio and watching television, and the proportion involved in senior and other associations increased between the cohorts. An explanation might be that socially active older people tend to be more physically active, which in turn is associated with less disability. Our findings (i.e. lower disability levels and more engagement in valued leisure activities in later born cohorts) might serve as a reason to adopt a more positive view to ageing in a world with an increasing number of older people.

Our findings should be seen in light of previous findings on birth cohort differences in these samples. The total prevalence of cardiovascular disorders decreased in both men (82.8 versus 73.9%) and women (90.8 versus 67.0%), with a larger decrease seen in women [35]. Cognitive functioning [36] improved in both cohorts, and alcohol consumption increased [37]. The prevalence of minor depression was higher in the 1930 cohort compared with the 1901–02 in both men (12.4 versus 3.7%) and women (19.1 versus 5.6%) [38].

Major strengths of this study are that it is based on general population samples examined with identical methods over a 30-year period as part of a comprehensive investigation on ageing. Most existing studies have compared older people of broader age ranges, which may provide different results depending on how the ages are distributed in those populations [7]. In addition, most estimates of functional ability among older people use relatively short time intervals between the cohorts. Although this makes it possible to investigate time-specific periods, longer intervals may provide more valid results in terms of secular trends.

There are also limitations which need to be addressed. First, although the response rate in this sample is relatively...
high, it declined from 78.0% in 1976–77 to 64.0% in 2005–06. Non-response in both cohorts was related to increased 3-year mortality, suggesting that non-responders were less healthy. The larger rate of non-response in cohort 1930 might therefore have resulted in an underestimation of functional disability in this cohort compared with the cohort born 1901–02. On the other hand, mortality was higher among non-responders in cohort 1901–02 compared with those in cohort 1930 (30 versus 16%), suggesting that non-responders in the latter cohort were healthier than non-responders in the earlier cohort. Taken together, the larger non-response in the later cohort probably led to an exaggeration of the differences in function between the cohorts, but not to an extent that would have changed the main findings.

Second, information about use of assistive devices was missing in the first examination, making comparison between the cohorts impossible. It has been argued that the access to such resources in older people influence their self-regulation of valued leisure activities, subsequently influencing their level of disability. Third, we used self-reports to estimate ADL/IADL in this study, as proxy interviews were not performed in 1976–77. Since self-ratings generally tend to be more positive than proxy reports, our results may be an underestimation of ADL/IADL disability in both cohorts. However, it has also been suggested that self-reports have high validity in relation to objective measures of functional disability [39]. Fourth, four out of eight IADL items were not used in the 1970s and could thus not be compared between cohorts. Fifth, changes in evaluations of responses over time may also have influenced the results. Finally, we were not able to differentiate between general secular changes that have occurred in all age groups, and those that have occurred only in the elderly. Compared with younger people, changes in functional ability are likely to have occurred mainly in the elderly, while international travelling and the use of cars probably have increased in all age groups. We are not able based on this study to determine whether older people are more similar to younger people in their travelling habits and driving patterns in the 2000s compared with the 1970s.

Key points

- Later born cohorts of 75-year-olds are less dependent in self-care tasks and household management compared with earlier cohorts.
- Later born cohorts of 75-year-olds are more successful in engaging in valued activities compared with earlier cohorts.
- Later born cohorts of 75-year-olds report to feel healthier compared with earlier cohorts.
- Later born cohorts of 75-year-olds report to be more satisfied with their social contacts compared with earlier cohorts.

Conflicts of interest

Funding sources had no involvement in the design, methods, subject recruitment, data collection, analysis and preparation of this manuscript or the decision to submit for publication. The corresponding author had full access to the data in this study and final responsibility for the decision to submit for publication.

Funding

This work was supported by The Swedish Research Council for Health, Working Life and Welfare (FORTE) (grant number 2013-2300 AGECAP and 2013-2496), The Swedish Research Council (grant numbers 11,267, 825-2007-7462, 825-2012-5041), EpiLife (grant number 2006-1506) and Swedish Brain Power.

Supplementary data

Supplementary data mentioned in the text is available to subscribers in Age and Ageing online.

References

Only the most important references are listed here and are represented by bold type throughout the text. The full list of references is available in the Supplementary data available in Age and Ageing online in Appendix S1.