



## The impact of assistive technology device use on the social participation levels of older adults

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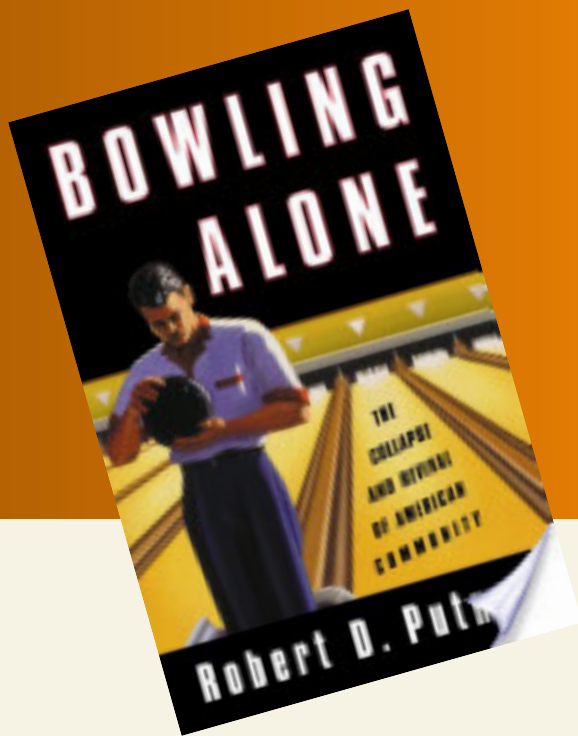
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# The Importance of Participation - Social Capital



America built on associations (Tocqueville, 1835)

Interaction brings norms of reciprocity and mutual benefit (Coleman, 1988; Putnam, 2000)

Positive health benefits to individuals through diffusion of information and peer support.

Social Capital is gained through changes in relationships that affect behavior (Perkins & Long, 2002)....

....but this requires that people are functionally able to do so.

# Paradox of Unmet Needs in the U.S.

- ❖ Those needing help with ADLs increases significantly with age:

	65+	85+
Bathing	6% /	24%
Toileting	3% /	11%
Walking	17% /	46%
Dressing	5% /	15%
Eating	2% /	6%



- ❖ Availability of informal caregivers (age 45-64) will decline:

Year:	2010	-	7.2	/	1
	2030	-	4.0	/	1
	2050	-	3.0	/	1



## Unmet needs due to functional limitations could lead to...

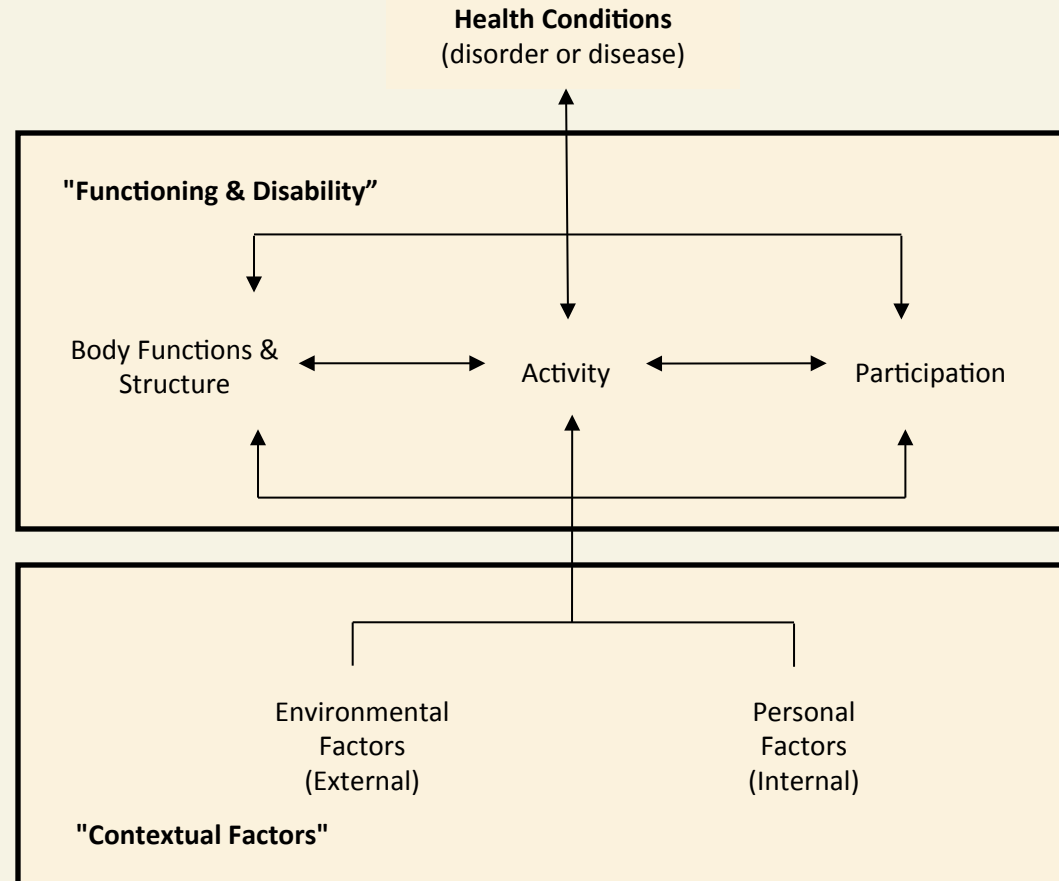
- ❖ Disability
- ❖ Loss of Independence
- ❖ Social Isolation/Loss of Social Capital

All of which decrease quality of life and may add to public and private expenditure for health and long-term care.

# ICF Framework

## Two interactive domains in a Biopsychosocial Model of Disability

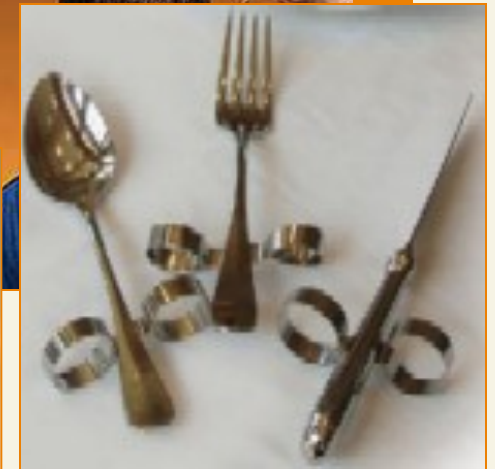
- ❖ *“Functioning”* is all bodily functions and structures, and *“Disability”* is impairment of function and limitation on activities
- ❖ *“Contextual factors”* are personal or environmental factors which can help or hinder functioning



# Assistive Technology Devices (ATD) Defined

Tools that help a person with limitations to perform physical activity that might otherwise be impossible.

- ❖ Mobility devices
- ❖ Sensory devices
- ❖ Devices to assist with ADLs



# Research Question

Does the use of Assistive Technology Devices, designed to reduce functional limitation, translate to a greater probability of social participation, which is particularly important to aging adults?



# Hypotheses



- ❖ H1: The use of mobility devices has a positive impact on the likelihood of participation.
- ❖ H2: The use of sensory devices has a positive impact on the likelihood of participation.
- ❖ H3: The use of devices to aid with ADLs has a positive impact on the likelihood of participation.



# Methodology - Data & Empirical Analyses

- ❖ National Health & Aging Trends Study (NHATS) in two waves (2011-2012); balanced panel  $n = 12,110$
- ❖ Three subsamples to include only those with each type of impairment (mobility, sensory, ADLs)
- ❖ Five separate logistic regression models; one for each type of participation within each subsample

$$\Pr(Part_{it}=1 | \mathbf{x}_{it}) = \Phi (\beta_1 ATD_{it} + \beta_2 Barrier_{it} + \beta_3 Interest_{it} + \beta_4 Environ_{it} + \beta_5 SocSup_{it} + \beta_5 ADL_{it})$$

# Methodology - Variables

## Dependent Variable - Participation ( $Part_{it}$ )

In the last month did you...

- ❖ Visit family & friends
- ❖ Attend religious services
- ❖ Attend club meetings
- ❖ Go out for enjoyment
- ❖ Volunteer

## Key Explanatory Variables - ATD Use ( $ATD_{it}$ )

In the last month did you use...

- ❖ Mobility device (cane, walker, wheelchair, scooter)
- ❖ Sensory device (hearing or vision)
- ❖ ADL assist device (dressing, bathing, toileting, eating)

# Methodology - Variables

## Other Control Variables –

- ❖ ( $Barrier_{it}$ ) health and transportation barriers
- ❖ ( $Interest_{it}$ ) measures which gauge interest in activity
- ❖ ( $Environ_{it}$ ) age, gender, race, education, income, home ownership, physical and cognitive health
- ❖ ( $SocSup_{it}$ ) marital status, children, hours of caregiving, perceptions of community, social network
- ❖ ( $ADL_{it}$ ) measure of whether one has ADL limitations

# Results – Descriptive statistics key variables

TABLE 1.1 Descriptive statistics for outcome variables  
full sample of individuals in wave 1, remaining in wave 2

	Wave 1		Wave 2		Diff.	Signif
	%	n	%	n		
<b>Participate in Activity (%) (Part)</b>						
Visits Family & Friends	86.3	6,051	87.3	6,049	1.0	
Attends Religious Services	59.8	6,053	58.2	6,046	(1.6)	
Join Clubs/Attend Meetings	36.8	6,052	36.9	6,046	0.1	
Goes Out for Enjoyment	75.0	6,051	75.3	6,052	0.3	
Does Volunteer Work	24.6	6,052	23.0	6,050	(1.6)	*

Notes: Data Source: National Health & Aging Trends Study, Waves 1 & 2, 2011-2012

\*p < .05, \*\*p < .01, \*\*\*p < .001

Little change in participation from wave to wave.  
Significant increase in the use of mobility devices,  
particularly walkers and wheelchairs and bathing and  
toileting devices.

TABLE 1.2 Descriptive statistics for key explanatory variables  
full sample of individuals in wave 1, remaining in wave 2

	Wave 1		Wave 2		Diff.	Signif
	%	n	%	n		
<b>Use Assistive Device (%) (ATD)</b>						
Any Mobility Device	29.0	6,052	32.3	6,055	3.3	***
Cane	20.5	6,055	21.0	6,054	0.5	
Walker	14.0	6,055	16.4	6,055	2.4	***
Wheelchair	7.0	6,055	8.1	6,055	1.1	*
Scooter	2.5	6,055	2.5	6,055	0.0	
Any Hearing Device	13.7	6,037	14.6	6,036	0.9	
Any Vision Device	94.1	6,014	93.4	5,994	(0.7)	
Any Eating Device	0.8	6,052	0.8	6,042	0.0	
Any Bathing Device	39.3	6,038	42.3	6,038	7.0	**
Any Toileting Device	42.9	6,040	46.4	6,036	3.5	***
Any Dressing Device	3.4	6,052	3.6	6,050	0.2	

Notes: Data Source: National Health & Aging Trends Study, Waves 1 & 2, 2011-2012

\*p < .05, \*\*p < .01, \*\*\*p < .001

# Results – Logistic regression analyses

TABLE 1.3 Logistic regression with random effects: Average marginal effects of device use on the probability of participation for those with limitations

	Participation Activity				
	Visit	Rel. Serv.	Join Clubs	Out Enjoy	Volun.
<b>Uses Assistive Device (ATD)</b>					
Cane	-0.002	0.020	0.010	-0.017	-0.014
Walker	0.002	-0.055 ***	-0.044 **	-0.001	-0.020 *
Wheelchair	-0.007	-0.044 *	-0.022	-0.035	-0.023
Scooter	-0.029	0.037	0.050 *	0.025	0.030
# Observations	4,535	4,536	4,542	4,540	4,546
Any Vision Device	0.004	0.019	-0.013	0.051 *	0.020
Any Hearing Device	0.014	0.030 **	0.031 **	0.021	0.056 ***
# Observations	10,549	10,549	10,556	10,556	10,562
Any Eating Device	-0.033	0.020	0.007	-0.060	-0.138 *
Any Bathing Device	0.017 *	0.028 *	0.021 *	0.012	0.023 *
Any Toileting Device	0.019	-0.027	0.016	0.004	0.036 *
Any Dressing Device	0.028	-0.013	-0.030	0.010	-0.021
# Observations	5,740	5,745	5,745	5,748	5,753

\*p < .05, \*\*p < .01, \*\*\*p < .001

- ❖ Little evidence that ATD use affects socializing with family or friends or going out for enjoyment.
- ❖ Mobility device significant impact is generally negative.
- ❖ Hearing aids show consistently positive and significant results for three activities. But vision devices have only mildly significant impact on going out for enjoyment.
- ❖ Current use of bathing devices has positive effect on the greatest number of activities.

## Results – Other significant covariates

- ❖  $Barrier_{it}$  - Decreased probability, all groups, most activities
- ❖  $Interest_{it}$  - Increased probability, all groups, all activities
- ❖  $Environ_{it}$  - Decreased probability if **male**,  
**race** other than white (except rel. serv.)  
Increased probability: **residential care** (rel, clubs),  
**education**, and **good health**,  
but **not dementia**

## Results – Other significant covariates

- ❖  $SocSup_{it}$  - Increased probability if **2 + children** (visit or going out) and **positive perceptions of community**  
Decreased probability if **no one to talk to do** (visit, or go out)
- ❖  $ADL_{it}$  - Decreased probability if **other physical limitations** (particularly join clubs and volunteer).

# Implications - Different Policy Messages

## Mobility Devices Discourage Participation



- ❖ Reminder of diminished ability
- ❖ Symbol of handicap
- ❖ Social stigma



- Reminder of capability
- Symbol of accessibility
- Social acceptance

## Hearing Devices Encourage Participation

- ❖ Despite the importance of hearing aids, only 1 in 5 older people with hearing loss seek assistance
- ❖ Encourage use through public funding
- Medicare does not cover routine hearing exams or hearing aids.





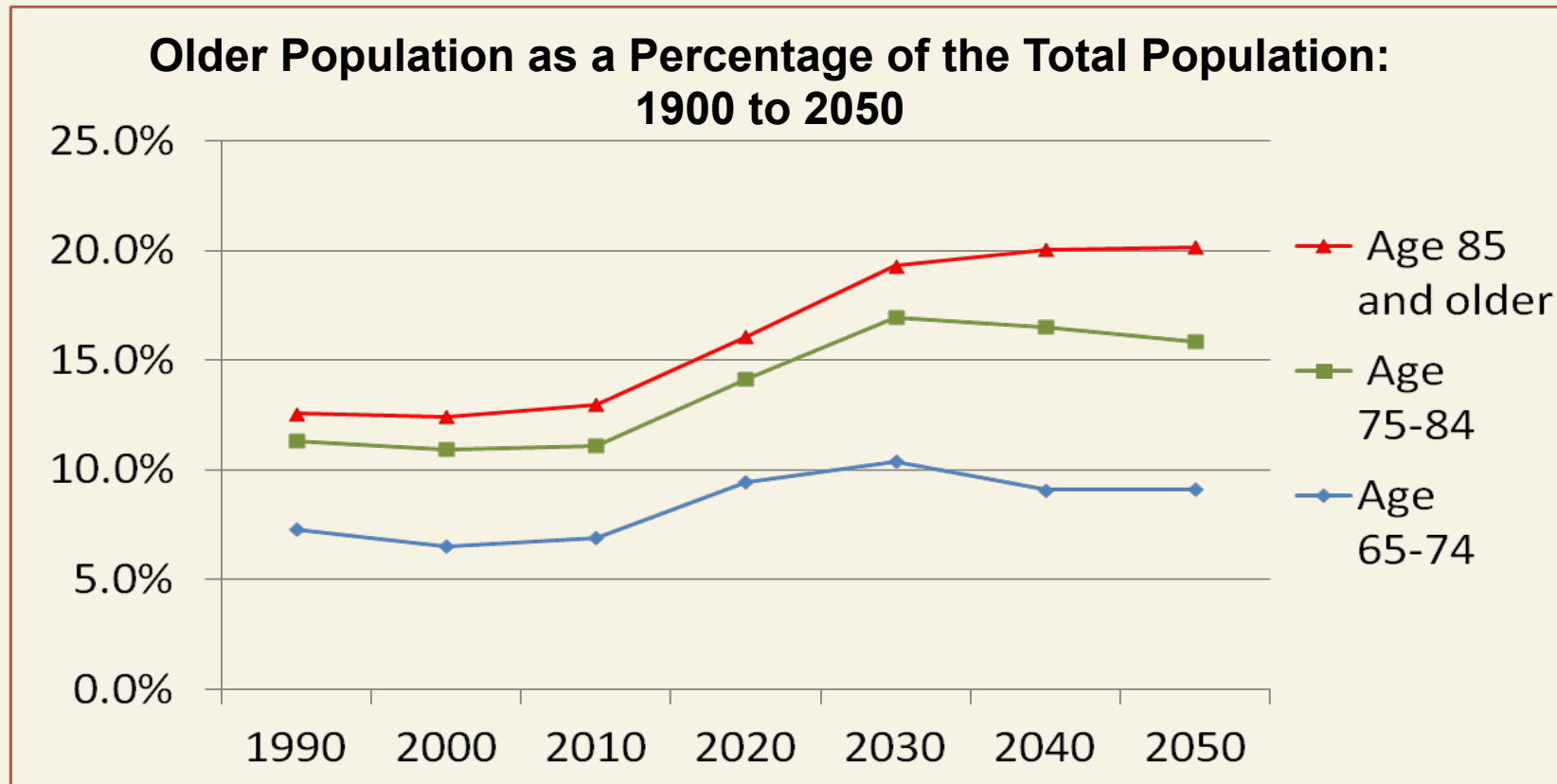
Questions?  
Comments?

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# Introduction – Demographic Statistics

- ❖ Aging baby boomers will continue to change demographics of U.S. population





## The WHO Int'l Classification of Functioning, Disability & Health

- ❖ A biopsychosocial model that synthesizes medical and social models of disability
- ❖ Distinguishes the inability to function without assistance from “disability”

The aim of rehabilitation should be to maximize function and minimize limitation of activity and restriction on participation.

## ATDs Benefit Chain



- ❖ Alleviate difficulty in functioning by improving one's capacity to perform (Cornman, Freedman & Agree, 2005).
- ❖ Enable a person to participate (Scherer et al., 2005) and engage within the community, building Social Capital and networks.
- ❖ Improve individual health and foster a smooth, efficient economy.
- ❖ Lead to reduced health and long-term care costs.

# Results – First difference analyses

TABLE 1.5 First difference models: Effects of a change in device use on the change in participation for those with limitations

	Participation Activity				
	Visit	Rel. Serv.	Join Clubs	Out Enjoy	Volun.
<b>Uses Assistive Device (ATD)</b>					
Cane	-0.008	-0.017	-0.019	-0.008	-0.032 *
Walker	0.044	-0.056 *	-0.047 *	0.018	-0.019
Wheelchair	-0.014	-0.060 *	-0.030	-0.043	-0.001
Scooter	-0.062	0.053	0.085 *	0.088	0.070 *
# Observations	2,116	2,119	2,124	2,124	2,128
Any Vision Device	-0.039	-0.037	0.004	0.081 *	0.015
Any Hearing Device	-0.008	0.022	-0.042	0.043	0.004
# Observations	4,929	4,926	4,934	4,934	4,940
Any Eating Device	-0.056	0.036	0.042	-0.051	-0.052
Any Bathing Device	0.010	-0.018	0.010	0.003	0.021
Any Toileting Device	0.002	0.029	-0.011	-0.006	0.023
Any Dressing Device	-0.002	-0.052 *	-0.001	-0.008	-0.030
# Observation	2,708	2,712	2,712	2,714	2,718

\*p < .05, \*\*p < .01, \*\*\*p < .001

To examine a correlation in the dynamic nature of device use and probability of participation

- ❖ A change in mobility device use retains negative impact.
- ❖ Hearing aid use loses significance and in some cases its positive impact. A change in vision device use has mild impact only on going out for enjoyment.
- ❖ Bathing device use has no effect on a change in performing activities.

# Results – Bivariate comparisons

TABLE 1.3 Difference in participation rates with and without device use subsample of those in need of device only

		Used device	Did not use device	Diff	Sig.		Used device	Did not use device	Diff	Sig.	
Mobility Aid n ≈ 5,148	Visits Family & Friends	79.0	84.2	(5.2)	***	Eating Device n ≈ 762	Visits Family & Friends	70.2	75.4	(5.2)	
	Attends Religious Services	49.8	58.6	(8.8)	***		Attends Religious Services	49.5	42.5	7.0	
	Join Clubs/Attend Meetings	27.2	28.9	(1.7)			Join Clubs/Attend Meetings	23.2	18.3	4.9	
	Goes Out for Enjoyment	59.8	71.4	(11.6)	***		Goes Out for Enjoyment	48.4	47.2	1.2	
	Does Volunteer Work	11.1	20.4	(9.3)	***		Does Volunteer Work	6.4	9.1	(2.7)	
Vision Aid n ≈ 11,423	Visits Family & Friends	87.1	72.0	15.1	***	Bathing Aid n ≈ 2,022	Visits Family & Friends	79.0	75.8	3.2	
	Attends Religious Services	59.6	43.7	15.9	***		Attends Religious Services	47.3	41.1	6.2	**
	Join Clubs/Attend Meetings	37.6	15.5	22.1	***		Join Clubs/Attend Meetings	22.1	19.0	3.1	
	Goes Out for Enjoyment	76.3	38.1	38.2	***		Goes Out for Enjoyment	56.6	49.6	7.0	**
	Does Volunteer Work	24.4	4.8	19.6	***		Does Volunteer Work	7.7	6.9	0.8	
Hearing Aid n ≈ 2,921	Visits Family & Friends	88.6	77.3	11.3	***	Toileting Aid n ≈ 5,620	Visits Family & Friends	84.8	75.4	9.4	***
	Attends Religious Services	61.5	48.8	12.7	***		Attends Religious Services	56.3	49.0	7.3	*
	Join Clubs/Attend Meetings	44.1	23.2	20.9	***		Join Clubs/Attend Meetings	34.8	24.0	10.8	***
	Goes Out for Enjoyment	79.6	60.2	19.4	***		Goes Out for Enjoyment	69.9	60.7	9.2	**
	Does Volunteer Work	27.7	15.2	12.5	***		Does Volunteer Work	20.9	13.5	7.4	**
						Dressing Aid n ≈ 2,387	Visits Family & Friends	84.7	78.3	6.4	**
					Attends Religious Services		50.8	48.4	2.4		
					Join Clubs/Attend Meetings		26.5	22.5	4.0		
					Goes Out for Enjoyment		64.6	56.4	8.2	**	
					Does Volunteer Work		13.6	9.0	4.6	**	

\* p < .05, \*\* p < .01, \*\*\*p < .001