

Trends in the Use of Assistive Technology and Personal Care for Late-Life Disability, 1992–2001

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We describe national trends during the 1990s in late-life difficulty and assistance with self-care activities. Among older Americans living in the community and experiencing difficulty with self-care activities, assistive-technology use increased substantially whereas use of personal care declined. Using a decomposition technique, we demonstrate that these shifts in assistance toward technology account for half the decline in the number of people dependent on personal care.

Key Words: Demography, Disability, Technology

In recent years, the nation has experienced declines in the prevalence of late-life disability. Although measures vary, declines of 1% to 2% per year in one common indicator—the proportion of older people dependent on personal care in activities of daily living (ADLs)—were observed during the 1990s (Freedman et al., 2004). Such trends are of particular interest because of their implications for medical, social, and long-term-care services.

Researchers have speculated that assistive technologies have contributed to diminished dependence in late life (Freedman et al., 2004; Spillman, 2004). In this context, assistive technologies include both portable aids (e.g., canes and walkers) and environmental modifications (e.g., grab bars and ramps) used to increase, maintain, or improve a person's functional capabilities.

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Such technologies are widely used by people in late life, particularly for walking and bathing (Cornman, Freedman, & Agree, 2005). Moreover, their use is associated with improved functioning and quality of life (Agree & Freedman, 2003; Taylor & Hoenig, 2004; Verbrugge, Rennert, & Madans, 1997) and diminished reliance on personal care (Agree & Freedman, 2000; Allen, Foster, & Berg, 2001; Hoenig, Taylor, & Sloan, 2003). However, it remains unclear to what extent increases over time in assistive technology are linked to population-level declines in dependence on personal care.

In this brief report, we describe national trends during the 1990s in difficulty and forms of assistance with self-care activities in late life. We then decompose declines in the use of personal care into the contributions of population growth, population aging, trends in underlying difficulty, and shifts in forms of assistance toward assistive technology. In doing so, we illustrate the importance of assistive technology to changes over the past decade in the number of older people who are dependent on others in self-care activities.

Methods

We used the 1992–2001 Medicare Current Beneficiary Survey (MCBS; $N = 128,568$ all years combined) to assess trends for respondents ages 65 years and older living in the community. Previous research describes MCBS' strengths for disability trend analysis (Freedman et al., 2004; Freedman, Martin, & Schoeni, 2002; Waidmann & Liu, 2000): identical questions on disability and assistance, uniform field procedures, low rates of proxy response (9.3%), high response rates (85–90% initially and 95% or higher for subsequent rounds), very low rates of missing data (0.1% for difficulty and personal care items and 0.7% for devices), and sample replenishment. Sampling weights allow generation of cross-sectional estimates that are representative of the older population.

Once a year, respondents were asked a series of questions about underlying difficulty (without assistive devices or help from another person), hands-on and supervisory help from another person (including both formal and informal assistance), and the use of special equipment or

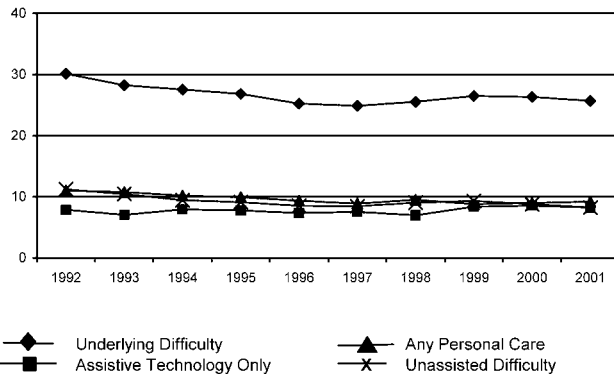


Figure 1. Age-adjusted rates of assistance with daily activities, 65 and older population, 1992–2001. (Trend is significant for underlying difficulty, $p < .05$; any personal care, $p < .01$; and unassisted difficulty, $p < .01$.)

aids for six personal care activities (walking, transferring, bathing, dressing, toileting, and eating). We classified individuals reporting underlying difficulty into three groups: those who depend on help from another person, those who independently use assistive devices (without personal care), and those who use neither form of assistance (referred to as *unassisted difficulty*).

Standardizing to the 1992 age distribution, we calculated trends in the prevalence of underlying difficulty and forms of assistance. We also presented age-stratified results (by age 65- to 79-year-olds and individuals 80 years of age or older), with groupings based on trend analyses within 5-year age groups (not shown). We calculated tests in Tables 1 and 2 on the basis of a continuous indicator for survey year that we entered into logistic regression models, pooled over all years, with controls for 5-year age groups. We adjusted standard errors by using Stata (2003) to account for the MCBS' sample design.

To calculate the contribution of four factors (growth of the population aged 65 and older, aging within this population, declines in underlying difficulty, and shifts in rates of assistance toward the independent use of assistive technology) to changes in the number of older people using personal care, we standardized and then decomposed changes in personal care according to Das Gupta (1993; p. 44). We limited this exercise to activities for which significant changes in forms of assistance occurred.

Results

Trends

Between 1992 and 2001, age-adjusted reports of underlying difficulty with self-care activities among older Americans declined from 30% to 26%, or an average of 2.1% per year (Figure 1 and Table 1). The older population also experienced significant declines in the use of personal care and in unassisted difficulty, but the independent use of assistive technology remained relatively steady (between 8% and 9%).

Among those reporting underlying difficulty with one or more ADLs, the chances of using technology without help increased significantly over time from 26% in 1992 to 32% in 2001 (Figure 2). These increases were accompanied by corresponding declines in reliance on personal care and in unassisted difficulty. In average

Table 1. Number and Percentage of Population Aged 65 and Older Reporting Difficulty With ADLs in 2001 and Average Annual Percent Change, 1992–2001

ADL	No. (in thousands) and % Reporting Difficulty in 2001	Average Annual % Change		
		65+ (Age Adjusted)	65–79	80+
Any ADL	8,378 (27.2)	-2.1**	-1.3	-3.2**
Walking	7,221 (23.4)	-1.8**	-0.9	-2.8**
Transferring	3,759 (12.2)	-2.8**	-1.9*	-3.8**
Bathing	3,319 (10.8)	-2.8**	-1.6*	-3.5**
Dressing	2,070 (6.7)	-2.4**	-0.9	-3.8**
Toileting	1,606 (5.2)	-1.6	-0.2	-2.6**
Eating	777 (2.5)	-2.1*	-1.0	-3.1**

Note: ADL = activity of daily living.
* $p < .05$; ** $p < .01$.

annual percentage terms, the independent use of technology for any ADL increased on average by 3.6% per year, whereas declines in personal care and in unassisted difficulty amounted to 1.4% and 1.9% per year, respectively (Table 2).

Distinct patterns in forms of assistance with any ADL were evident by age and activity. For the 65- to 79-year-old age group, for example, increases in the independent use of assistive technology were offset by declines in unassisted difficulty. In contrast, among the population aged 80 and older, increases in independent use of assistive technology were offset by declines of, on average, 2% per year in reliance on personal care. With respect to specific activities, forms of assistance changed significantly only for walking and bathing.

Decomposition

In 1991, 3.2 million people in the United States who were aged 65 and older were reliant on help from others in one or more self-care activities (Table 3). By 2001, the figure dropped by 151,000 to 3.1 million.

Although this decline is relatively small, it is impressive given demographic shifts during this period. Growth of the population aged 65 and older and aging within that group added, respectively, 166,000 and 281,000 older people reliant on personal care for ADLs. Had these population shifts not occurred, the decline in the number of older persons dependent on personal care would have exceeded half a million.

Declines in underlying difficulty resulted in 520,000 fewer people using personal care for any ADL. Shift toward the independent use of technology accounted for 78,000 fewer people who were reliant on personal care, a smaller but still sizeable share of the decline. If shifts in forms of assistance had not occurred, declines in personal care would have been substantially smaller, reaching only 73,000 or about half the observed decline.

The patterns for walking are similar to those for any activity. Between 1992 and 2001, the number of older people receiving help from another person to walk declined from 2.0 million to 1.9 million, a net decline of 135,000. In the absence of shifts toward technology, declines in personal care would have been substantially

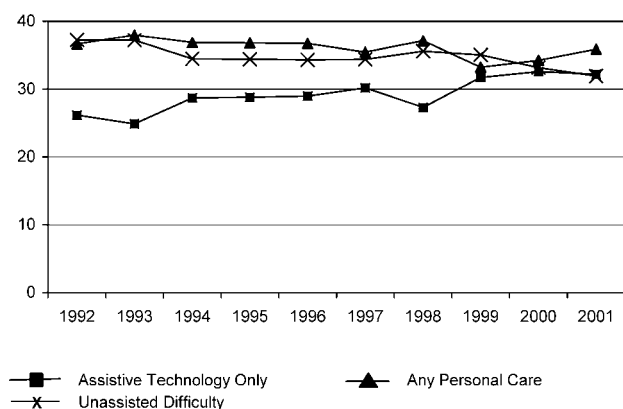


Figure 2. Age-adjusted rates of assistance with daily activities among those reporting underlying difficulty with daily activities, 65 and older population, 1992–2001. (Trend is significant for assistive technology only, $p < .01$; any personal care, $p < .05$; and unassisted difficulty, $p < .01$.)

(90%) smaller, declining by only 14,000. In contrast, declines in the use of personal care for bathing were much smaller than for walking and were driven completely by declines in underlying difficulty.

Table 2. Average Annual Percent Change in Reports of Assistance Among the Population Aged 65 and Older Reporting Difficulty with ADLs, 1992–2001

ADL	65+ (Age Adjusted)	65–79	80+
Any ADL			
Any personal care	–1.4*	–0.7	–2.0**
AT only	3.6**	4.3**	2.8**
Unassisted difficulty	–1.9**	–2.7**	–0.6
Walking			
Any personal care	–1.3	0.0	–2.6**
AT only	3.5**	3.8**	3.4**
Unassisted difficulty	–2.4**	–3.2**	–1.2
Transferring			
Any personal care	–0.6	–0.1	–1.2
AT only	1.2	1.4	1.2
Unassisted difficulty	–0.4	–0.9	0.2
Bathing			
Any personal care	–1.1	–1.2	–0.9
AT only	4.2**	4.7**	3.7**
Unassisted difficulty	–3.0*	–3.1	–3.4*
Dressing			
Any personal care	–1.0	–1.1	–0.6
AT only	3.7	5.5	–0.1
Unassisted difficulty	0.5	0.3	0.6
Toileting			
Any personal care	–1.3	–0.3	–1.9
AT only	1.8	1.3	2.2
Unassisted difficulty	–0.6	–1.2	0.0
Eating			
Any personal care	–0.9	1.4	–2.9
AT only	4.3	4.7	4.4
Unassisted difficulty	0.6	–1.7	2.7

Notes: ADL = activity of daily living; AT = assistive technology. * $p < .05$; ** $p < .01$.

Discussion

This brief report provides new insight into the contribution of assistive technology to recent declines in the use of personal care in late life. Among older Americans living in the community and experiencing difficulty in self-care activities, the independent use of technology increased substantially, offsetting the use of personal care. Shifts in forms of assistance toward the independent use of assistive technology accounted for about half of the observed decline between 1992 and 2001 in the number of older people dependent on personal care in daily activities. Assistive technology appears to be especially important for declines in dependence on personal care for walking, particularly for the population of individuals who are 80 years of age or older.

This study is limited in several respects. Many technologies that influence quality of life, such as aids for transportation, communication, and other medical, information, and household technologies, were not included. Furthermore, it was not possible for us to explore whether increases in accessible environments have furthered declines in reports of underlying difficulty. Consequently, our assessment of the role of technology in alleviating dependence on personal care is likely to be conservative. Moreover, we were unable to identify specific devices linked to declines in dependence. Other studies have documented, however, that canes, walkers, wheelchairs, bath seats, and grab bars are among the most commonly used assistive devices in late life (Agree & Freedman, 2000; Cornman et al., 2005). Finally, because this study is descriptive, we cannot conclude that expansion of assistive technology use *caused* declines in personal care. To the contrary, older individuals may increasingly turn to technological solutions if personal care is not readily available. However, at least one randomized control trial has demonstrated that the introduction of assistive technology forestalls dependence on personal care among older adults (Mann, Ottenbacher, Fraas, Tomita, & Granger, 1999).

Despite these limitations, our findings have implications for understanding the potential of assistive technologies to reduce dependence in late life. Three points are noteworthy. First, without increases in technological assistance, the nation would have experienced much more modest declines in the number of older people dependent in daily activities. This finding, coupled with several expected demographic trends—including growing numbers of elderly persons, fewer potential informal caregivers, and a relative shrinking of the long-term-care workforce (Wolf, 2001)—underscores the importance of public policies that promote access to assistive technologies as a means of enhancing independence of the older population.

Second, we note that trends toward greater use of assistive technology displaced personal care over the past decade despite very limited reimbursement for self-help items. During the study period, Medicare limited reimbursement to those technologies classified as durable medical equipment—reusable, medically necessary equipment ordered by a doctor for use in the home. This definition excluded devices that were obtained

Table 3. Components of Change Between 1992 and 2001 in Number of People Using Any Personal Care for ADLs (in thousands)

Activity	No. Using Any Personal Care		Change Between 1992 and 2001	Change Associated With:			
	1992	2001		Population Growth	Population Aging	Declines in Rate of Underlying Difficulty	Shift Toward Independent Use of AT
Any ADL	3,230	3,079	-151	166	281	-520	-78
Walking	2,028	1,893	-135	103	190	-307	-121
Bathing	2,149	2,101	-49	112	232	-439	47

Note: ADL = activity of daily living; AT = assistive technology.

outside of the medical system, designed for use outside of the home (e.g., portable wheelchairs), or used mainly to enhance functioning or safety (e.g., grab bars). Recently, Medicare changed its definition of medical necessity to include the ability to safely accomplish mobility-related ADLs (Centers for Medicare and Medicaid Services, 2005). Evaluating this policy shift may yield further insight into the benefits to society of enhanced access to assistive technologies in late life.

Finally, although clearly an important factor, assistive technology does not appear to be the *foremost* reason for recent declines in dependence on personal care. Of the four factors considered—population growth, population aging, declines in underlying difficulty, and shifts in forms of assistance—declines in underlying difficulty accounted for the greatest share of declines in dependence. Further research is needed to sort out the factors driving declines in underlying difficulty so that clinicians can devise effective strategies to forestall disability for future cohorts of older people.

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