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Article

Can we determine whether physical limitations are more prevalent in the US than in countries with comparable life expectancy?

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ABSTRACT

We evaluate the variability in estimates of self-reported physical limitations by age across four nationally representative surveys in the US. We consider its implications for determining whether, as previous literature suggests, the US estimates reveal limitations at an earlier age than in three countries with similar life expectancy: England, Taiwan, and Costa Rica. Based on cross-sectional data from seven population-based surveys, we use local mean smoothing to plot self-reported limitations by age for each of four physical tasks for each survey, stratified by sex. We find substantial variation in the estimates in the US across four nationally-representative surveys. For example, one US survey suggests that American women experience a walking limitation 15 years earlier than their Costa Rican counterparts, while another US survey implies that Americans have a 4-year advantage. Differences in mode of survey may account for higher prevalence of limitations in the one survey that used a self-administered mail-in questionnaire than in the other surveys that used in-person or telephone interviews. Yet, even among US surveys that used the same mode, there is still so much variability in estimates that we cannot conclude whether Americans have better or worse function than their counterparts in the other countries. Seemingly minor differences in question wording and response categories may account for the remaining inconsistency. If minor differences in question wording can result in such extensive variation in the estimates within a given population, then lack of comparability is likely to be an even greater problem when examining results across countries that do not share the same language or culture. Despite the potential utility of self-reported physical function within a survey sample, our findings imply that absolute estimates of population-level prevalence of self-reported physical limitations are unlikely to be strictly comparable across countries—or even across surveys within the same population.

1. Introduction

Self-reported measures of physical function are included in virtually all large-scale health interview surveys and are widely used in aging-related research. In addition to being easily obtainable, such measures are an important component of prognostic indexes for predicting survival. The subjective nature of self-reports may capture valuable information about underlying health and wellbeing not easily measured by clinical tests. Indeed, research has demonstrated that self-reported measures of physical function are among the strongest predictors of survival at older ages, outperforming standard clinical biomarkers (Goldman et al., 2016; Swindell et al., 2010).

Based on these self-reports, previous comparative studies have concluded that older Americans are more likely to report physical limitations than their same age counterparts in many other countries (Avendano, Glymour, Banks, & Mackenbach, 2009; Crimmins, Garcia, & Kim, 2010; Wahrendorf, Reinhardt, & Siegrist, 2013). A National Academy of Sciences panel found that the percentage of those aged 50 and older reporting a physical limitation was higher in the U.S. than the other seven countries considered—Japan and six European countries (Crimmins et al., 2010). Another study of persons aged 50–85 documented that Americans report a higher number of physical limitations, on average, than their counterparts in 12 out of 13 European countries (Poland was the exception) (Wahrendorf et al., 2013).

Yet, it is unclear whether such self-reported measures are truly comparable across populations that vary in terms of language, culture,

Abbreviations: CRELES, Costa Rican Study on Longevity and Healthy Aging; ELSA, English Longitudinal Study of Aging; HRS, Health and Retirement Survey; MIDUS, Midlife in the United States study; NHANES, National Health and Nutritional Examination Survey; NHIS, National Health Interview Survey; TLSA, Taiwan Longitudinal Study of Aging

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and social norms (Meijer, Kapteyn, & Andreyeva, 2011). The subjective nature of these measures may make them sensitive to variation in question wording, response categories, and ordering of the questions; to mode of interview and other survey methods; and to differences between individuals in the interpretation of "difficulty."

In this paper, we take advantage of similar questions about physical limitations administered in four US nationally representative surveys, fielded in a similar period, to evaluate the variability in estimates representing the same population. We then consider the implications of this variability for determining whether Americans have more physical limitations than their counterparts in three countries with similar life expectancy—78.9 years in the US versus 80.6 in England/Wales; 78.8 years in Taiwan; 78.7 in Costa Rica as of 2010 (The World Bank, 2015; University of California, Berkeley (USA) & Max Planck Institute for Demographic Research (Germany), 2016).

1.1. Background

Previous research suggests that several factors may affect self-reports of physical function and disability. One important consideration is mode of survey (e.g., face-to-face, telephone, or mail-in questionnaire). Walsh and Khatutsky (2007) demonstrate that estimates of disability vary considerably by survey mode. Second, variation in response may be attributable to differences in sequencing, question wording, and response categories (Dillman & Christian, 2005; Picavet & van den Bos, 1996; Rodgers & Miller, 1997). A third issue is use of proxy respondents, whose assessments can differ from those of the respondents themselves (Rodgers & Miller, 1997). A fourth major concern, particularly for comparative research, is that responses about physical limitations may reflect variation in the threshold for reporting difficulty, owing to such factors as personality, expectations, cultural norms, and physical environments. For example, Melzer, Lan, Tom, Deeg and Guralnik (2004) identify significant differences in thresholds between American and Dutch older adults, as well as across age and income groups within the US; they conclude that part of the apparent Dutch advantage in walking ability results from their higher threshold for reporting difficulties.

2. Materials and methods

2.1. Data

We use cross-sectional data from seven population-based surveys, the first four of which represent the US: wave 2 (2004-06) of the Midlife in the United States (MIDUS) study; the 2006-07 wave of the Health and Retirement Survey (HRS); the 2005-06 National Health and Nutritional Examination Survey (NHANES); the 2006 National Health Interview Survey (NHIS); wave 2 (2004-05) of the English Longitudinal Study of Aging (ELSA); the 2003-04 wave of the Taiwan Longitudinal Study of Aging (TLSA); and wave 1 (2004-06) of the Costa Rican Study on Longevity and Healthy Aging (CRELES). We selected these datasets because they were fielded during a similar period (2003–2007), include similar questions about physical limitations, and represent countries with similar life expectancy spanning four regions of the world: North America, Central America, Europe, and Asia. The availability of four nationally-representative datasets for the US allows us to examine the consistency of the estimates across surveys representing the same population.

Table S1 summarizes sample designs, response rates, and restrictions on the analysis sample for each dataset. For comparability across surveys, we exclude institutionalized respondents. Given that age is top-coded at age 85 and older in NHANES and NHIS and top-coded at age 90 and older in ELSA, we exclude respondents aged 85 and older. In auxiliary analyses (not shown), we test the sensitivity of the results to the exclusion of interviews that were completed by proxy; the conclusions remain unchanged. Among community-dwelling respondents younger than 85, missing data for our key dependent variable (walking limitation) is highest in NHIS (2%) and lowest in TLSA (< 0.05%); those respondents are excluded from analysis following common practice. Our analysis samples comprise: n = 1784 for MIDUS (ages 30–84); n = 15,609 for HRS (ages 52–84); n = 4788 for NHANES (ages 20–84); n = 23,193 for NHIS (ages 18–84); n = 8350 from ELSA (ages 52–84); n = 5040 for TLSA (ages 50–84); and n = 2128 for CRELES (ages 60–84).

2.2. Measures

Each survey asks respondents whether they have difficulty performing four tasks: walking a short distance, lifting/carrying, climbing stairs, and bending/stooping/kneeling/crouching/squatting (see Table S2 for details). This information was collected via a self-administered mail-in questionnaire in MIDUS, a phone interview for a random half of the HRS sample, and a face-to-face interview for the other half of the HRS sample and all respondents in the other surveys. Although there are some differences in the question wording and in the response categories, the walking task is the most comparable across all surveys (but probably less exacting for Taiwan). Thus, we focus primarily on the results for walking. Respondents are coded as having a limitation on the specified task if they report any level of difficulty.

All analyses control for age and sex. For comparisons across US datasets, we further adjust for race/ethnicity and education to account for potential between-survey differences in the demographic characteristics of the samples.

2.3. Analytical strategy

All analyses are weighted using survey-provided probability weights (rescaled as needed so that the sum of weights equals the unweighted sample size for each dataset) to account for the sampling design. We use local mean smoothing to plot the reports of difficulty by age for each physical task, separately by sex and dataset. To quantify differences across datasets in these smoothed curves, we use an age-equivalent formulation (Zajacova, Montez, & Herd, 2014). To test for significant differences across US surveys, we pool the data and fit a logit model for each type of limitation controlling for age, sex, and survey. In a subsequent model, we further adjust for race/ethnicity and education. The "svy" commands in Stata 12.1 are used to fit the models while accounting for survey design (i.e., stratification, clustering, and probability weights).

3. Results

3.1. Comparisons across US datasets

As shown in Fig. 1, about 40 percent of men aged 75 in NHIS—who serve as the reference group—report having a walking limitation. The equivalent age at which a similar percentage of men report a walking limitation is 6 years higher (81) in NHANES, where the question wording is most comparable, while it is age 71 in MIDUS and 84 in HRS (Table 1). Among women, the corresponding age is 71 in NHIS versus 77 in NHANES, but much lower in MIDUS (57); the equivalent age in HRS (76) is similar to NHANES. Thus, there is extensive variation in the sex- and age-specific prevalence of self-reported walking limitation across different datasets representing the US non-institutionalized, national population around 2005.

For the other physical tasks, MIDUS respondents consistently report limitations at a younger age than respondents in the other US surveys (Table 1 and Figs. S3.1–3.3). In the case of lifting/carrying and stair climbing, the US surveys with the most comparable question (NHIS and NHANES) yield similar estimates for stair climbing (Fig. S3.2), but the equivalent ages for lifting/carrying differ by seven years for men and five years for women (Fig. S3.1). For bending/kneeling/stooping, NHIS