

The Value of Service Dogs for People With Severe Ambulatory Disabilities

A Randomized Controlled Trial

Karen Allen, PhD; Jim Blascovich, PhD

Objective.—To assess the value of service dogs for people with ambulatory disabilities.

Design.—Randomized, controlled clinical trial.

Setting.—Environments of study participants.

Participants.—Forty-eight individuals with severe and chronic ambulatory disabilities requiring use of wheelchairs who were recruited from advocacy and support groups for persons with muscular dystrophy, multiple sclerosis, traumatic brain injury, and spinal cord injury. Participants were matched on age, sex, marital status, race, and the nature and severity of the disability in order to create 24 pairs. Within each pair, participants were randomly assigned to either the experimental group or a wait-list control group.

Intervention.—Experimental group members received trained service dogs 1 month after the study began, and subjects in the wait-list control group received dogs in month 13 of the study.

Main Outcome Measures.—Dependent variables evaluated were self-reported assessments of psychological well-being, internal locus of control, community integration, school attendance, part-time work status, self-esteem, marital status, living arrangements, and number of biweekly paid and unpaid assistance hours. Data collection occurred every 6 months over a 2-year period, resulting in five data collection points for all subjects.

Results.—Significant positive changes in all but two dependent measures were associated with the presence of a service dog both between and within groups ($P < .001$). Psychologically, all participants showed substantial improvements in self-esteem, internal locus of control, and psychological well-being within 6 months after receiving their service dog. Socially, all participants showed similar improvements in community integration. Demographically, all participants showed increases in school attendance and/or part-time employment. Economically, all participants showed dramatic decreases in the number of both paid and unpaid assistance hours.

Conclusions.—Trained service dogs can be highly beneficial and potentially cost-effective components of independent living for people with physical disabilities.

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THE AMERICANS With Disabilities Act exists to increase independence and enhance opportunities for individuals

with disabilities.¹ Since the passage of this act, the development of assistive technology for individuals with severe ambulatory disabilities has accelerated. Although numerous high-tech devices address many important needs of people with disabilities, such advancements leave unmet several important daily living needs, including such personal activities as hygiene, dressing, shopping,

and food preparation. Of at least equal importance, social needs, particularly those involving direct interpersonal contact and community integration, cannot be met solely by technology.

Typically, family, friends, and paid personal aides provide assistance in personal and social domains. Although the philosophy underlying the Americans With Disabilities Act rests on assumptions of the rights of individuals with disabilities to live as independently as possible in the community, the United States currently has no comprehensive national long-term care policy on affordable, home-based assistance.^{1,2} Access to paid personal assistance varies throughout the United States, with eligibility often tied to Medicaid programs. Such programs usually exclude certain disabling conditions and frequently do not offer comprehensive, round-the-clock service.³ Finally, it has been suggested that major problems in the recruitment and retention of competent, dependable personal assistants are common.⁴

People in the United States who have severe ambulatory disabilities often live in relative social isolation. Not surprisingly, researchers have reported that these individuals have lower levels of self-esteem and higher levels of depression than the general population.⁵⁻⁹ Negative attitudes, stereotypes, and stigmatization in society contribute to such seclusion.^{10,11}

Many persons have advocated the role of service dogs to help individuals with severe ambulatory disabilities meet both personal and social needs. Such dogs, specially trained for the person they assist, can often perform nearly 100 tasks. For example, service dogs can open and close doors, turn switches on and off, pull a person up from a sitting or lying down position, assist a person in and out

From the Department of Medicine, State University of New York at Buffalo (Dr Allen), and Department of Psychology, University of California, Santa Barbara (Dr Blascovich).

Reprints: Karen Allen, PhD, Department of Medicine, Millard Fillmore Hospital, 3 Gates Circle, Buffalo, NY 14209.

Table 1.—Summary Demographic and Disability Data on Matched Groups

Characteristic	Group			
	Experimental		Wait-List Control	
	Men	Women	Men	Women
Sample size	12	12	12	12
Race				
White	8	9	8	9
African American	4	3	4	3
Mean (SD) age, y	25 (1.5)	25 (1.2)	25 (1.3)	25 (1.2)
Marital status				
Married	1	3	2	2
Divorced/separated	7	3	8	4
Never married	4	6	2	6
Disability				
Spinal cord injury	7	4	7	4
Muscular dystrophy	1	1	1	1
Multiple sclerosis	2	6	2	6
Traumatic brain injury	2	1	2	1

of baths and pools, help pull on clothing, procure and pick up objects, pull wheelchairs, help with shopping, carry parcels, and drag a person to safety in case of fire or other emergency.

Much anecdotal evidence exists regarding the instrumental and emotional support service dogs provide for their owners. Furthermore, researchers have produced evidence that people without disabilities display fewer negative attitudes and feel less awkwardness and aversion toward individuals with disabilities who are accompanied by service dogs.¹²⁻¹⁵

Empirical evidence suggests the benefits of companion animals, particularly dogs, for people. For example, family companion animals can serve a social support role for people without disabilities. In one experiment, women under stress exhibited lower levels of cardiovascular reactivity and better task performance in the presence of their canine companions than in the presence of their closest women friends.¹⁶

Although the earlier study suggests that service dogs might improve the quality of life of people with disabilities, to the best of our knowledge a prospective, controlled investigation involving service dogs has not been published. The current study describes a randomized trial designed to provide key data regarding the impact of service dogs on the lives of people with disabilities and the economic impact of service dogs.

METHODS

Participants

Participation was limited to individuals who had expressed interest in a service dog and who currently required substantial personal assistance from family, friends, and paid aides. Qualifying individuals from New York, Pennsylvania,

Massachusetts, and Connecticut were contacted through advocacy or support groups (for example, the Muscular Dystrophy Association, the Multiple Sclerosis Association). Forty-eight individuals who had been wheelchair mobile for at least 2 years participated in a split-plot, factorial-designed¹⁷ clinical study. Although several disability groups were represented (Table 1), all individuals had ambulatory motor impairment, and many had additional motor and cognitive impairments including quadriplegia, large-muscle atrophy, lack of small-muscle coordination, aphasia, and problems with attention span and memory as well.

Individuals were matched on several characteristics, including age, sex, marital status, race, and the nature and severity of the disability, to create 24 pairs. Within each pair, individuals were randomly assigned to either the experimental or the wait-list control group. Participants in the former group were told that they would receive their dogs after 1 month, and those in the latter group were told they would receive their dogs after 13 months. Table 1 provides summary demographic and disability characteristics of the two matched groups.

Procedure

Individuals assigned to the experimental group received assistance dogs 1 month after the study began (in 1990), and subjects in the wait-list control group 12 months later (13 months after the study began). Data collection occurred every 6 months over a 2-year period, resulting in five data collection points for all subjects (months 0, 6, 12, 18, and 24), and all participants completed questionnaires at each collection point. Data were collected through questionnaires mailed to the participants themselves.

Advocacy group representatives initiated telephone contact as necessary to ensure questionnaire completion.

Questionnaires

At each data collection point, participants completed questionnaires designed to ascertain psychological variables, demographic status, and assistance information. Measurements of psychological variables were performed using the following standardized instruments: the Spheres of Control Scale (to assess internal locus of control),¹⁸ the Rosenberg Self-esteem Scale,¹⁹ the Affect Balance Scale (to assess psychological well-being),²⁰ and the Community Integration Questionnaire.²¹ In addition, participants completed a specialized demographic questionnaire that included questions about current marital status, educational achievements, work status, and living arrangements. Participants also provided data regarding the number of hours of paid and unpaid assistance they received.

Service Dogs

Dogs were made available to participants in this study through trainers dedicated to providing dogs to people with disabilities. All the dogs were initially raised in family environments to socialize them. The dogs then entered training designed to teach them how to provide general assistance. Following this, each dog was paired with a person with a disability and was given individualized special training to expand the dog's commands to meet the unique needs of the person to whom it was assigned and to ensure that the person with a disability learned to handle the dog effectively. The total training time for the dogs ranged from 6 to 12 months.

Scoring

The selected demographic variables used to index quality of life included student status, work status, living arrangements, and marital status. Student status and work status were scored dichotomously to distinguish regular or no school attendance and regular (≥ 4 hours per week) or no part-time work hours, respectively. The living arrangement score reflected three levels of independence in living (ie, living alone with assistance, living with one's family, living in a group home). The marital status score reflected three categories (ie, never married, married, divorced/separated). The psychosocial status questionnaires were scored according to specific instructions provided by the questionnaire authors and developers.¹⁸⁻²¹ Assistance data were tabulated from participant reports of biweekly paid hours (ie, the number of contracted paid as-

Table 2.—Frequency of Significant Dependent Variables by Month*

Variable	Month				
	0	6	12	18	24
Self-esteem score					
Experimental group	13.0 (2.1)	25.8 (1.6)	35.3 (0.6)	36.2 (0.8)	36.6 (0.7)
Control group	14.1 (1.2)	14.0 (1.2)	14.3 (1.0)	25.3 (1.2)	35.3 (0.5)
Internal locus of control score					
Experimental group	64.4 (4.3)	135.0 (5.2)	179.4 (3.7)	187.6 (3.9)	189.8 (1.8)
Control group	61.5 (2.3)	60.9 (1.9)	61.0 (1.9)	135.2 (3.8)	178.8 (3.7)
Psychological well-being score					
Experimental group	1.6 (0.5)	6.2 (0.5)	8.0 (0.3)	8.1 (0.4)	8.8 (0.4)
Control group	1.8 (0.4)	1.8 (0.4)	1.7 (0.5)	6.3 (0.5)	8.1 (0.3)
Community integration score					
Experimental group	2.3 (0.6)	15.3 (1.0)	25.3 (0.9)	26.7 (0.7)	27.2 (0.5)
Control group	2.2 (0.5)	2.3 (0.4)	2.3 (0.4)	15.7 (0.5)	25.3 (0.5)
School attendance, No. of subjects					
Experimental group	0	15	18	15	11
Control group	0	0	0	10	7
Part-time employment, No. of subjects					
Experimental group	0	9	14	21	23
Control group	0	0	0	15	17
Biweekly paid assistance hours					
Experimental group	87.9 (9.4)	47.4 (5.0)	28.0 (4.8)	20.6 (1.7)	19.6 (1.9)
Control group	83.5 (4.0)	83.5 (4.0)	84.2 (4.0)	42.1 (4.1)	21.3 (1.6)
Biweekly unpaid assistance hours					
Experimental group	38.4 (4.1)	24.5 (6.2)	14.8 (4.3)	12.8 (4.2)	12.0 (5.0)
Control group	39.8 (2.3)	39.8 (2.3)	39.8 (2.3)	22.5 (3.5)	13.4 (2.1)

*The values given are mean (SD) unless otherwise indicated. The comparisons made were performed at the same relative data points, ie, months 0, 6, and 12 for the experimental group and months 12, 18, and 24 for the wait-list control group, and are significant at $P < .001$.

sistance hours) and unpaid hours (ie, the number of biweekly volunteered hours from family members and friends).

Analytic Strategy

Parametric (analysis of variance [ANOVA]) and nonparametric (χ^2) statistical analyses using a dual analytic approach were performed as appropriate on dependent variables comparing the experimental and wait-list control groups. Although participants in the experimental and wait-list control groups were carefully matched, group was treated conservatively as a between-group factor in the ANOVAs. Thus, each split-plot ANOVA had one between-group factor with two levels, ie, experimental group and wait-list control group, and one within-group factor, month, with three levels. First, experimental and wait-list control groups were compared at the first three data collection points (months 0, 6, and 12), that is, before the service dogs were assigned to the wait-list control group. Second, the first three data collection points of the experimental group (months 0, 6, and 12) were compared with the last three data collection points of the wait-list control group (months 12, 18, and 24), that is, we compared the same relative points in time for the two groups 1 month before and 6 and 12 months after the service dogs were provided. It was expected, a priori, that a statistically significant group-by-month interaction would

emerge between the groups in the first but not the second analysis.

RESULTS

Comparisons at the First Three Data Points

These analyses revealed significant main effects for group and month ($P < .001$ for all comparisons) and significant interactions for group by month ($P < .001$ for all comparisons) for all psychosocial status variables (ie, self-esteem, psychological well-being, internal locus of control, and community integration). Similar main effects for group and month ($P < .001$) and significant interaction for group by month ($P < .001$) were found for assistance variables (paid and unpaid assistance). When we used χ^2 analyses, significant main effects for group and month ($P < .001$) and significant interactions for group by month ($P < .001$) emerged for school attendance and part-time employment, but not for marital status or living arrangement. Table 2 includes the relevant means and standard deviations for all significant dependent variables (see months 0, 6, and 12). The top panel of Figure 1 depicts the pattern of means for self-esteem. The patterns of means for psychological well-being, internal locus of control, community integration, school status, and part-time work status are all quite similar to the pattern for self-esteem. The top panel of Figure 2 depicts

the pattern of means for paid assistance hours. The pattern for unpaid assistance hours is the same as for paid assistance hours. In sum, the canine-assisted experimental group fared much better than the non-canine-assisted wait-list control group on the dependent variables after month 0.

Comparisons at the Same Relative Data Points

These analyses showed significant effects only for month for all dependent variables ($P < .001$ for all comparisons) except marital status and living arrangements, for which there were no significant effects. Table 2 includes the relevant means and standard deviations for all significant dependent variables and indicates the comparisons at the same relative data points, ie, months 0, 6, and 12 for the experimental group and months 12, 18, and 24 for the wait-list control group. The bottom panel of Figure 1 depicts the pattern of means for self-esteem, which again was the prototype pattern for all significant psychological dependent variables, as well as school and part-time work status. The bottom panel of Figure 2 depicts the pattern of means for paid assistance hours, which was also the prototype for unpaid assistance hours.

COMMENT

Substantial positive changes on most dependent measures were associated

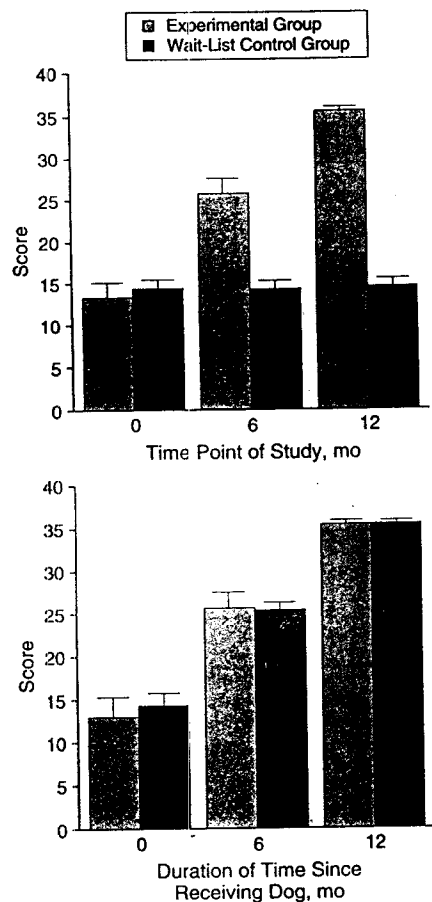


Figure 1.—Mean self-esteem scores by assignment group and selected month. The experimental group received their dogs 1 month after study initiation, and the wait-list control group received their dogs 13 months after the study began.

with the presence of a service dog both between and within groups. Psychologically, all participants showed substantial improvements in self-esteem, internal locus of control, and psychological well-being within 6 months after receiving their service dogs. Socially, all participants showed similar improvements in community integration. Demographically, participants demonstrated substantial increases in terms of school attendance and part-time employment. Economically, all participants showed dramatic decreases in the number of both paid and unpaid assistance hours.

That service dogs would improve the psychological well-being of individuals with severe disabilities was expected from the results of previous companion animal research.¹⁵ However, the community integration measure revealed several intriguing new findings based on behavioral reports demonstrating increased levels of social interaction, employment, and use of public transportation.

Although the effects for marital status and living arrangement were not

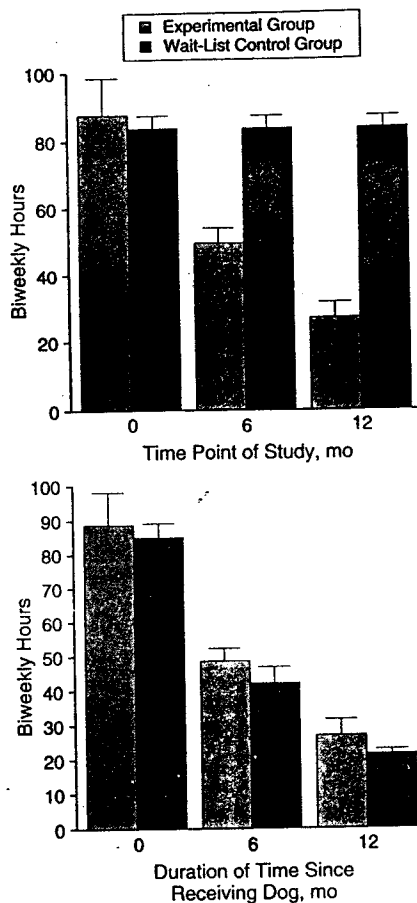


Figure 2.—Mean biweekly paid assistance hours by assignment group and selected month. The experimental group received their dogs 1 month after study initiation, and the wait-list control group received their dogs 13 months after the study began.

significant, there were improvement trends in both categories. After receiving their dogs, five participants who were separated or divorced were reconciled with their spouses. In addition, another divorced individual remarried after receiving a dog. To date, no participants who were married before receiving their service dogs have become separated or divorced. Although only five participants moved to more independent living arrangements after receiving a dog, and none to less independent arrangements, we learned that others had tried to increase their independence but failed due to specific group home policies prohibiting dogs.

Somewhat unexpectedly, reports of paid and unpaid assistance demonstrated dramatic economic benefits of service dogs. After 12 months, the presence of a service dog was associated with a decrease of approximately 60 (68%) biweekly paid assistance hours in the experimental group. Table 3 contrasts estimated cost data for individuals with and without service dogs based on sev-

eral assumptions: total calculated costs of initial canine training at \$10 000²²; lost investment income on initial training costs at 5% per annum compounded quarterly; \$1000 per year in animal maintenance²³; an expected canine service period of 8 years²²; and \$8, \$10, and \$12 per hour for paid human assistance. As Table 4 depicts, actual savings begin to accrue during the second year and increase to \$60 000 or more after 8 years as a function of human assistance costs per hour. In addition to dollar savings, the presence of a service dog was also associated with a decrease of approximately 25 (64%) biweekly unpaid assistance hours, thereby diminishing a substantial time and economic burden for family and friends who were caregivers.^{24,25} Figure 3 illustrates the relationship between various reduction percentages of paid assistance and total cost savings over an 8-year period.

According to the World Institute on Disability, more than 3.8 million people in the United States need personal assistance services, but fewer than 850 000 are actually receiving them.² Estimates from other national surveys suggest that between 2.7 million²⁶ and 4.3 million²⁷ people require some assistance from another person. Although currently available national survey data tell us little about the subset of people who have the level of need that warrants a paid assistant, the need may be substantial, and it has been suggested⁴ that dependable, competent assistants are difficult to find.

The extent to which the results of this study can be generalized to the entire group of individuals who require some degree of personal assistance remains to be determined because of the nature of our sample. Our participants were selected with the help of advocacy and support groups for each of the disability types included in the study, and little is known about possible differences between people who tend to join such groups and those who do not. We deliberately selected individuals for our study who wanted a service dog and had severe, chronic conditions requiring many hours of caregiving. We have demonstrated what dogs can do for such a group. We can only speculate that individuals with fewer needs would also find service dogs beneficial albeit with less, though perhaps substantial, savings.

Because it is not possible to conduct a masked investigation of the benefits of service dogs, we cannot completely rule out the contribution of participant expectations or demand characteristics to the results of this study. Regarding the former, the experimental treatment in

Table 3.—Long-term Reduction in Paid Assistance Due to Service Dogs*

Year	Quarter	Paid Human Assistance, h/wk	\$8/h, \$	\$10/h, \$	\$12/h, \$	Training, \$	Upkeep, \$	Discounted Total		
								\$8/h, \$	\$10/h, \$	\$12/h, \$
No Service Dog										
1	1	44	352	440	528	...	...	...	...	...
	2	44	348	435	522	...	...	...	...	...
	3	44	344	429	515	...	...	...	...	...
	4	44	339	424	509	...	...	...	...	...
2		2288	17432	21790	26149	...	...	...	...	...
3		2288	16602	20753	24903	...	...	...	...	...
4		2288	15812	19765	23718	...	...	...	...	...
5		2288	15059	18823	22588	...	...	...	...	...
6		2288	14342	17927	21512	...	...	...	...	...
7		2288	13659	17073	20488	...	...	...	...	...
8		2288	13008	16260	19512	...	...	...	...	...
Total		...	107297	134119	160944	...	...	...	...	...
Service Dog										
1	1	44	352	440	528	10000	250	10602	10690	10778
	2	34	269	336	403	...	247	516	583	650
	3	24	187	234	281	...	244	431	478	525
	4	14	108	135	162	...	241	349	376	403
2		728	5547	6933	8320	...	952	6499	7886	9272
3		728	5283	6603	7924	...	907	6190	7510	8831
4		728	5031	6289	7546	...	864	5895	7153	8410
5		728	4791	5989	7187	...	823	5614	6812	8010
6		728	4563	5704	6845	...	784	5347	6488	7628
7		728	4346	5432	6519	...	746	5092	6179	7265
8		728	4139	5174	6209	...	711	4850	5884	6919
Total		...	...	...	...	...	...	51385	60039	68691

*These calculations are based on a reduction of 68% in costs per week of paid assistance in the service dog group and a discount rate of 5%. Ellipses indicate not applicable.

Table 4.—Long-term Reduction in Paid Assistance Due to Service Dogs*

Year	Annual and Cumulative Discounted Savings					
	\$8/h, \$		\$10/h, \$		\$12/h, \$	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
1	(10515)	(10515)	(10399)	(10399)	(10282)	(10282)
2	10933	418	13905	3506	16876	6594
3	10413	10831	13243	16749	16073	22667
4	9917	20747	12612	29361	15307	37974
5	9445	30192	12011	41372	14578	52552
6	8995	39187	11439	52812	13884	66436
7	8567	47754	10895	63706	13223	79659
8	8159	55912	10376	74082	12593	92252
Total	55912	...	74082	...	92252	...

*These calculations are based on a reduction of 68% in costs per week of paid assistance in the service dog group and a discount rate of 5%. Ellipses indicate not applicable.

our study necessarily included subject expectations as well as certain other factors inherent in the service dog-participant pairing process and the specialized training during which participants became acquainted with their dogs. In addition, because participants were selected from advocacy groups, it is possible that responses were somewhat biased for the purpose of promoting policy changes related to service dogs. We believe, however, that the primary or major aspect of the treatment was in fact the assistance provided by the dog. Several factors support this belief. First, whatever expectations existed did not appear to affect the wait-list control

group prior to their acquisition of a dog, even though they had been accepted into the program. Second, third-party judgments based on written comments collected every 6 months corroborated the well-being and functionality of the participants before and after they received the dog. These judgments from family members and friends of the participants were consistent with the participant self-report measures. Although it is possible that subjects in the control group "put off" improving their own well-being and functionality until they received their service dogs (ie, for an entire year) it is, in our opinion, unlikely. Furthermore, even if they had, this argument is irrel-

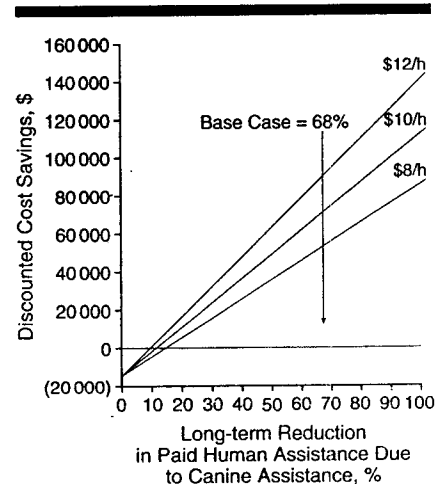


Figure 3.—Cost savings of service dogs by reduction in paid assistance at several levels of hourly wage and based on a discount rate of 5%.

evant to the comparisons between month 0, when no one had received a dog, and month 6 after receiving a dog.

Several factors reduce the possibility of demand characteristics. First, participants knew the dog was theirs to keep no matter what. Second, they were told that they could drop out of the study at any time, with no changes in the medical and social services they were receiv-

ing. Thus, there was little personal incentive for participants to provide "good" data. Furthermore, in our opinion, the enthusiasm with which participants and their friends and family members described experiences with the dogs was too overwhelming and enduring to be anything but genuine. Finally, we believe that the longitudinal nature of the design supports our contention that the results were directly related to the pres-

ence of the service dogs.

Although this study demonstrates the utility and potential cost-effectiveness of service dogs, dogs can be only part of a comprehensive plan for long-term home assistance. Although all of our participants were able to reduce the number of paid and unpaid hours of required human assistance, they still need some human help daily. We suggest that service dogs are an economically sound and

efficacious option for people who want canine assistance. In times of heated political debate regarding health care costs, the comment of one of our participants, who lives with the consequences of spinal cord injury, provides an insight: "With my [dog], I feel safe and capable, and I am no longer afraid of the future. Everyone needs someone to care for, and we care for each other with dignity."

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