

ACTIVE Distal Outcome Measures for Far Transfer

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Advanced Psychometrics Workshop

Friday Harbor, WA

June 10, 2014

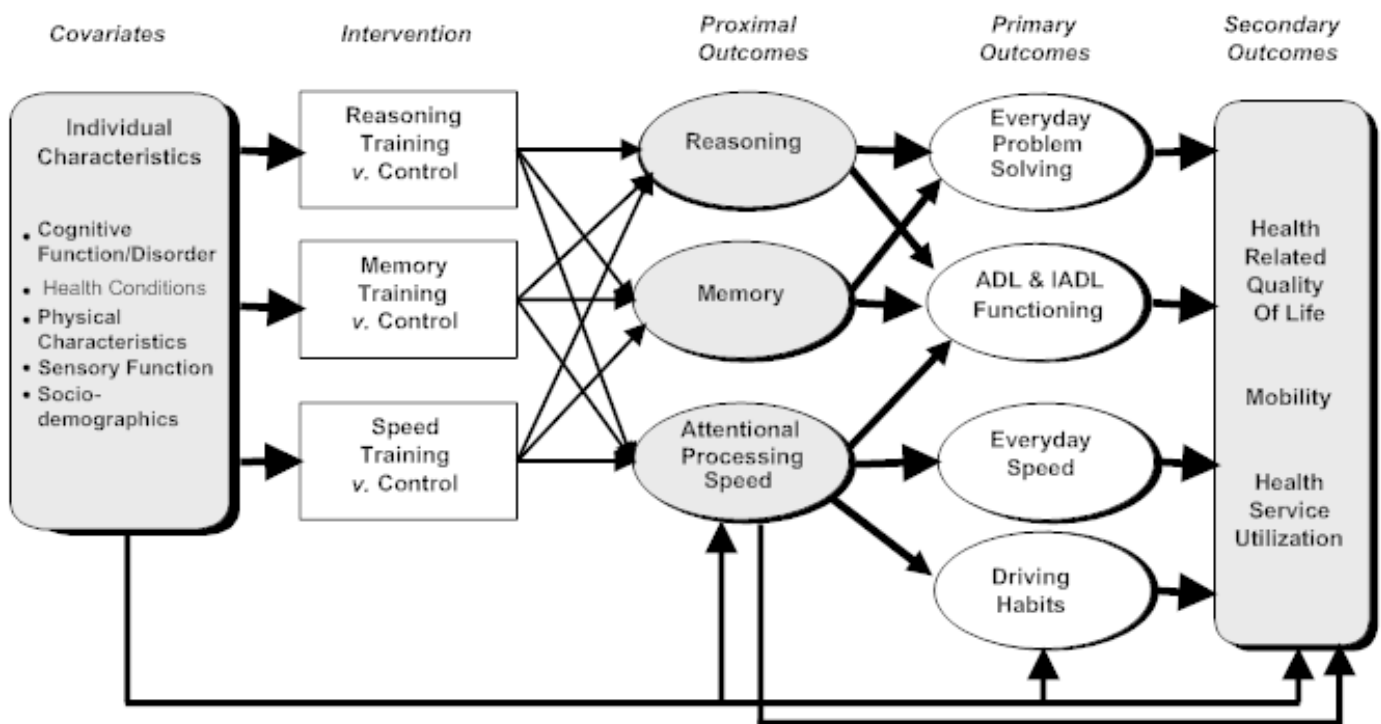
<http://goo.gl/qnP7d4>

Acknowledgements

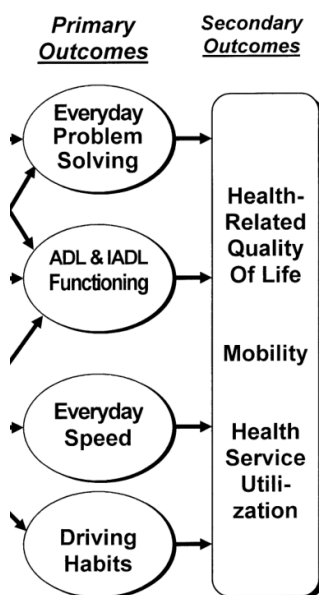
- Funded in part by Grant R13 AG030995 from the National Institute on Aging
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Friday Harbor Psychometrics 2014

Figure B.1 Conceptual Model



Primary Outcomes



Everyday problem solving

Everyday Problems Test (EPT)

Involves 2 questions each about 14 everyday items

Willis, S., & Marsiske, M. (1993). Manual for the Everyday Problems Test. University Park, PA: Pennsylvania State University.

Form 617, all time, varname = ept (total score)

At the top of the page is a recipe for Sour Milk Biscuits. Read Question A "Which ingredient is mixed with the sour milk?" Find the answer to the question in the recipe.

SOUR MILK BISCUITS

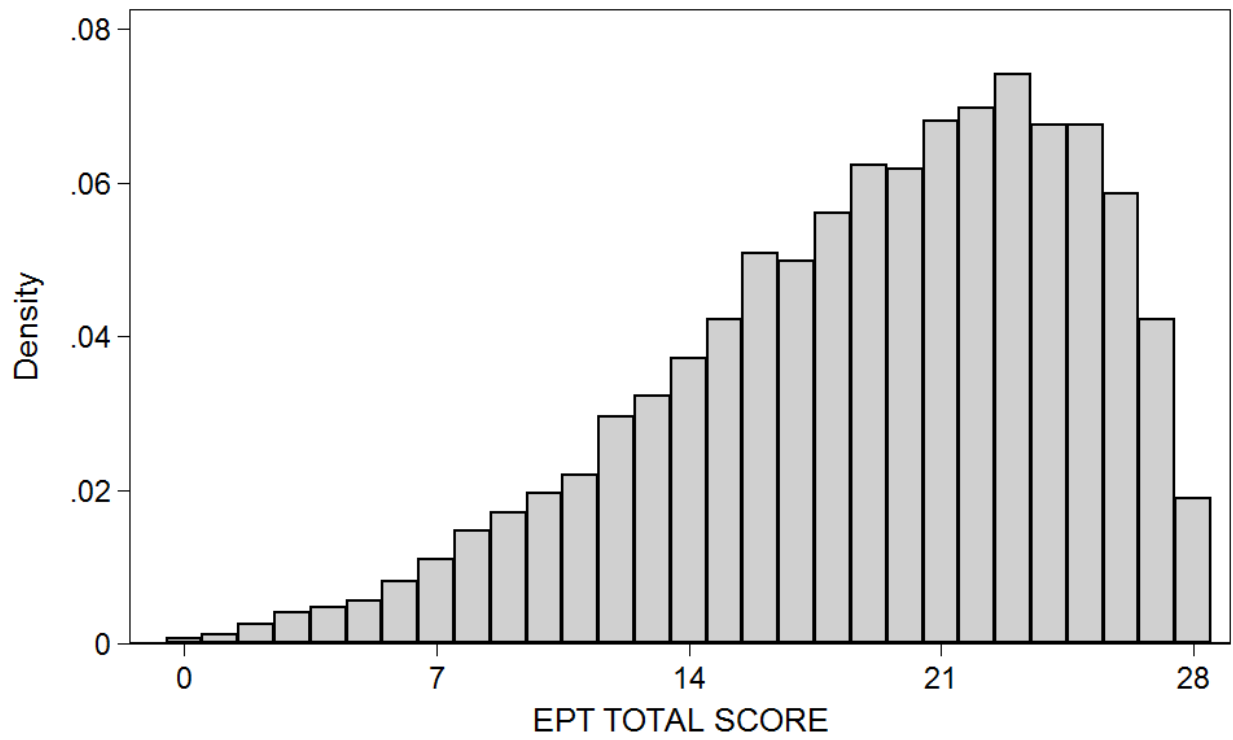
2 cups flour	2 tablespoons shortening
3 teaspoons baking powder	1/2 teaspoons soda
1 teaspoon salt	3/4 cup sour milk

Sift flour, baking powder, and salt together. Rub in shortening with finger tips. Mix soda and sour milk. Add slowly to first mixture and mix to a soft dough. Roll out on slightly floured board to 1/2 inch thickness. Cut with a biscuit cutter. Bake in quick oven (450 degrees F) 10 to 15 minutes.

Yield: 12 biscuits

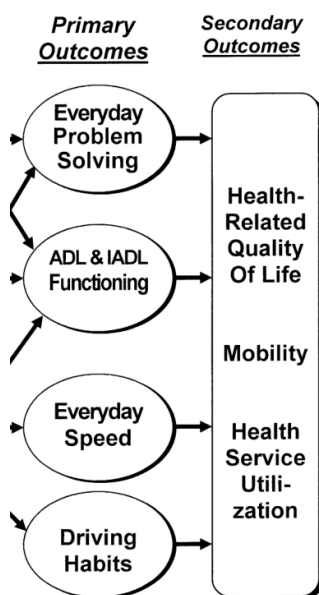
A. Which ingredient is mixed with the sour milk?

Soda



N = 14,546 and observed at time points [ti] = 1 2 3 4 5 6 7
var plotted is ept

Primary Outcomes



Everyday problem solving

Observed Tasks of Daily Living (OTDL)

Presents a set of tasks, and a rater scores performance.

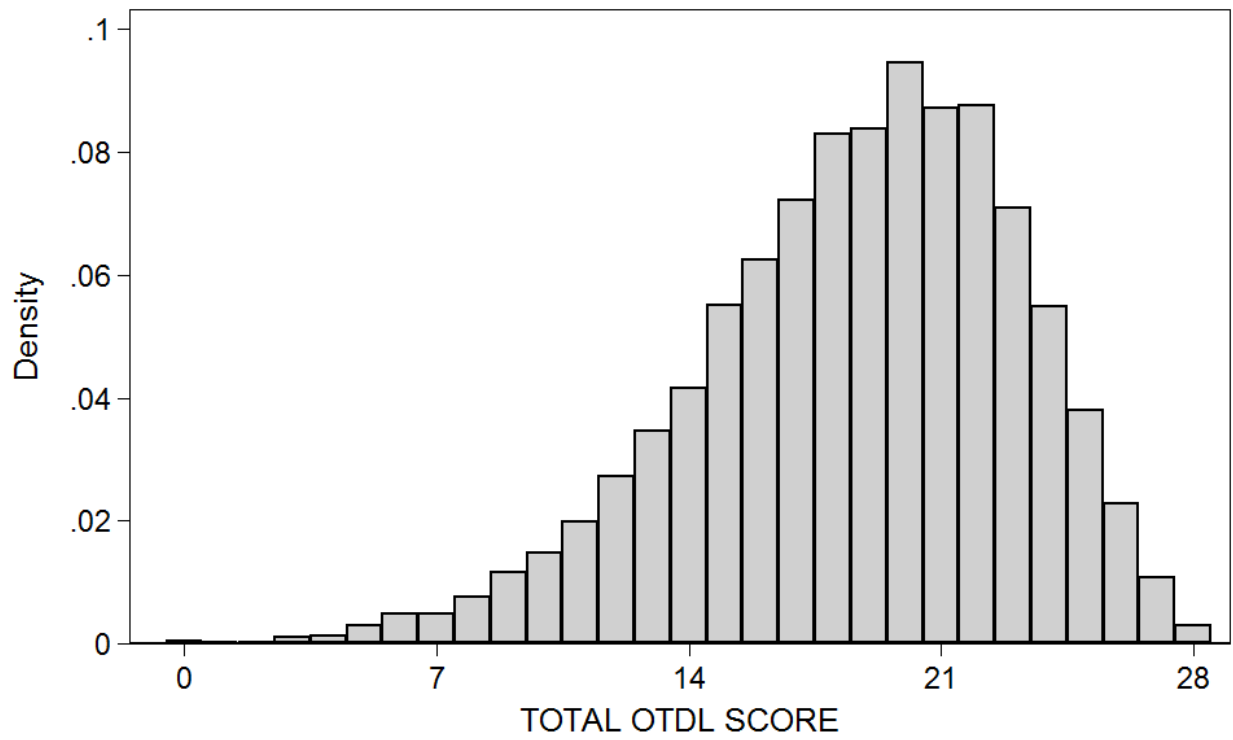
Diehl, M., Willis, S. L., & Schaie, K. W. (1995). Everyday problem solving in older adults: observational assessment and cognitive correlates. *Psychology and Aging*, 10(3), 478. ([pdf](#))

Form 422, not at post-test, variable name = otd1

TASK 1: PRESENT 2.5" X 2.0" MEDICINE BOTTLES FOR THREE PRESCRIPTIONS WITH PHARMACY LABELS FACING THE SUBJECT AND SAY:

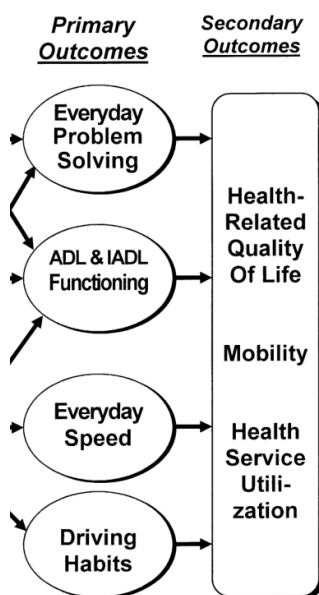
Here are the three medicine bottles for an elderly man. His name is Bill Reese. Please look at the labels on these medicine bottles for a moment and then answer the questions that you see here on this index card.

B1. HOW MANY DAYS WILL A REFILL OF TAGAMET LAST FOR BILL?



N = 11,157 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is otdl

Primary Outcomes



Everyday speed

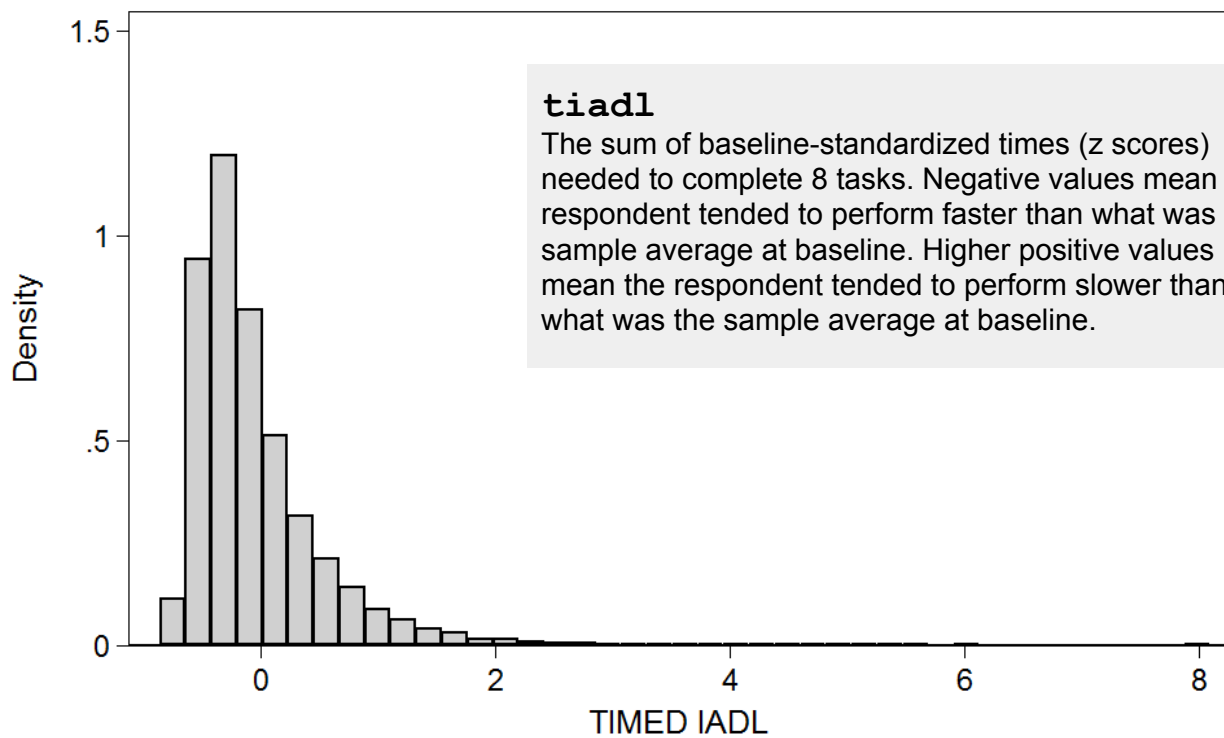
Timed Instrumental Activities of Daily Living (TIADL)

Perform 5 five tasks as fast as possible, score being time taken

Owsley, C., McGwin, G., Jr., Sloane, M. E., Stalvey, B. T., & Wells, J. (2001). Timed instrumental activities of daily living tasks: relationship to visual function in older adults. [Optometry and vision science official publication of the American Academy of Optometry. 78\(5\), 350-359.](#)

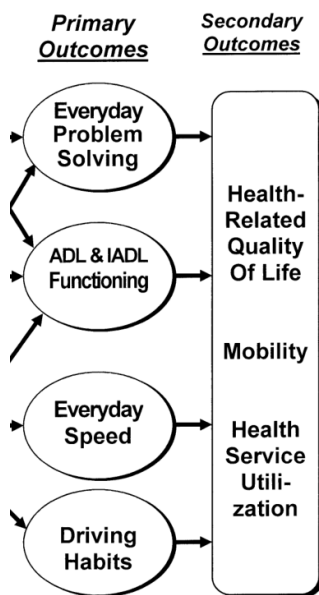
Form 815, all time points, variable name = tiadl

<http://users.php.ufl.edu/marsiske/TIADL/tiadl.htm>



N = 13,762 and observed at time points [ti] = 1 2 3 4 5 6 7
var plotted is tiadl

Primary Outcomes



ADL & IADL Functioning

[ostensibly] from Minimum Data Set

Task segmentation approach not reported

Morris, J., Hawes, C., Murphy, K., Nonemaker, S., Phillips, C., Fries, B., & Mor, V. (1991). Resident assessment instrument training manual and resource guide. Natick, MA: Eliot Press, Inc.

Morris, J., Bernabei, R., Ikegami, N., Gilgen, R., Fries, B., Steel, K., & Carpenter, I. (1997). RAI-Home Care (RAI-HC)(C) Assessment Manual. Washington, DC: InterRAI Corporation.

ADL & IADL Summary Scores

ptotp MDS IADL TOTAL PERFORMANCE

dtotp MDS IADL TOTAL DIFFICULTY

adlt MDS ADL TOTAL PERFORMANCE

Form 815, not at post-test

For each of the physical activities that I read to you, I will ask you two questions.

- First, during the last 7 days, how much of the activity did you do on your own?

and

- Second, how difficult was it for you to do the activity on your own? Or, if someone else did the activity for you, how difficult would it have been for you to do the activity on your own?

1. SELF PERFORMANCE OF IADLs

	Did all on own	Some help some of time	Help all of time	Fully performed by others	Activity not performed by you or others	Not difficult	Some help needed or I am slow, or I became tired	Great difficulty
<i>Preparing Meals</i>								
a. Planning meals, reading recipes, assembling ingredients	1	2	3	4	5	1	2	3
b. Setting out food and utensils	1	2	3	4	5	1	2	3
c. Cooking	1	2	3	4	5	1	2	3

... Although the tester should complete the MDS as an interview, they must also use their own observations while completing the assessment. If a subject's behavior is not congruent with a subject's self report, the tester should re-ask the question as a prompt prior to coding the activity....

Question #2: How difficult was it (or would have been) to do...?

If the subject reports s/he was involved in performance of the activity over last seven days, (coded 1, 2, or 3) ASK: *"How difficult was it to do on your own?"*

If the subject reports s/he was not involved in the activity in last seven days (e.g., others did it or there was no need to do it; coded 4 or 5), ASK: *"How difficult would it have been to do on your own?"*

Three coding options available: Choose the best option from the following list.

(1) Not difficult: Subject did not have difficulty, or would not have difficulty completing the activity or sub-task(s) on their own.

(2) Some help needed or I am slow, or I became fatigued: Subject did require or would require some help, or was slow in performing task(s) or became fatigued.

(3) Great difficulty: Subject had great difficulty or would have great difficulty performing all sub-tasks on their own.

Source: Question by Question Specifications Guide for Administration of the Individual Assessment Part II (10th Annual Post-Test) Measurements

ACTIVE/MDS IADL & ADL areas

IADLs

Meal preparation

Housework

Managing finances

Managing health care

Phone use

Shopping

Travel

ADLS

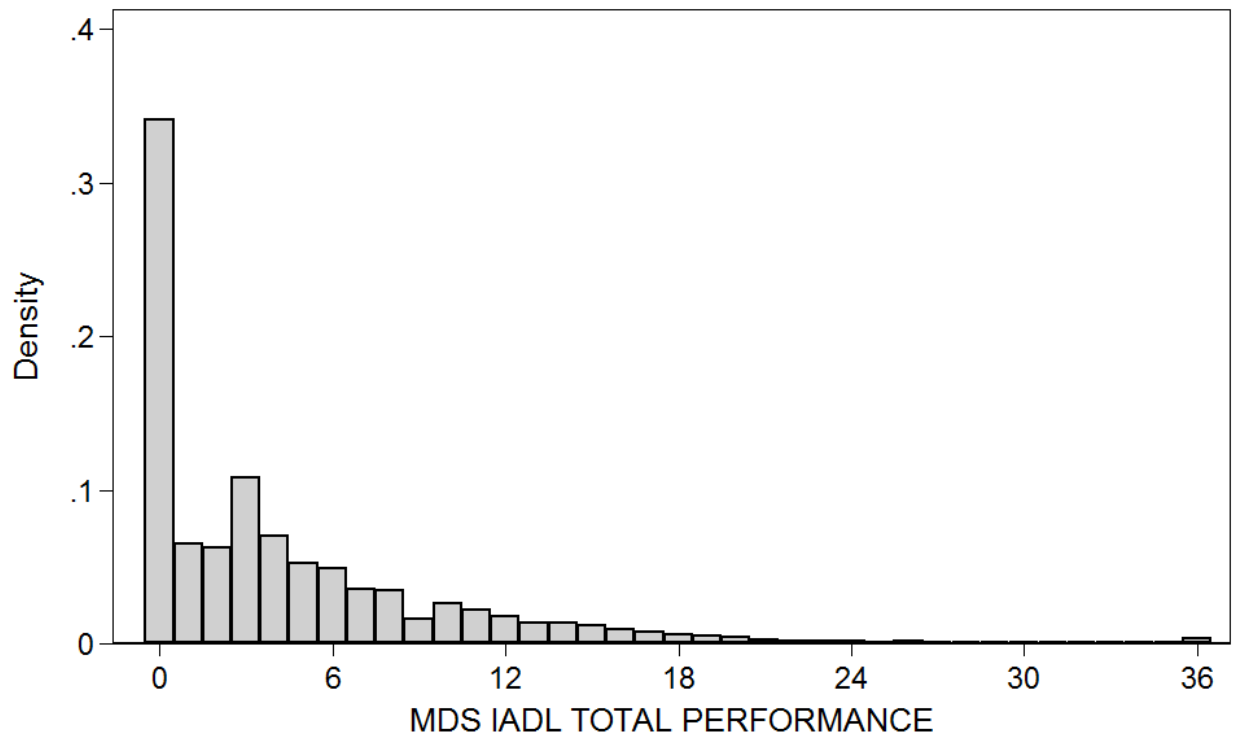
Dressing

Personal hygiene

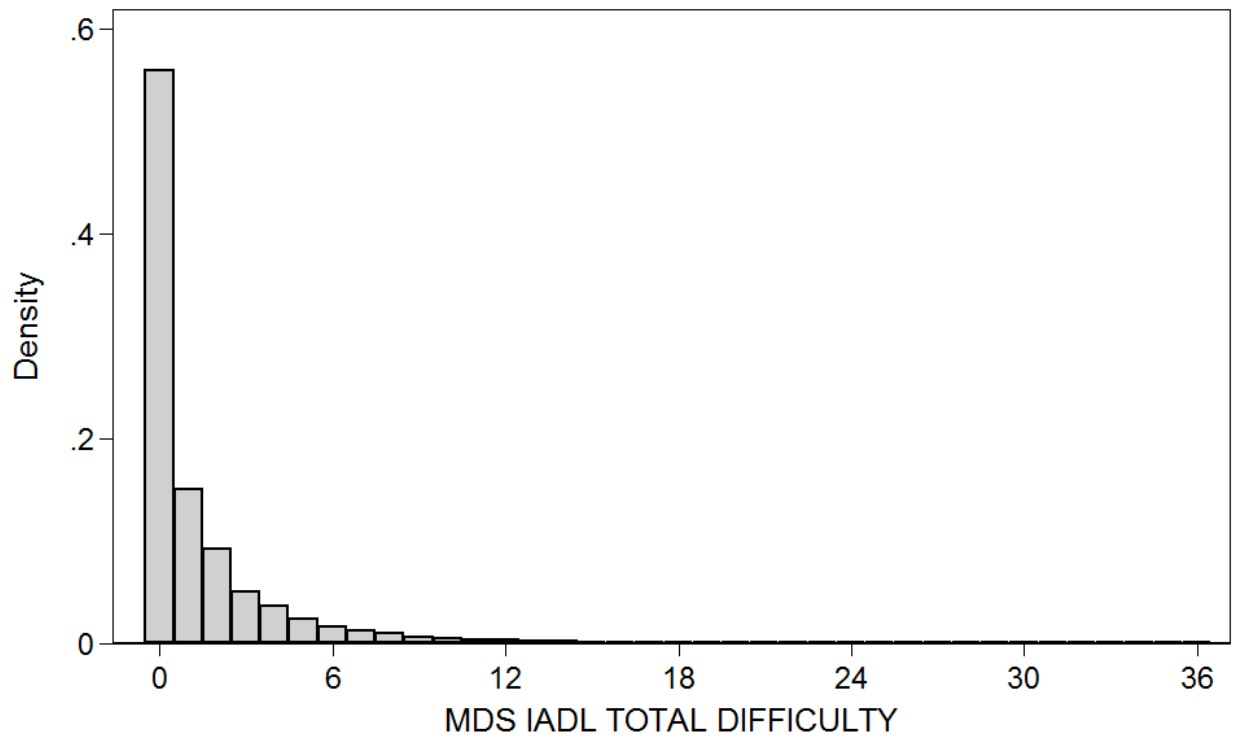
Locomotion

Transfer

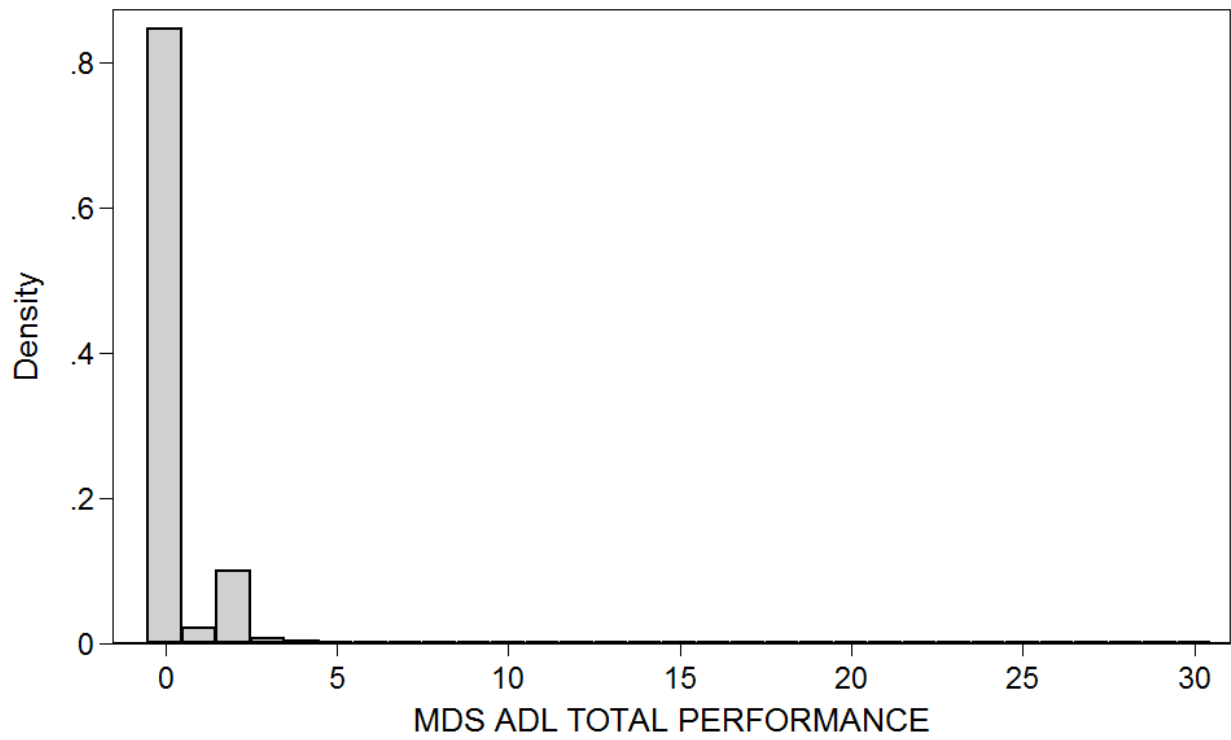
Toilet



N = 12,421 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is ptotp

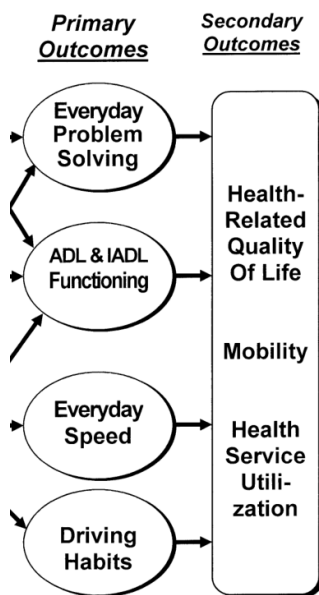


N = 12,428 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is dtotp



N = 12,426 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is adlt

Primary Outcomes



Mobility/Driving Habits

Life Space ([Stalvey et al 1999](#))

Driving Space

Exposure to difficult driving

Driving avoidance

* Also: Falls. Nobody's published on this. Speed training protects.

to rate their independent performance in tasks related to bathing, dressing, and personal hygiene.

Driving habits are assessed with three measures: Total driving space, total exposure to difficult driving, and total driving avoidance score [59]. Each of these scores is weighted equally in the driving habits composite. Total driving space is a score reflecting the extent of travel (e.g., restricted driving to one's own neighborhood versus frequently driving across state lines). Total exposure to difficult driving is a measure of the degree of difficulty experienced across a number of driving tasks (e.g., merging, turning left across traffic). Total driving avoidance is a score reflecting the number of driving situations a driver avoids (e.g., avoids driving in the rain, avoids driving alone). Thus those drivers who will drive only in their own neighborhood during daylight with a friend would have a very low driving habits composite score, while those driving at any time and in all situations with no difficulty would have a high score.

59. Owsley C, Stalvey B, Wells J, Sloane ME. Older drivers and cataract: Driving habits and crash risk. *J Gerontol: Med Sci* 1999;54A:M203–M211.

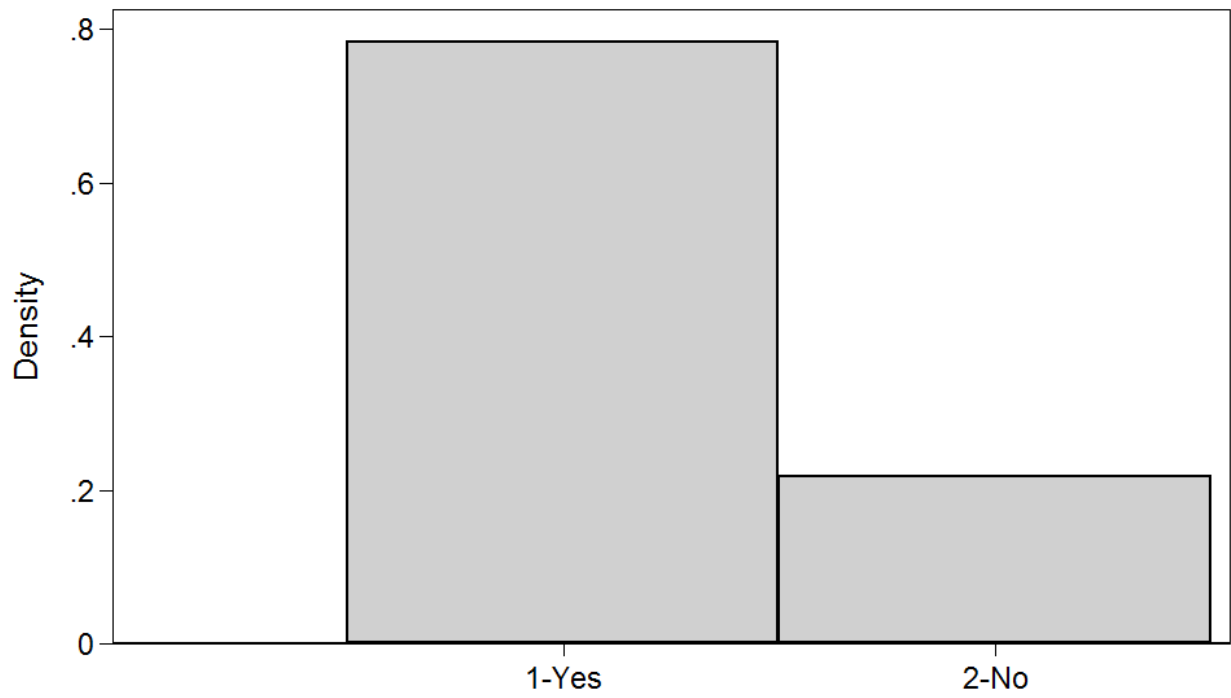
Stalvey, B., Owsley, C., Sloane, M., & Ball, K. (1999). The Life Space Questionnaire: A measure of the extent of mobility of older adults. *Journal of Applied Gerontology*, 18(4), 460-478.

Table 1. The Life Space Questionnaire (LSQ) Items and Test-Retest Reliability

	<i>% Agreement</i>		
1. During the past 3 days , have you been to other rooms of your home besides the room where you sleep?	100	lbedrm7d	
2. During the past 3 days , have you been to an area immediately outside your home such as your porch, deck or patio, hallway of an apartment building, or garage?	99	imouts7d	
3. During the past 3 days , have you been to an area outside your home such as a yard, courtyard, driveway, or parking lot?	99	otsysr7d	<u>drive there?</u>
4. During the past 3 days , have you been to places in your immediate neighborhood, but beyond your own property or apartment building?	95	beyprp7d	drbey7d
5. During the past 3 days , have you been to places outside your immediate neighborhood, but within your town or community?	92	outsnb7d	droutn7d
6. During the past 3 days , have you been to places outside your immediate town or community?	70	outstn7d	droutr7d
7. During the past 3 days , have you been to places outside of your county?	73	outsct2m	drouc2m
8. During the past 3 days , have you been to places outside the state?	92	outsst2m	droust2m
9. During the past 3 days , have you been to places outside this region of the United States?	99	outsrg2m	droutr2m

NOTE: Response options are yes/no. Introduction to subject: "Please think about the places you have been during the past 3 days."

**NB:
ACTIVE used
a 7 day or 2
month look-
back
period.**



F815: J7. Been outside immediate town or community in last 7 days?

N = 9,993 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is outstn7d

59. Owsley C, Stalvey B, Wells J, Sloane ME. Older drivers and cataract: Driving habits and crash risk. *J Gerontol: Med Sci* 1999;54A:M203–M211.

The Driving Habits Questionnaire (DHQ) was designed to obtain information about driving during the past year. Prototype versions of the DHQ were used in our earlier work (11,15,16). The DHQ as used in the present study is provided in the Appendix, along with test-retest reliability information. The DHQ is designed to be interviewer-administered, and it addresses six domains.

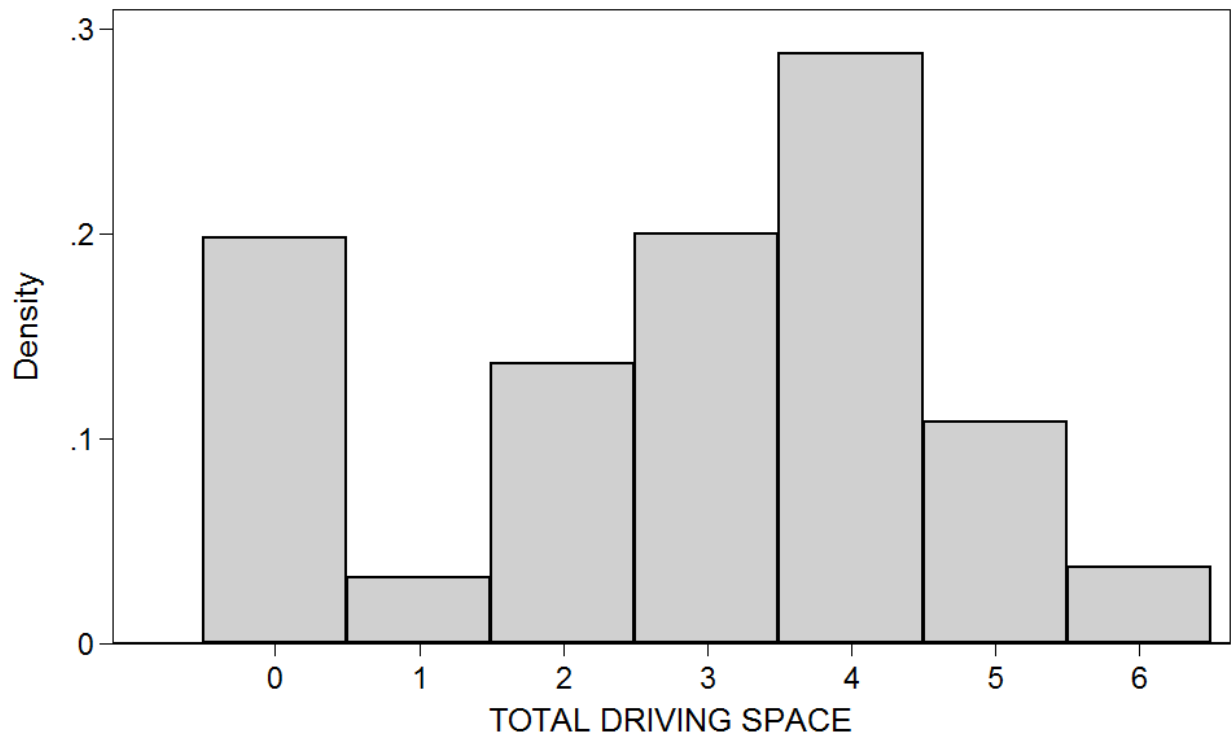
Current driving status and miscellaneous issues.—Items 1–10 establish current driving status, general driving practices (e.g., spectacle and seatbelt use, driving speed), and self-assessed quality of driving.

Driving exposure.—Items 11–14 ask about the average number of days driven per week and where the respondent drives in a typical week. The latter generates an estimate of the number of places traveled to, number of trips made, and number of miles driven in a typical week.

Dependence on other drivers.—Items 15 and 16 provide a detailed assessment of who the respondent travels with in a car on a regular basis and who usually drives with that person. From this interview, an estimate of “dependency” on other drivers is generated, which ranges from 1–3 with higher scores meaning greater levels of dependency on others to drive.

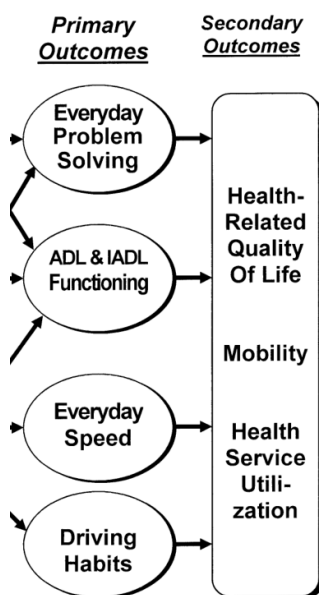
Driving difficulty.—Items 17–24 ask respondents to rate the degree of visual difficulty experienced in specific driving situations. Ratings are made on a 5-point scale (5 = no difficulty, 4 = a little difficulty, 3 = moderate difficulty, 2 = extreme difficulty, 1 = so difficult I no longer drive in that situation). A composite score of driving difficulty was computed based on the responses to all eight items and scaled on a 100-point scale [(mean score – 1) × 25]. Lower composite scores indicate a greater degree of difficulty.

curdriv0 : F815: L1. Do you consider yourself a current driver?
curdriv1 : F815: L2. Repeat: Do you currently drive?
prefway : F815: L3. Which way do you prefer to get around?
fastdriv : F815: L4. How fast do you usually drive compared to traffic?
qualdriv : F815: L5. How would you rate the quality of your own driving?
daysdriv : F815: L6. How many days do you drive in an average week?
miledriv : F815: L7. How many miles do you drive in an average week?
raindriv : F815: L8. Have you driven while it was raining in the last 2 months?
raindra : F815: L8a. Would you say you drove in the rain with...
raindrb : F815: L8b. Avoid driving in the rain?
alondriv : F815: L9. Have you driven alone in the last 2 months?
alondra : F815: L9a. Would you say you drove alone with...
alondrb : F815: L9b. Avoid driving alone?
lhturn : F815: L10. Have you made left turns in the last 2 months?
lhturna : F815: L10a. Would you say you make left turns with...
lhturnb : F815: L10b. Avoid making left turns?
mergtraf : F815: L11. Have you merged into traffic in the last 2 months?
mergtra : F815: L11a. Would you say you merged into traffic with...
mergtrb : F815: L11b. Avoid merging into traffic?
hightraf : F815: L12. Have you driven on high traffic roads in the last 2 months?
hightra : F815: L12a. Would you drive on high traffic roads with...
hightrb : F815: L12b. Avoid driving on high traffic roads?
rushhour : F815: L13. Have you driven in rush hour traffic in the last 2 months?
rushoa : F815: L13a. Would you drive in rush hour traffic with...
rushob : F815: L13b. Avoid driving in rush hour traffic?
nightdrv : F815: L14. Have you driven at night in the last 2 months?
nightdra : F815: L14a. Would you drive at night with...
nightdrb : F815: L14b. Avoid driving at night?
lanechan : F815: L15. Have you made lane changes in the last 2 months?
lanecha : F815: L15a. Would you make lane changes with...
lanechb : F815: L15b. Avoid making lane changes?
limitdrv : F815: L16. Has anyone suggested that you limit or stop driving?
limitdr1 : F815: L16a1. Suggestion to limit or stop driving: Spouse?
limitdr2 : F815: L16a2. Suggestion to limit or stop driving: Son or daughter?
limitdr3 : F815: L16a3. Suggestion to limit or stop driving: Friend?
limitdr4 : F815: L16a4. Suggestion to limit or stop driving: Doctor/medical?
limitdr5 : F815: L16a5. Suggestion to limit or stop driving: Eye doctor?
limitdr6 : F815: L16a6. Suggestion to limit or stop driving: Other?
numbaacd : F815: L17. How many accidents have you been involved in?
policacd : F815: L17a. To how many of these accidents were the police called?
numbpol : F815: L18. How many times have you been pulled over by the police?
numbtick : F815: L18a. On how many of these occasions did you receive a ticket?



N = 12,247 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is totds

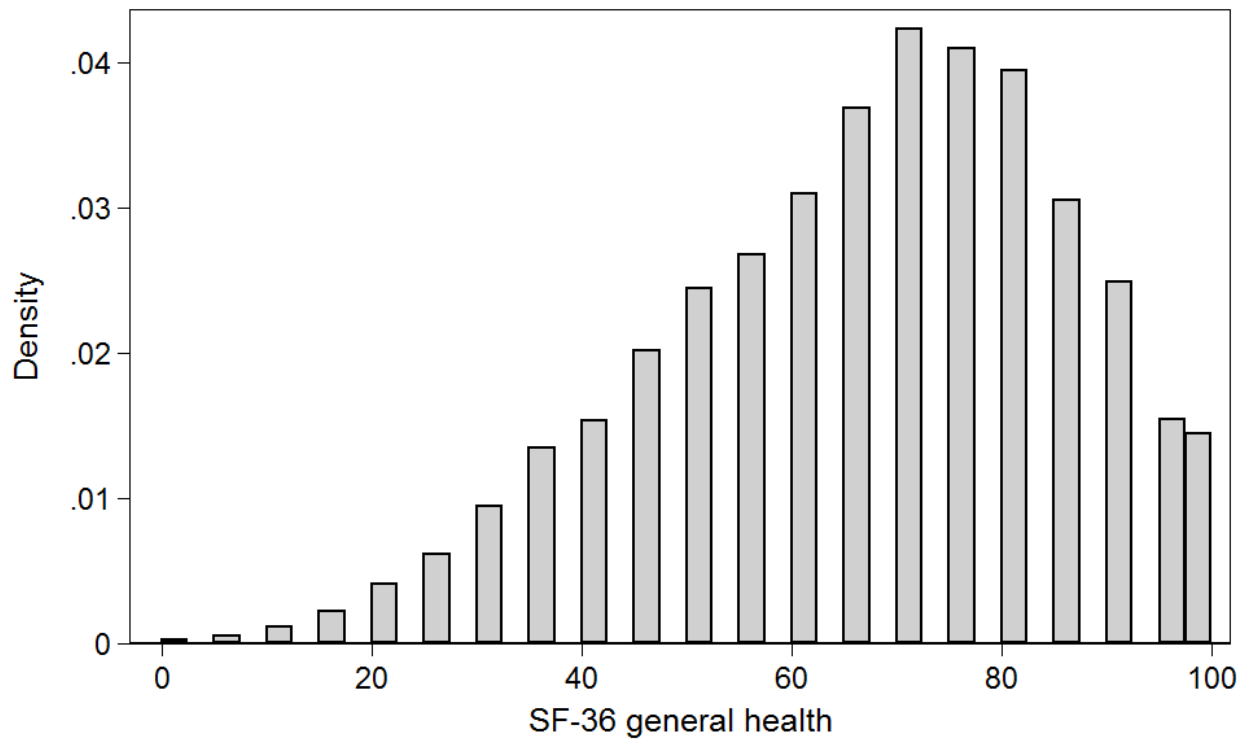
Secondary Outcomes



Health-Related Quality of Life SF-36

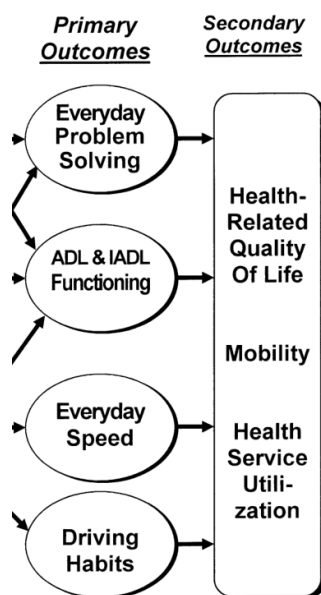
sf36pf : SF-36 physical functioning
sf36rp : SF-36 role - physical
sf36bp : SF-36 bodily pain
sf36sf : SF-36 social functioning
sf36mh : SF-36 mental health
sf36re : SF-36 role - emotional
sf36vt : SF-36 vitality
sf36gh : SF-36 general health

Form 707, and ????, not at post-test
Mode of administration ???



N = 12,135 and observed at time points [ti] = 1 3 4 5 6 7
var plotted is sf36gh

Secondary Outcomes



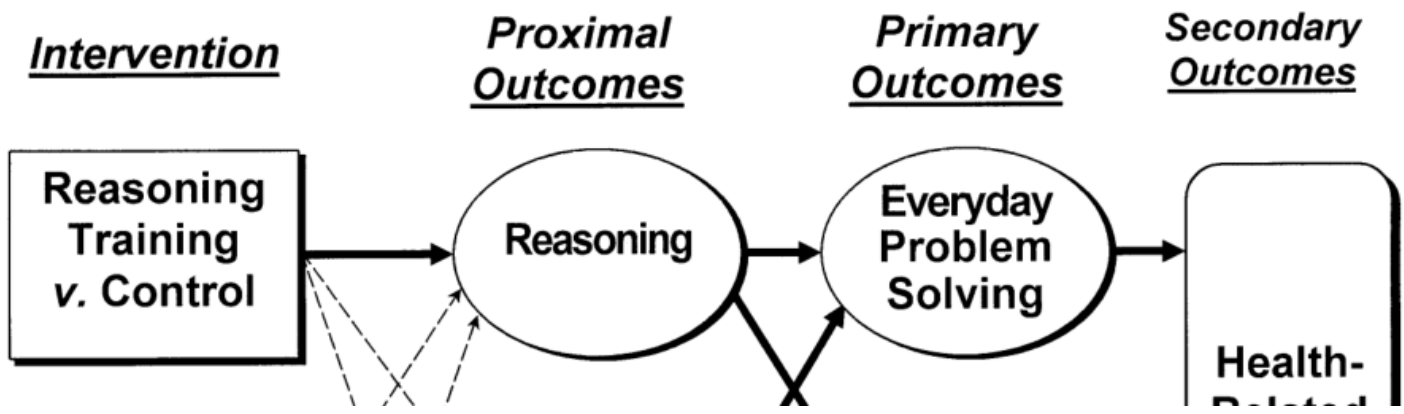
Health Services Utilization

Medicare/Medicaid linked data, not available publicly

But see:

Wolinsky, F. D., Mahncke, H. W., Kosinski, M., Unverzagt, F. W., Smith, D. M., Jones, R. N., . . . Tennstedt, S. L. (2009). The ACTIVE cognitive training trial and predicted medical expenditures. [BMC Health Services Research, 9\(109 \(29 June 2009\)\)](#).

About Transfer



Ball, K., Berch, D., Helmers, K., Jobe, J., Leveck, M., Marsiske, M., . . . Willis, S. (2002). Effects of cognitive training interventions with older adults: a randomized controlled trial. *JAMA*, 288(18), 2271-2281.

Table 4. Net Effect of Booster Training on Proximal and Primary Outcomes*

Measure	Memory Training			Reasoning Training			Speed Training			Control† Showing Reliable Improvement, %‡
	Net Effect Size (P Value)§	Showing Reliable Improvement, %‡		Net Effect Size (P Value)§	Showing Reliable Improvement, %‡		Net Effect Size (P Value)§	Showing Reliable Improvement, %‡		
		No Booster	Booster		No Booster	Booster		No Booster	Booster	
Proximal Outcome Composites										
Memory										
A1	0.044	23	21	-0.043	13	9	-0.004	13	10	14
A2	0.060	39	40	-0.012	27	28	0.042	27	29	29
Reasoning										
A1	-0.009	35	32	-0.304 (<.001)	49	72	0.125 (.003)	23	34	31
A2	-0.036	37	35	0.152 (<.001)	47	57	-0.039	33	28	35
Speed										
A1	-0.03	37	33	-0.043	31	36	-0.919 (<.001)	68	92	32
A2	0.02	35	38	-0.065	33	36	-0.347 (<.001)	65	79	37
Primary Outcome Composites										
Everyday problem solving										
A1	-0.007	18	20	0.001	24	23	0.019	21	20	21
A2	-0.033	19	23	-0.037	25	25	-0.06	27	25	23
ADL and IADL functioning										
A1	-0.088	17	17	-0.206	17	19	-0.246 (.04)	13	16	16
A2	0.096	18	16	-0.196	15	17	-0.217	18	18	17
Everyday speed										
A1	0.041	31	30	-0.068	26	29	-0.149 (.01)	28	34	30
A2	-0.033	33	33	-0.019	26	30	-0.091	27	33	29
Driving habits ¶										
A1	-0.082	14	23	-0.059	19	19	0.088	16	15	19
A2	-0.025	14	18	-0.052	14	17	-0.055	14	18	18

*Only significant P values reported. A1 indicates first annual evaluation; A2, second annual evaluation; ADL, activities of daily living; and IADL, instrumental activities of daily living.

†Net effect of the control is 0 at all time points, since net effect of group is defined as (group mean–control mean at time point)–(group mean–control mean at baseline).

‡Net difference divided by intrasubject SD (see "Methods" section).

§Calculated as the percentage of participants in each group who were ≥1 SEM above baseline.

||Favorable response is in the negative direction.

¶For self-reported drivers only.

Ball, K., Berch, D., Helmers, K., Jobe, J., Leveck, M., Marsiske, M., . . . Willis, S. (2002). Effects of cognitive training interventions with older adults: a randomized controlled trial. *JAMA*, 288(18), 2271-2281.

Table 4. Net Effect of Booster Training on Proximal and Primary Outcomes*

Measure	Speed Training			
	Net Effect Size (P Value)§	Showing Reliable Improvement, %‡		Control‡ Showing Reliable Improvement, %‡
		No Booster	Booster	
Everyday problem solving				
A1	0.019	21	20	21
A2	-0.06	27	25	23
ADL and IADL functioning				
A1	-0.246 (.04)	13	16	16
A2	-0.217	18	18	17
Everyday speed				
A1	-0.149 (.01)	28	34	30
A2	-0.091	27	33	29
Driving habits ¶				
A1	0.088	16	15	19
A2	-0.055	14	18	18

Rebok, G. W., Ball, K., Guey, L. T., Jones, R. N., Kim, H. Y., King, J. W., . . . Willis, S. L. (2014). Ten-year effects of the Advanced Cognitive Training for Independent and Vital Elderly cognitive training trial on cognition and everyday functioning in older adults. *Journal of the American Geriatrics Society*, *62*(1), 16-24. doi: 10.1111/jgs.12607

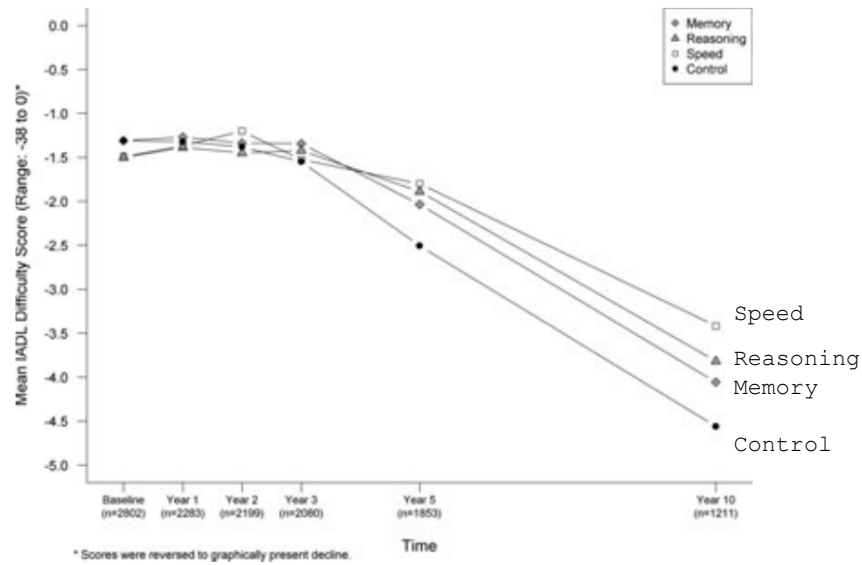


Figure 3. Training effects on self-reported instrumental activity of daily living (IADL) difficulty scores. The figure displays mean IADL difficulty scores for each training group at each time point. Higher scores indicate better functioning. The sample sizes show the number of participants with complete data for the IADL difficulty score at each time point.

Table 2. Effect of Training on Cognitive and Functional Outcomes from Baseline to Year 10

Cognitive and Functional Outcomes	Intervention Group			Control Group
	Memory	Reasoning	Speed	
Instrumental activity of daily living difficulty (possible range 0–38^c, N = 1,211)				
Score at baseline, mean ± SD	1.0 ± 1.8	1.2 ± 2.0	1.1 ± 2.0	0.9 ± 2.1
Mean change from baseline to year 10	–3.1	–2.7	–2.3	–3.6
Effect size (99% CI) ^a	0.48 (0.12–0.84)	0.38 (0.02–0.74)	0.36 (0.01–0.72)	
At or above baseline level, % ^b	61.6 (<i>P</i> < .01)	60.2 (<i>P</i> < .01)	58.5 (<i>P</i> < .05)	49.3
Everyday problem solving (possible range 0–56, N = 1,104)				
Score at baseline, mean ± SD	40.7 ± 7.7	39.2 ± 8.1	38.7 ± 7.7	39.4 ± 9.1
Mean change from baseline to year 10	–6.1	–5.6	–6.0	–5.7
Effect size (99% CI) ^a	0.004 (–0.23–0.24)	–0.02 (–0.25–0.22)	0.008 (–0.23–0.24)	
At or above baseline level, % ^b	59.6	63.1	61.0	61.4
Everyday speed of processing (possible range –3–100, N = 938)^d				
Score at baseline, mean ± SD	3.2 ± 1.0	3.3 ± 1.2	3.4 ± 1.3	3.4 ± 1.1
Mean change from baseline to year 10	1.5	–1.4	–1.5	–1.4
Effect size (99% CI) ^a	0.02 (–0.19–0.23)	–0.004 (–0.21–0.21)	–0.05 (–0.26–0.16)	
At or above baseline level, % ^b	34.9	30.5	29.0	30.2

^aEffect size defined as training improvement from baseline to year 10 minus control improvement from baseline to year 10 divided by the intrasubject standard deviation (SD) of the composite score. Positive effect sizes indicate improvement.

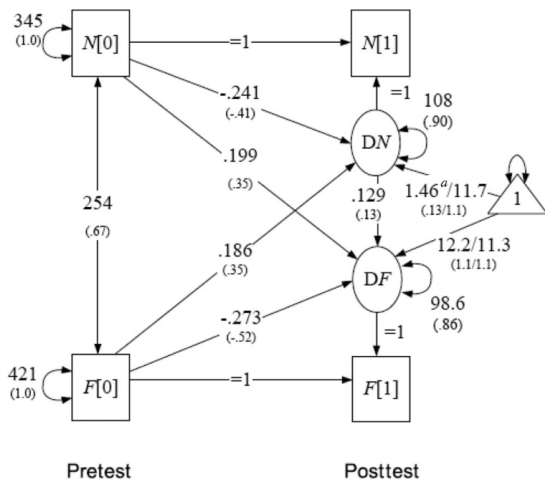
^bCalculated as the percentage of participants in each group who were ≥0.66 standard errors of measurement above baseline.

^cCoded as 0 = no difficulty; 1 = some help needed or participant is slow or becomes tired; 2 = great difficulty.

^dOne component of this composite score is a standardized z-score, with a potential range of $-\infty$ to ∞ .

CI = Confidence Interval.

Example: Far Transfer



McArdle & Prindle (2008)

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Post-test gains in proximal reasoning outcome (DN) correlate 0.13 with post-test gains in far outcome (DF).

Far = F(EPT, OTDL, TIADL)

Q: Correlation or transfer?

Figure 2. Numerical results from a bivariate structural equation modeling for a two-group pre-post change score analysis. *DNear* ($DN[1]$) and *DFar* ($DF[1]$) are change scores, which implied through fixed unit values labeled “= 1.” Numbers presented are Model 2b maximum likelihood estimates, with standardized estimates in parentheses for Control and Trained groups (Mplus, Version 4.0; Muthén & Muthén, 2002); $\chi^2(12, N = 1,397) = 37$; $\epsilon_a = .05$.

Example: Far Transfer

McArdle & Prindle (2008)

[Psyc Aging 23\(4\):702-719](#)

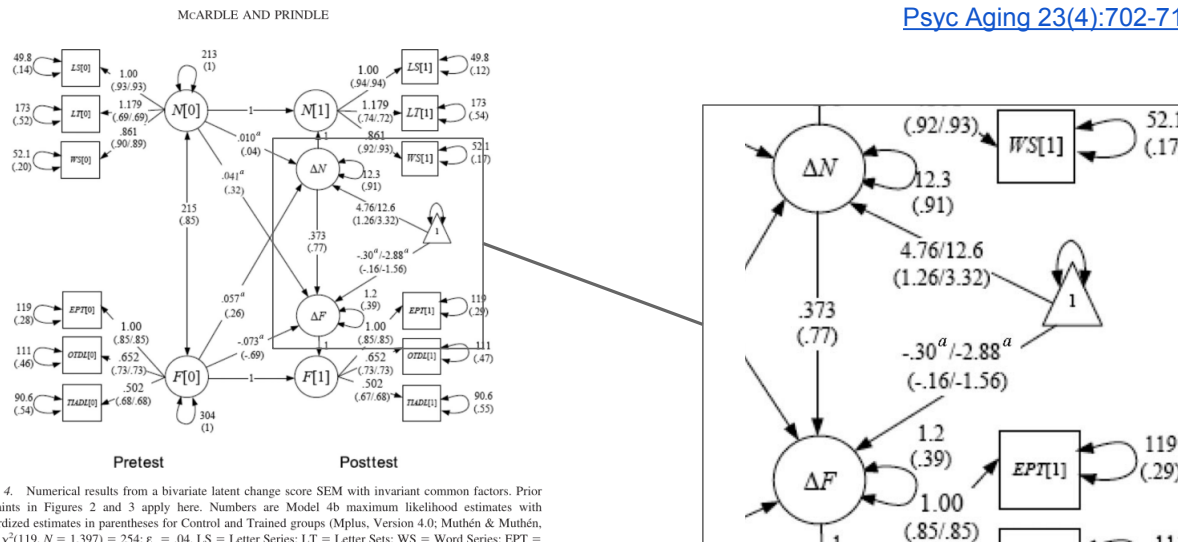


Figure 4. Numerical results from a bivariate latent change score SEM with invariant common factors. Prior constraints in Figures 2 and 3 apply here. Numbers are Model 4b maximum likelihood estimates with standardized estimates in parentheses for Control and Trained groups (Mplus, Version 4.0; Muthén & Muthén, 2002); $\chi^2(119, N = 1,397) = 254$; $e_u = .04$. LS = Letter Series; LT = Letter Sets; WS = Word Series; EPT = Everyday Problems Test; OTDL = Observed Tasks of Daily Living; TIADL = Timed Instrumental Activities of Daily Living; a = not significant.



San Juan Transfer Station