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Education and disability trends of older Americans, 2000–2014

Yuping Tsai†
National Center for Immunization and Respiratory Diseases (NCIRD), Centers for Disease Control and Prevention (CDC), 1600 Clifton Road NE, MS A19, Atlanta, GA 30329, USA

Abstract

Background—Trends in disability among older Americans has declined since the 1980s. The study examines whether the trend continues to decline and whether educational disparities exist in the prevalence of functional limitations.

Methods—I used the 2000–2014 National Health Interview Survey and included adults aged ≥65 years. Functional limitations was measured by three outcomes: the need for help with activities of daily living (ADLs) or instrumental activities of daily living (IADLs) and physical function limitations. I used a set of logistic models to estimate the average annual change rate of functional limitations. I examined whether the annual rate of change differed by education, age group and sex.

Results—During 2000–2014, the annual increase rate of ADL limitations was 1.7% ($P < 0.001$) and was 2.0% ($P < 0.001$) for physical function limitations; IADL limitation did not change significantly. All subgroups experienced an increase in ADL and physical function limitations except for adults with a more than high school education. The lower-educated group had a higher proportion and a higher annual rate of increase in all outcomes. Increasing trends in chronic conditions may contribute to the increasing trend in functional limitations.

Conclusions—The study highlighted a large educational disparity in late-life disability among older Americans.

Keywords

education; functional limitations; older adults

Introduction

Determining the disability trend among older Americans has drawn much attention from researchers as the ≥65 population has grown considerably to 43 million in 2012, representing 14% of the US population.[1] The number is likely to continuously grow as the baby boomers started reaching 65 in 2011. To facilitate policy planning and to address the needs of the growing elderly population, it is important to assess changes in health of older

Address correspondence to Dr. Yuping Tsai, ytsai@cdc.gov.
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Yuping Tsai, Health Economist

Americans as this issue has important implications for the well-being of the elderly and for the provision of medical and long-term care.

Existing studies had looked at trends in the prevalence of functional disability (i.e. limitations in performing activities of daily living [ADLs] or instrumental activities of daily living [IADLs]) of older Americans.[2–17] The consensus was that disability trends in the US had declined from the 1980s through the early 2000s. Using updated data, recent studies had shown a different picture. Freeman *et al.* (2013) examined disability trends using five national surveys and concluded that there was no significant change in ADL or IADL limitations for the ≥65 population between 1999 and 2008.[5] Martin *et al.* (2010) used the 1997–2008 National Health Interview Survey (NHIS) and found a significant decline in IADL limitations ($P < 0.001$) but physical function limitations (e.g. having difficulty in walking for a quarter mile, climbing 10 steps, standing two hours, sitting two hours, stooping, and bending or kneeling) among those 65 and over did not change significantly.[12] Extending the data to the 2010 NHIS, Martin and Schoeni (2014) found that IADL limitations continued to decrease ($P < 0.001$) but physical function limitations significantly increased ($P < 0.01$) (no significant change in ADL limitations in both studies).[13] Overall, recent studies provided suggestive evidence that the decreasing disability trend of older Americans during the 1980s and 1990s did not continue to the 21st century.

The association between socioeconomic status and health outcomes has been well established in the literature and income and education are commonly found to be positively associated with health outcomes.[1,18,19] Most existing studies reported the overall prevalence of old-age disability. A few studies had addressed differences in functional disability by socioeconomic status. Freedman and Martin (1999) used the 1984–1996 Survey of Income and Program Participation and found that individuals with less than a high school education were at twice the risk of high school graduates for functional limitations in late life.[20] Schoeni *et al.* (2005) used the 1982–2002 NHIS and found that although disability trends among those 70 and older declined for all subgroups, the decline was the greatest for the most educated.[21] Minkler *et al.* (2006) examined the association between income and functional limitations using the Census 2000 supplementary Survey and concluded that there was a negative relationship between income and the prevalence of functional limitations among those 55 and older.[22] These studies, however, are limited in using older data years[20–22] and reporting an overall rate instead of trends.[22]

The current study used the 2000–2014 NHIS to examine the trend in functional limitations among those aged 65 and over. The paper examined four important questions: first, have functional limitations continued to decline or has the historic decline plateaued since 2000? Second, are there educational disparities in the trajectories of functional limitations? Third, do age and gender differences play a role in functional limitation trend as functional limitations were more common among the oldest age group and women? Fourth, does the prevalence of chronic conditions account for changes in functional limitations? The study added to the current literature by using the most updated data and providing in-depth investigations of the time trend in functional limitations by education. Using education as a proxy for socioeconomic status could be justified by the reasons highlighted in Freedman and Martin (1999): it is easier to measure education compared to measuring occupation or income; education is strongly associated with health-related behaviors; education is generally determined early in life and thus health outcomes in late life is less likely to affect educational attainment.[20]

Methods

Data and measures

I used data from the 2000–2014 NHIS. The NHIS is an ongoing cross-sectional survey of the civilian noninstitutionalized population of all ages in the US. In each survey year, the NHIS provides sampling weights to adjust for changes in sample designs and nonresponse; application of sampling weights generates nationally representative estimates.

The NHIS has been consistently collecting health-related information for several decades and therefore allows comparing outcomes across years. I used three outcomes to measure functional limitations—ADL limitations (i.e. because of a physical, mental, or emotional problem, do you need the help of other persons with personal care needs, such as eating, bathing, dressing, or getting around inside this home?), IADL limitations (i.e. because of a physical, mental or emotional problem, do you need the help of other persons in handling routine needs, such as everyday household chores, doing necessary business, shopping or getting around for other purposes?) and physical function limitations (i.e. the individual reported to have at least one among the nine physical function difficulties: walking for a quarter mile, climbing 10 steps, standing two hours, sitting two hours, stooping, bending or kneeling, reaching over head, grasping small objects, lift/carrying 10 pounds and pushing large objects). Information on ADL and IADL limitations was obtained from the family core questionnaire of the NHIS, which collected information on all family members. A randomly-selected adult in each family was interviewed for the sample adult file of the NHIS from which I extracted the information on physical function limitations and body weight and height. I included four chronic conditions—vision problems, diabetes, hypertension and weight problems (i.e. BMI≥30)—in the analysis as the information was consistently collected in the 2000–2014 NHIS and these conditions had a strong association with functional limitations based on my preliminary examinations of the data. I determined whether the individual had the chronic condition based on the sample adult questionnaire of the NHIS (i.e. have you ever been told by a doctor or other health professionals that you had such a condition?).

Study design

The study population included individuals participating in the NHIS sample adult survey and at least 65 years old during each of the survey years. I compared the proportion of functional limitations in the years of 2000 and 2014 and estimated the average annual rate of change in the proportion of functional limitations using a set of logistic regression models and a pooled sample of data over all years. The dependent variable in the logistic model was equal to one if the adult had a specific functional limitation and zero otherwise; the key explanatory variable is the time trend variable that took the value of zero in the year 2000 and increased by one in each of the subsequent years. The average annual rate of change was calculated as the estimated odds ratio on the time trend variable minus one and then multiplied by 100. The control variables in all regression models included age group (65–74, 74–84, and ≥85), sex (males versus females), education (less than high school, high school, and more than high school), race (white versus non-white), Hispanic origin (Hispanic versus non-Hispanic), and marital status (married, widowed and others). Subsequent analyses examined whether the average annual change rate of function limitations differed according to education, age group and sex by including an interaction term between the time trend variable and the characteristic of interest in the regression model (e.g. $Trend \times Male$). Similar analyses were conducted for chronic conditions, in which the dependent variable in the logistic model was equal to one if the adult had a specific chronic condition and zero otherwise. To examine whether and how the chronic condition affected the average annual change rate of functional limitations, I compared the average annual change rate of functional limitations obtained from the chronic condition-adjusted and nonadjusted regression models. Statistics were conducted using the Stata package (Stata 12; Stata Corporation, College Station, TX).

The study was reviewed by the Human Subjects Coordinator at CDC's National Center for Immunization and Respiratory Diseases. As an analysis of secondary data without identifiers, this study was deemed not to require ethical approval.

Results

Study population

The analysis included 89 568 individuals aged 65 and above, ranging from 4368 to 8541 per year. In each study period, the study population was predominantly women (≥60%), white (≥86%), married or widowed (≥75%), and in the 65–74 age group (≥50%). Between 2000 and 2014, the proportion of having a high school and above education increased by 17.7 percentage points [PPs] ($P < 0.001$); the proportion of diabetes increased by 7.6 PPs, 10.2 PPs for hypertension, and 7.8 PPs for weight problems; the proportion of vision problems decreased by 4.3 PPs (all changes in chronic conditions were at $P < 0.001$) (Table 1).

Functional limitations

Between 2000 and 2014, there was a significant increase in the proportion of ADL (0.9 PP, $P < 0.05$) and physical function limitations (3.2 PPs, $P < 0.001$); the average annual rate of increase was 1.7% ($P < 0.001$) for ADL and 2.0% ($P < 0.001$) for physical function limitations from 2000 to 2014; IADL limitations did not change significantly during the study period (Table 2). Trends across educational groups were notably different, with the lower-educated adults experiencing a large increase in ADL (the annual growth rate was ≥2.2%, $P < 0.001$) and physical function limitations (the annual growth rate was ≥2.1%, $P < 0.001$) over the years; the proportion of any of the three functional limitation measures was the lowest for adults with a more than high school education (Table 2). The data also showed that educational disparities in ADL limitations has been significantly widen since 2000.

Adults in the ≥85 age group had the highest proportion of functional limitations and the highest annual growth rate in functional limitations compared to other age groups. Females compared to males had a higher proportion of functional limitations and the annual rate of increase in ADL limitations was considerably greater (2.0% versus 0.9%, $P = 0.097$).

Chronic conditions

There was a decreasing trend in vision problems (the annual rate was −2.1%, $P < 0.001$) and an increasing trend in diabetes, hypertension, and weight problems (the annual rate was ≥3.3%, $P < 0.001$) (Table 3). The lowest-educated had the highest proportion and the highest annual rate of increase in diabetes and hypertension but their improvement in vision problems was the lowest. The ≥85 age group had the highest proportion and the highest annual increase rate of hypertension (4.9%, $P < 0.001$) while younger age groups had a higher proportion of diabetes and weight problems. Males compared to females had a greater annual increase rate of hypertension (4.3%, $P < 0.001$) and weight problems (3.8%, $P < 0.001$).

Functional limitations and chronic conditions

Adjusting for vision problems (i.e. a constant trend in vision problems) increased the annual rate of increase in functional limitations while adjusting for diabetes, hypertension, or weight problems reduces the annual rate of increase (the reduction was greater for the lower-educated compared to those with a more than high school education); the annual rate of increase in physical function limitations reduced considerably after adjusting for the four chronic conditions (1.2%, $P < 0.001$); adjusting for hypertension and weight problems notably reduced the annual growth rate of physical function limitation for males (Table 4).

Discussion

Main finding of this study

The study used the 2000–2014 NHIS data and showed that there was an increasing trend in ADL and physical function limitations among the ≥65 population and IADL limitation did not change significantly. There were large educational disparities in the trajectories of functional limitations in terms of a higher proportion of any of the three functional limitation measures and a higher rate of increase in functional limitations among the lowest-educated older adults. Educational disparities in ADL limitations has been widen since 2000. The increasing trends in chronic conditions among the lower-educated adults may be a key factor contributing to educational disparities in functional limitations.

What is already known on this topic

Previous studies had found a decreasing trend in disability of older Americans in the 1980s and 1990s and had offered several explanations to the declining trend, such as advanced diagnosis and treatment technology, reduction in infectious diseases, changes in healthy behaviors, and increasing use of assistive technology.[4,14,17] Studies also investigated the role of chronic conditions in late-life disability trends. Freedman *et al.* (2007) and Schoeni *et al.* (2008) documented that reductions in heart and circulatory conditions, vision impairments, and possibly arthritis played a major role in the reduction in disability among older Americans in the 1980s and 1990s.[7,14]

What this study adds

The findings in functional limitations were contrary to most existing studies that showed a decreasing or flat trend in ADL or IADL limitations, suggesting that factors that contributed to the improvement in late-life disability of older Americans may have become less important in the 21st century as these improvements mostly occurred during the early 1980s to the late 1990s. The study showed that holding the prevalence of diabetes, hypertension, or weight problems constant over time would reduce the annual rate of increase in functional limitations, suggesting that the increasing trend in these conditions explained part of the increase in functional limitations and other social determinants of health and health-related factors may play a key role in the trajectories in functional limitations.

Although aging process played a role in the health status of old adults as functional limitations were more common among the oldest age group and women (women make up a disproportionate number of disabled elderly population because they tend to live longer than men),[23,24] I found that conditions that related to lifestyle such as diabetes and weight problems were more prevalent among the younger age groups. Strategies to promote healthy lifestyle and behaviors among older Americans, such as healthy eating habits and routine physical activities, are likely to improve the increasing rate of functional limitations among older adults.

The improvement in education among older Americans was found to be a critical determinant in the reduction in late-life disability in the 1980s and 1990s.[13,20] The findings in the current study was consistent with the finding as this study showed that higher-educated older adults had a lower proportion and a smaller increase in functional limitations compared to lower-educated older adults. The study revealed that educational attainment among old adults continued to increase but highlighted the large educational disparity in late-life disability.

Educational disparities in functional limitations and chronic conditions may reflect inequalities in the social environment (e.g. living conditions and social support), access to health care, and quality of care and may reflect differences in lifestyle (e.g. inactive and lower consumption of fiber and fresh fruits), willingness to conduct risky behaviors (e.g. smoking and drinking), the life skills and knowledge regarding preventive care and medical treatments, and occupational opportunities and earning potential, which in turn would lead to different health outcomes.[18,25–27]

Individuals with a lower socioeconomic status tend to have limited access to health care and to forego or delay preventive care and medical treatments due to cost concerns.[18,25] Although older adults in the US are covered by Medicare, a greater proportion of eligible adults with a low socioeconomic status did not enroll.[28] Also, Medicare coverage is not comprehensive and many medical services and devices needed are not covered (e.g. dental care, vision care, hospital services that exceed Medicare length of stay limitations, hearing aids, and most long-term care services and supports. Medicare beneficiaries in need of walkers or wheelchairs are also required to pay a proportion of the costs). Adults with a low socioeconomic status are less likely to have the financial resources to afford the medical care needed. This study found a significant decrease in vision problems among the highest-educated, which may be due to the prevalence of eye surgeries among the highest-educated as they were most likely to afford the out-of-pocket costs associated with the surgeries.

The increasing trend in functional limitations suggested that negative contributing factors such as limited access to health care, lack of medical care knowledge, and the increasing rate of chronic conditions have dominated the positive contributing factors such as the prolonged increase in educational attainment among old adults. Strategies to reverse the increasing trend in functional limitations are needed and may be targeted at older adults with low socioeconomic background.

Limitations of this study

The findings should be interpreted in light of some limitations. First, the NHIS is survey data, which could be subject to reporting and sampling errors. Also, there were missing responses to the questions regarding educational attainment and chronic conditions. However, the nonresponse rate among those 65 and above was really low (i.e. ~1% for the education question and ~0.1% for questions regarding chronic conditions) and thus should not significantly change the results. Second, the NHIS includes community-dwelling older Americans only, which could have biased the estimates of functional limitations and chronic conditions. However, previous studies have concluded that the findings regarding disability trends would not significantly change if institutionalized older Americans were included in the sample.[5,12]

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Table 1

Characteristics of the study population, NHIS 2000 and 2014

	2000	2014
	N = 6044	*N* = 8541
	No. (%)	
Age group		
65–74 years	3183 (51.4)	4824 (56.2)[b]
75–84 years	2250 (38.2)	2615 (30.8)[b]
≥ 85 years	611 (10.4)	1102 (13.0)[b]
Sex		
Males	2270 (38.3)	3448 (40.1)[a]
Females	3774 (61.7)	5093 (59.9)[a]
Education		
Less than high school	2094 (32.1)	1743 (18.5)[b]
High school	1973 (34.0)	2539 (30.0)[b]
More than high school	1977 (33.9)	4259 (51.6)[b]
Race		
White	5158 (88.8)	6985 (85.6)[b]
Nonwhite	886 (11.2)	1556 (14.4)[b]
Hispanic origin		
Yes	562 (5.1)	768 (7.4)[b]
No	5482 (94.9)	7773 (92.6)[b]
Marital status		
Married	2470 (41.5)	3591 (42.6)
Widowed	2,580 (42.8)	2799 (33.0)[b]
Others	994 (15.7)	2151 (24.3)[b]
Chronic conditions		
Vision problems	1099 (18.0)	1211 (13.7)[b]
Diabetes	883 (15.6)	1812 (23.2)[b]
Hypertension	3221(52.8)	5413 (63.0)[b]
Weight problems (BMI≥30)	1151 (19.1)	2245 (26.9)[b]

The percentages were weighted using the NHIS sampling weights.

[a]The difference between 2000 and 2014 was statistically significant at $P < 0.05$.

[b]The difference between 2000 and 2014 was statistically significant at $P < 0.001$.

Table 2

Proportion and the average annual change rate of functional limitations by education, age group, and sex, NHIS 2000–2014

	ADL			IADL			Physical function		
	2000 %[a]	Change between 2000 and 2014 Percentage point	Annual change rate %	2000 %[a]	Change between 2000 and 2014 Percentage point	change rate %	2000 %[a]	Change between 2000 and 2014 Percentage point	Annual change rate %
All	5.0	0.9[b]	1.7**	12.6	−0.4	0.3	61.4	3.2[c]	2.0**
Education									
Less than high school	7.3	3.9[c]	2.2**[d]	18.6	3.0[b]	0.4	68.7	5.6[c]	2.5**
High school	3.6	2.5[c]	2.6**[d]	9.8	2.7[b]	0.9*[d]	59.7	6.7[c]	2.1**
More than high school (reference)	4.3	−0.4	−0.1	10.5	−1.4	−0.3	56.3	3.8[b]	1.7**
Age group									
65–74 years	3.1	0.3	1.5*	7.1	0.1	0.3	54.0	3.9[b]	2.0**[d]
75–84 years	5.8	0.5	1.5*	15	−1.7	0.1	66.2	2.2	1.7**[d]
≥85 years (reference)	11.8	4.3[b]	2.0*	33.3	−0.6	0.7	80.8	3.5	3.4**
Sex									
Males	4.2	0.3	0.9	8.9	−0.3	−0.1	54.0	3.0[b]	2.0**
Females (reference)	5.6	1.4[b]	2.0**	15.3	−0.3	0.5	66.0	3.6[c]	2.1**

The analysis included 89 568 individuals aged 65 and above. The average annual change rate was estimated using a logistic model that adjusted for age group, sex, race, Hispanic origin, education and marital status. The annual change rate by subgroup was estimated by adding an interaction term between the trend variable and the characteristic of interest in the logistic model.

* $P < 0.05$,

** $P < 0.001$.

[a] The proportion was weighted using the NHIS sampling weights.

[b] The difference between 2000 and 2014 was statistically significant at $P < 0.05$.

[c] The difference between 2000 and 2014 was statistically significant at $P < 0.001$.

[d] The difference in the annual rate relative to that of the reference group was statistically significant at $P < 0.05$.

Table 3

Proportion and the average annual change rate of chronic conditions by education, age group, and sex, NHIS 2000–2014

	Vision problems			Diabetes			Hypertension			Weight problems (BMI≥30)		
	2000 %[a]	Change between 2000 and 2014 Percentage point	Annual change rate %	2000 %[a]	Change between 2000 and 2014 Percentage point	change rate %	2000 %[a]	Change between 2000 and 2014 Percentage point	Annual change rate %	2000 %[a]	Change between 2000 and 2014 Percentage point	Annual change rate %
All	18.0	−4.3[c]	−2.1[**]	15.6	7.6[c]	3.9[**]	52.8	10.2[c]	3.5[**]	19.1	7.8[c]	3.3[**]
Education												
Less than high school	23.7	−4.7[c]	−1.8[**d]	19.3	11.3[c]	4.2[**]	57.3	12.0[c]	3.9[**d]	22.2	5.2[c]	2.3[**d]
High school	14.7	−1.8	−1.6[**d]	15.2	9.7[c]	4.1[**]	52.5	11.9[c]	3.6[**]	18.5	10.3[c]	3.7[**]
More than high school (reference)	16.0	−3.6[c]	−2.7[**]	12.5	7.1[c]	3.5[**]	48.9	11.0[c]	3.1[**]	16.8	8.8[c]	3.8[**]
Age group												
65–74 years	13.9	−1.8[b]	−0.9[*d]	16.5	8.1[c]	3.6[**]	50.5	10.0[c]	3.3[**d]	23.9	7.9[c]	3.0[**]
75–84 years	20.1	−6.4[c]	−2.9[**]	15.4	7.7[c]	4.3[**]	56.2	9.7[c]	3.2[**d]	15.5	7.9[c]	3.8[**]
≥85 years (reference)	30.5	−9.3[c]	−3.5[**]	11.8	5.5[b]	4.5[**]	51.9	15.2[c]	4.9[**]	8.4	5.7[b]	4.2[**]
Sex												
Males	16.8	−3.5[c]	−2.4[**]	17.5	8.4[c]	4.0[**]	48.5	13.0[c]	4.3[**d]	17.3	8.1[c]	3.8[**d]
Females (reference)	18.7	−4.7[c]	−1.9[**]	14.4	7.0[c]	3.8[**]	55.5	8.5[c]	2.9[**]	20.3	7.7[c]	3.0[**]

The analysis included 89 568 individuals aged 65 and above. The average annual change rate was estimated using a logistic model that adjusted for age group, sex, race, Hispanic origin, education, and marital status. The annual change rate by subgroup was estimated by adding an interaction term between the trend variable and the characteristic of interest in the logistic model.

[*] $P < 0.05$,

[**] $P < 0.001$.

[a] The proportion was weighted using the NHIS sampling weights.

[b] The difference between 2000 and 2014 was statistically significant at $P < 0.05$.

[c] The difference between 2000 and 2014 was statistically significant at $P < 0.001$.

[d] The difference in the annual rate relative to that of the reference group was statistically significant at $P < 0.05$.

Table 4

The average annual change rate of functional limitations by education, age group, and sex, NHIS 2000–2014[b]

	Average annual change rate, %				
	N = 89 568				
	Vision problems	Diabetes	Hypertension	Weight problems (BMI≥30)	Adjusting for the four chronic conditions
All					
ADL	2.2^{**}	1.1^{*}	1.4^{**}	1.6^{**}	1.6^{**}
IADL	0.8^{**}	−0.2	0.0	1.3	0.1
Physical function	2.3^{**}	1.6^{**}	1.5^{**}	1.5^{**}	1.2^{**}
Education					
ADL					
Less than high school	2.8^{**a}	1.6^{*a}	2.0^{*a}	2.2^{**a}	2.1^{**a}
High school	3.1^{**a}	2.1^{**a}	2.3^{**a}	2.4^{**a}	2.4^{**a}
More than high school (reference)	0.5	−0.5	−0.3	−0.1	0.0
IADL					
Less than high school	0.9^{*}	−0.2	0.1	0.4	0.3
High school	1.3^{*}	0.4	0.5	0.6	0.5
More than high school (reference)	0.3	−0.7	−0.6	−0.6	−0.5
Physical function					
Less than high school	2.8^{**}	1.9^{**}	1.9^{**}	2.2^{**}	1.8^{**}
High school	2.3^{**}	1.6^{**}	1.5^{**}	1.5^{**}	1.1^{**}
More than high school (reference)	2.1^{**}	1.4^{**}	1.3^{**}	1.1^{**}	1.0^{**}
Age group					
ADL					
65–74 years	1.7^{*}	1.0	1.3^{*}	1.6^{*}	1.3^{*}
75–84 years	2.1^{**}	0.9	1.3^{*}	1.4^{*}	1.4^{*}
≥85 years (reference)	3.0^{**}	1.5^{*}	1.7^{*}	1.9^{*}	2.2^{**}

	Average annual change rate, %				
	N = 89 568				
	Vision problems	**Diabetes**	**Hypertension**	**Weight problems (BMI≥30)**	**Adjusting for the four chronic conditions**
IADL					
65–74 years	0.5	−0.2	0.4	0.1	−0.2
75–84 years	0.7	−0.5	−0.2	−0.1	−0.1
≥85 years (reference)	1.6^{*}	0.3	0.3	0.6	0.9
Physical function					
65–74 years	2.1^{**a}	1.6^{**a}	1.5^{**a}	1.4^{**}	1.0^{**}
75–84 years	2.2^{**a}	1.2^{**a}	1.2^{**a}	1.2^{**}	1.1^{**}
≥85 years (reference)	4.2^{**}	3.1^{**}	2.7^{**}	3.3^{**}	3.3^{**}
Sex					
ADL					
Males	1.5^{*}	0.2	0.6	0.8	0.7
Females (reference)	2.6^{**}	1.6^{**}	1.8^{**}	1.9^{**}	2.0^{**}
IADL					
Males	0.5	−0.7	−0.5	−0.3	−0.4
Females (reference)	1.0^{**}	0.0	0.2	0.3	0.3
Physical function					
Males	2.3^{**}	1.5^{**}	1.3^{**}	1.4^{**}	1.0^{**}
Females (reference)	2.3^{**}	1.7^{**}	1.6^{**}	1.6^{**}	1.4^{**}

* $P < 0.05$,

** $P < 0.001$.

[a] The difference in the annual rate relative to that of the reference group was statistically significant at $P < 0.05$.

[b] The average annual change rate was estimated using a logistic model that adjusted for age group, sex, race, Hispanic origin, education, and marital status.

The annual change rate by subgroup was estimated by adding an interaction term of the trend variable and the characteristic of interest in the logistic model.