

RESEARCH LETTER

Association Between Positive Age Stereotypes and Recovery From Disability in Older Persons

To the Editor: Little research has been conducted on factors that account for why some older persons recover from disability and others do not. We considered a new culture-based explanatory factor: age stereotypes (defined as beliefs about old people as a category).¹ Positive age stereotypes may promote recovery from disability through several pathways: limiting cardiovascular response to stress,² improving physical balance,³ enhancing self-efficacy,⁴ and increasing engagement in healthy behaviors.^{1,4} We hypothesized that older persons with positive age stereotypes would be more likely to recover from disability than those with negative age stereotypes. Recovery was based on 4 essential activities of daily living (ADLs; bathing, dress-

ing, transferring, and walking) that are strongly associated with use of health care services and longevity.^{5,6}

Methods. The sample was drawn from the Precipitating Events Project, a study with high participation (75.2%) and follow-up (95.4%) rates. Participants were recruited from a health plan in greater New Haven, Connecticut, interviewed monthly for up to 129 months, and completed home-based assessments every 18 months from March 1998 through December 2008.^{5,6} Inclusion criteria were age of 70 years or older, English-speaking, community-living, nondisabled (ie, independent in the 4 ADLs at baseline), responded to the baseline age-stereotype measure, and experienced at least 1 month of ADL disability during follow-up (117 participants remained nondisabled). The final sample consisted of 598 participants (79.3% of the Precipitating Events Project cohort). The Yale University Human Subjects Committee approved the study; all participants provided verbal informed consent.

Age stereotypes were assessed by asking, "When you think of old persons, what are the first 5 words or phrases that come to mind?"^{1,4} Responses (coded on a 5-item scale ranging from 1 = most negative [eg, decrepit] to 5 = most positive [eg, spry]) were averaged and dichotomized at the mean of 2.12.^{1,4} Interrater reliability was 94.0%. This measure has been validated and the stereotypes have been found to be stable across time.^{1,4} Recovery was assessed by 3 validated ADL-improvement transitions: severe disability (needing assistance in 3 or 4 of the ADLs) to no disability (independent in all 4 ADLs), severe disability to mild disability (needing assistance in 1 or 2 of the ADLs), and mild disability to no disability.⁶ Covariates related to disability in previous studies^{5,6} included age, sex, race, education, living alone, number of physician-diagnosed chronic conditions, Mini-Mental State Examination score, depressive symptoms, and physical frailty (ie, >10 seconds on a rapid-gait test). The latter 5 covariates were updated every 18 months.

A competing risk Cox model for recurrent events⁶ evaluated the likelihood of the positive age-stereotype group to experience each recovery transition. This model adjusted for time participants spent in each ADL-disability state (severe, mild, or none), whether they recovered or worsened, and number of times and degree to which they recovered or worsened.⁶ Absolute risk increase percentages were calculated for the positive age-stereotype group. An individual growth model examined the association between age stereotypes and ADL-disability states over the 129 months. All models were adjusted for all covariates. We used SAS version 9.2 (SAS Institute Inc) and considered 2-tailed *P* values of less than .05 as significant.

Results. Participants in the positive and negative age-stereotype groups were similar at baseline (TABLE 1).

Relative to the negative age-stereotype group, the positive age-stereotype group had the following hazard ratios for recovery transitions: severe to none, 1.44 (95% CI, 1.01 to 2.06); severe to mild, 1.23 (95% CI, 1.03 to 1.46); and mild to none, 1.15 (95% CI, 1.03 to 1.29). The positive age-stereotype group showed an advantage in the associated absolute risk increase percentages (TABLE 2). As indicated by the individual growth model,

Table 1. Baseline Characteristics of Study Participants by Age-Stereotype Groups

	Overall (n = 598)	Age Stereotypes		<i>P</i> Value ^a
		Positive (n = 232)	Negative (n = 366)	
Age, mean (SD), y	79 (5.2)	79 (5.1)	79 (5.4)	.91
Female, No. (%)	378 (63.2)	230 (62.8)	148 (63.8)	.81
Nonwhite race/ethnicity, No. (%) ^b	49 (8.2)	22 (9.5)	27 (7.4)	.36
Physically frail, No. (%)	267 (44.7)	99 (42.7)	168 (45.9)	.44
Education, mean (SD), y	12 (2.8)	12 (2.7)	12 (2.9)	.24
Chronic conditions, mean (SD)	2 (1.2)	2 (1.3)	2 (1.2)	.34
Mini-Mental State Examination score, mean (SD)	27 (2.5)	27 (2.5)	27 (2.5)	.67
Depression, No. (%) ^c	82 (13.7)	25 (10.8)	57 (15.8)	.10
Lives alone, No. (%)	236 (39.5)	93 (40.1)	143 (39.1)	.80

^aThe Wilcoxon rank-sum was used to evaluate differences in means. The χ^2 and Fisher exact tests were used to evaluate differences in percentages.

^bEthnic and racial groups were self-determined according to US Census categories.

^cDefined as Center for Epidemiologic Studies Depression Scale score of 20 or greater.

Table 2. Association of Positive Age Stereotypes With Recovery From Disability

Recovery Transition ^a	Increase in Absolute Risk of Recovery for Positive Age-Stereotype Group, % ^b	Likelihood of Recovery by Positive Age-Stereotype Group ^c	
		Hazard Ratio (95% CI) ^d	<i>P</i> Value
Severe disability to no disability	7.7	1.44 (1.01-2.06)	.04
Severe disability to mild disability	8.1	1.23 (1.03-1.46)	.02
Mild disability to no disability	1.1	1.15 (1.02-1.29)	.02

^aThe number of person-months at risk for the transition from severe disability to no disability was 4704, for the transition from severe disability to mild disability it was 4704, and for the transition from mild disability to no disability it was 8411.

^bThe absolute risks were calculated from models that included age-stereotype group and the 9 covariates from Table 1. The time-dependent covariates were updated every 18 months. Values refer to the absolute risk of making the specific transitions between month *t* and *t* + 1. The absolute risks were calculated using coefficients obtained from a set of pooled logistic regression models (1 for each transition).

^cThe competing risk model adjusted for time participants spent in each activity of daily living disability state (severe, mild, or none), whether they recovered or worsened, and number of times and degree to which they recovered or worsened.⁶

^dThe hazard ratios were calculated from models that included age-stereotype group and 9 covariates. The time-dependent covariates were updated every 18 months.

the age-stereotype group $\times$ time interaction ($\beta = -0.0004$ [95% CI, -0.0006 to -0.0002]; $P = .001$) showed that the positive age-stereotype group had a significantly slower rate of ADL decline.

Comment. Older persons with positive age stereotypes were 44% more likely to fully recover from severe disability than those with negative age stereotypes. The study was limited by recruitment from 1 community; however, its demography is similar to the US population, except for an underrepresentation of black participants. Further research is needed to determine whether interventions to promote positive age stereotypes could extend independent living in later life.

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Author Contributions: Dr Levy had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Acquisition of data: Levy, Gill.

Analysis and interpretation of data: Levy, Slade, Murphy, Gill.

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CORRECTION

Errors in Table and Text. In the Original Contribution entitled, "Prevalence of and Factors Associated With Persistent Pain Following Breast Cancer Surgery," published in the November 11, 2009, issue of *JAMA* (2009;302[18]:1985-1992), an error occurred in the footnote of Table 1 and in the Questionnaire section of the Methods. For the reporting of results regarding severity of pain, scores for moderate pain should have been 4 to 6 and scores for severe pain should have been 7 to 10. This article has been corrected online.