Khadr, Z., & Yount, K., (2012). Differences in self-reported physical limitation among older women and men in Ismailia, Egypt. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 67 (5),* 605–617, doi:10.1093/geronb/gbs066.

Differences in Self-Reported Physical Limitation Among Older Women and Men in Ismailia, Egypt

Zeinab Khadr[1,2] and Kathryn Yount[3,4]

[1]Department of Statistics, Faculty of Economics and Political Science, Cairo University.
[2]The Social Research Center, The American University in Cairo.
[3]Hubert Department of Global Health and Department of Sociology and
[4]Department of Behavioral Sciences and Health Education, Emory University.

Objectives. This study explores the reasons for gender differences in self-reported physical limitation among older adults in Ismailia, Egypt.

Method. 435 women and 448 men, 50 years and older in Ismailia, Egypt, participated in a social survey and tests of physical performance. Ordered logit models were estimated to compare unadjusted gender differences in reported disability with these differences adjusted sequentially for (a) age and objective measures of physical performance, (b) self-reported morbidities and health care use, and (c) social and economic attributes.

Results. Compared with men, women more often reported higher levels of limitation in activities of daily living (ADLs), upper-extremity range of motion (ROM), and lower-extremity gross mobility (GM). Adjusting for age and objective measures of physical performance, women and men had similar odds of self-reporting difficulty with ADLs. With sequential adjustments for the remaining variables, women maintained significantly higher odds of self-reported difficulty with upper-extremity ROM and lower-extremity GM.

Discussion. Cross-culturally, gender differences in self-reported disability may arise from objective and subjective perceptions of disability. Collectively, these results and those from prior studies in Bangladesh and the United States suggest that gender gaps in self-reported physical limitation may be associated with the degree of gender equality in society.

Key Words: Self reported health—Physical limitation—Gender differences—Egypt.

Background

In most settings, women have longer life expectancies at birth than men, but experience higher levels of morbidity and disability (Kinsella & Velkoff, 2001). Researchers have assessed the reasons for these gaps mainly in Western industrialized settings, using self-reported data from national surveys. Although objective measures are the gold standard to assess levels of and gaps in morbidity, self-reported measures strongly predict declining physical function, placement in nursing homes, and mortality (Bernard et al., 1997; Ferrucci, Guralnik, Baroni, Tesi, Antonini, & Marchionni, 1991; Reuben, Reubenstein, Hirsch, & Hayes, 1992). That said, self-reported measures of morbidity may conflate objective and subjective states (Murray & Chen, 1992), with the latter often reflecting people's social roles and living conditions (Zimmer, Natividad, Ofstedal, & Lin, 2002). Therefore, differences between men and women in their self-reported morbidity might be attributed to actual differences in their objective health and to differences in their social attributes (Yount & Agree, 2005).

Does Higher Objective Physical Limitation Explain Women's Greater Reported Disability?

Some researchers have argued that differences between women and men in self-reported physical limitation reflect real differences in their ability to execute physical tasks (e.g., Merrill, Seeman, Kasl, & Berkman, 1997) as well as women's higher propensity than men to report difficulty in performing particular activities (e.g., Rahman & Liu, 2000). In that sense, differences in men's and women's objective physical performance should account for a substantial portion of differences in their self-reported physical limitations, whereas the remaining differences can be attributed to other factors. Several studies have shown that objective measures of physical performance correlate strongly with their self-reported counterparts (Merrill et al., 1997; Rahman & Liu, 2000; Sherman & Reuben, 1998; Simonsick et al., 2001). Among non-institutionalized older adults in the United States, correlations of .37–.50 were observed between two objective measures of physical performance and three similar self-reported measures (Sherman & Reuben, 1998); however, these correlations differed for older women and men, suggesting potential gender differences in the propensity to report disability. Indeed, in rural Bangladesh, older women have self-reported greater limitation in activities of daily living (ADLs) than men of the same age and with similar levels of objective physical performance (Rahman & Liu, 2000).

What Accounts for Women's Higher Residual Reported Disability?

The literature offers three broad explanations for residual gender differences in self-reported physical limitations after

Received June 8, 2010; Accepted June 20, 2012
Decision Editor: Merril Silverstein, PhD

adjusting for objective measures of physical performance. First, women and men have different underlying levels of morbidity, and women have a higher propensity to use health care. Second, women and men differ in their socioeconomic status, social relationship, and cultural-specific gender roles. Third, women and men differ in their perception of health and the relation of this perception to cultural-specific gender roles.

Gaps in underlying morbidity and health care use.—According to the first explanation, women's greater residual reported disability results in part from their higher rates of some non-fatal disabling conditions, such as diabetes, arthritis, obesity, and high fertility (Al Snih, Ray, & Markides, 2006; Alvarado, Zunzunegui, Béland, & Bamvita, 2008; Hallouda et al., 1993; Kaplan & Erickson, 2000; Lamb, 1997; Ross & Bird, 1994; Salinas & Peek, 2008; Strauss, Gertler, Rahman, & Fox, 1993; Verbrugge, 1985), which may affect women's perceived ability to perform certain tasks. In underprivileged communities in Lebanon, chronic risk factors and health conditions have accounted for women's greater difficulty with ADLs, but only partly attenuated their higher odds of reported difficulties in instrumental activities of daily living (IADLs) and physical tasks (Al Hazzouri et al., 2010). In Arab countries including Egypt, high total fertility may elevate the risks of disabling conditions and disability, especially among older rural women who lacked trained care (Hallouda, Amin, & Farid, 1983; Lamb, 1997; Obermeyer, 1992). In Egypt, the total fertility rate in 1979/1980 was 5.3 children per woman and more than 6 children for rural women (Hallouda etal., 1983). Recent research in Ismailia has shown that very high fertility predicts reporting difficulty with more ADLs (Engelman, Agree, Yount, & Bishai, 2010). Finally, in some settings, women's higher propensity than men to seek health services may enhance their knowledge of personal health conditions (Green & Pope, 1999; Mendoza-Sassi & Beria, 2003; Newsom, Kaplan, Huguet, & McFarland, 2004; Verbrugge, 1985), thereby further altering self-perceptions of physical abilities. Compared with older men in Ismailia, Egypt, older women have had *higher* unadjusted odds of use of modern medication (OR [odds ratio] = 2); however, their relative odds decreased significantly (OR = .96) after adjustment for socioeconomic status, social relationship, perceived and observed morbidity, and use of health care (Yount & Khadr, 2006).

Gaps in socioeconomic status and social relationships.—According to the second explanation, women's greater residual reported disability may result from their lower socioeconomic status, poorer social support, and gender socialization. First, compared with older men in Arab countries and other settings, older women have had less schooling as well as less access to the formal labor market and social insurance (Kinsella & Velkoff, 2001; Yount & Sibai, 2009). Among older adults, lower socioeconomic status (variously measured) has been associated with higher risks of reporting poorer perceived health and functioning (Robert & House, 1996; Ross & Bird, 1994), as well as poorer performance in 18 self-maintenance, mobility, and physical tasks (Camacho, Strawbridge, Cohen, & Kaplan, 1993).

Second, in Egypt and other settings, older women more often are widowed, live alone, and live in institutional settings (Yount & Agree, 2005; Yount & Khadr, 2008; Yount & Sibai, 2009). Lower social integration has been associated with higher mortality and lower functioning (Seeman, 1996; Verbrugge, Reoma, & Gruber-Baldini, 1994), and such effects have occurred at lower network sizes for men than women (Berkman & Syme, 1979). Among community-dwelling older adults in Egypt, adjusting for widowhood in models of any reported difficulty with physical tasks and IADLs reduced differences between women and men in these measures of disability (Yount & Agree, 2005). Gender differences in social relationship also may affect reported physical limitations indirectly by altering men's and women's use of formal care. Caregivers who enhance the quality of care at home may reduce an older person's need for formal health care, or may encourage its use (Lieberman, Meana, & Stewart, 1998).

Gendered socialization and perception of health.—According to the third explanation, women's greater residual reported disability may be attributed, besides to the previously mentioned structural explanation, to gender differences in perception of health embedded within the self-reported measure of disability and other related factors. Part of these differences in perceptions of health may arise from gender socialization and roles that shape the way in which women and men act in relation to their health (Matthews, Manor, & Power, 1999). Women are usually the major care givers within the family and tend to prioritize the needs of others before their own needs, which affects their physical and psychological health as well as their use of health services. In contrast, men have the premise that they cannot be seen as weak or to look as though their masculinity is threatened. These social pressures may lead men to delay seeking help when they need it or to ignore a health problem until it becomes more serious. Gendered socialization in patriarchal Arab countries has two implications for gaps in residual reporting of disability. First, women and men are taught to interpret pain and dysfunction differently, with men expected to ignore symptoms unless they are severe (Bendelow, 1993; Courtenay, 2000). These practices encourage expressions of physical robustness in men and expressions of distress and overt pain in women (Fillingim, King, Ribeiro-Dasilva, Rahim-Williams, & Riley, 2009; Miller & Newton, 2006; Nayak, Shiflett, Eshun, & Levine, 2000; Pool, Schwegler, Theodore, & Fuchs, 2007). Studies in diverse settings have revealed gender differences in the perception, expression, and tolerance of pain (Fillingim et al., 2009; Verbrugge,

Lepkowski, & Konkol, 1991). Another historical aspect of gender socialization in Arab countries has been high levels of son preference and young women's lower age-gender status in the family. Son preference has predicted girls' shorter breastfeeding duration (Hwalla, 2006), lower odds of proper curative care (Yount, 2004), and higher risks of being undernourished (Khawaja, Dawns, Meyerson-Knox, & Yamout, 2008). Moreover, son preference and norms of patriarchal kinship have imposed substantial constraints on women's opportunities for education and formal employment, relegating them to the roles of wife and mother (Obermeyer, 1992). By implication, these systematic patterns of gender socialization may lead women to have some higher residual reported disability, even after adjustment for the above factors.

Implications of This Research

To a large extent, the research on gender differences in reported physical functioning has been limited to Western, industrialized contexts. Elsewhere, such research has been limited by a lack of data on objective physical performance and socioeconomic attributes that distinguish women and men. To our knowledge, only two studies on this subject have been conducted in Egypt (Lamb, 1997; Yount & Agree, 2005), and both used data from the 1989 *WHO Health and Social Aspects of Aging* study, which lacked objective measures of physical performance. Lamb (1997) investigated the effect of social and health conditions on women's and men's reported difficulty performing at least one of six Katz-type (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963) ADLs (eat, dress, groom, walk 300 m, transfer in and out of bed, or bathe). Yount and Agree (2005) focused on gender differences in reported ADL, IADL, and physical tasks, controlling sequentially for reported morbidity, social relationships, and socioeconomic status. This study, in contrast, uses novel data from Ismailia, Egypt, to assess first to what extent objective measures of physical performance account for differences in women's and men's self-reported physical limitation. We then assess to what extent other health and social factors account for residual gender differences in self-reported physical limitation.

The Setting

Egypt has a population of approximately 77.7 million, with an annual growth rate of 1.8% (Central Agency for Population Mobilization and Statistics [CAPMAS], 2008). About 7.7 million or 10% of Egyptians are aged 55 years and older (United Nations [UN], 2009), and this age group is projected to reach 15 million (or 14% of the total population) by 2025 (United Nations, 2009). The majority (52%) of the projected older population is expected to be women as a result of their current longer life expectancy at birth (71 *vs* 68 years for men) (WHO 2010). Women's longer life expectancy, however, is associated with many chronic morbidities that underlie physical impairment and disability, such as obesity, diabetes, hypertension, ischemic heart disease (Yount & Agree, 2005; Yount & Khadr, 2006; Yount & Sibai, 2009).

Ismailia governorate, the setting of this study, is located in Lower (Northern) Egypt and houses approximately 953,000 residents (CAPMAS, 2008). In 2005, most households had access to electricity (98%) and piped water (95%) (United Nations Development Programme [UNDP] & Institute for National Planning [INP], 2008). In 2006, the gross national product (GDP) per capita (US$1206) was slightly lower than that for all Lower Egypt (US$1234), as was women's labor force participation (24% *vs* 27%). Yet, the literacy rate among adults 15 years or older (76%) was higher than for all Lower Egypt (69%), as was the literacy rate for women (71% *vs* 69%). Moreover, the health infrastructure in Ismailia fares better than in all Lower Egypt, with similar numbers of doctors (6) and nurses (17) per 10,000 residents but more beds (28.3 *vs* 17.9 per 10,000) and health units (15 *vs* 11 per 100,000). Thus, Ismailia, Egypt, fares better on some socioeconomic indicators even when compared with the wealthier, Northern part of Egypt.

Data, Participants, and Sample

The data for this analysis come from a study funded by the National Institute on Aging, entitled "Measurement of Gender Differences in Disability and Care." This study was conducted in 2003 in one rural and one urban district in Ismailia governorate with two aims: (a) to assess the feasibility of conducting in-home tests of physical function, and (b) to compare subjective and objective measures of physical functioning among adults 50 years and older. The study was conducted by Emory University and the Social Research Center of the American University in Cairo, in collaboration with the faculty of Medicine, Suez Canal University.

The field work for the survey was carried out in three stages. The first stage consisted of a household census of the study area. The second stage (or baseline) involved a face-to-face interview with respondents. The final stage (or follow-up), which was carried out approximately 2 weeks later, included a series of in-home tests of physical performance and retests of a subset of questions asked at baseline. Following published guidelines from the *Women's Health and Aging Study* (WHAS) (Guralnik, Fried, Simonsick, Casper, & Lafferty, 1995), six performance tests assessed upper-extremity range of motion (ROM), and three performance tests assessed lower-extremity gross mobility (GM). The six ROM tests included grip strength, pinch gauge, shoulder external and internal rotations, overhead lift, and the Purdue pegboard. The Purdue Pegboard Test was first developed in 1948 by Joseph Tiffin, an Industrial Psychologist at Purdue University. It measures gross movements of hands, fingers, and arms as well as fingertip dexterity in an assembly task. Testing these abilities is done

by timing how many pins a person can move from a cup and place sequentially into pin holes located in the pegboard. The three GM tests included standing balance, gait speed, and chair stands. An Egyptian geriatrician who was trained by members of the WHAS team then trained the field staff to conduct these tests of physical performance.

The target sample was 450 women and 450 men distributed evenly across the ages 50–59, 60–69, and 70 years or older. A household census was completed in three randomly selected segments in one urban district and six villages in a rural district to develop the sample frame of older adults. All women and men aged 70 years or older were invited to participate, and sampling fractions were used to sample randomly women and men 50–59 years (1:3) and 60–69 years (1:2). A total of 1,182 adults (559 men and 623 women) were selected to take part in the study. Eighty-nine percent of eligible participants completed the baseline interview (1,053 total; 491 men and 562 women), and 88% of baseline participants completed the in-home tests of physical performance (933 total; 535 women and 398 men).

The sample for this analysis included ever-married adults 50 years or older with complete data on relevant variables from the baseline interview and tests of physical performance. Of the 933 test participants, 9 never-married participants and 41 participants with item non-response for selected covariates were excluded, yielding an unweighted sample of 883 (400 men and 483 women) or a weighted sample of 883 (435 women and 448 men). Weights were used to reflect the older adult population in Ismailia governorate, by sex and 10-year age groups (50–59, 60–69, and 70 years or older), according to the 2006 census.

A comparison between baseline participants who were included in (n = 883) and excluded from (n = 170) the analysis revealed that the later group was more often men, working, self-supported, wealthy, insured, and less likely to report any difficulty executing physical tasks and using outpatient services in the prior 4 months. However, differences between women and men in their mean attributes did not differ markedly between the two samples (results available upon request). Moreover, in multivariate models of disability, proportionate reductions in the coefficient for female gender with the successive inclusion of covariates other than objective performance were similar for these two samples (results available upon request). These results suggest that sample selectivity most likely had a negligible effect on the generalizability of the findings to older adults in these districts.

Measures and Methodology

Dependent variables.—The dependent variables in this analysis were scales of self-reported difficulty with ADLs, upper-extremity ROM, and lower-extremity GM. Difficulty with ADLs was used to capture extreme disability that may not be captured by scores for difficulty with ROM and GM. Self-reported difficulty with ADLs was based on reports of the level of difficulty (0 = *none*, 1 = *some*, 2 = *a lot*, and 3 = *unable*) with eating, dressing, getting in and out of a bed or chair, bathing, and reaching and using the toilet by yourself and not using aids (Katz et al, 1963). The 0–3 scores for each activity were summed, and the sum was divided into three ordered categories (0 = *had no difficulty with any activity*, 1 = *had some or a lot of difficulty with one activity* [scored 1–2], 2 = *was unable to perform at least one activity or had some and a lot of difficulty with at least two activities* [scored 3–15]). Measures of difficulty with ROM and GM followed a standard system of scoring (Simonsick et al., 2001), with some changes to the measure of GM to fit this sample. The scale derived by Simonsick and colleagues (2001) measured disability in a moderately to severely disabled population of women, whereas the sample in Ismailia was drawn from the general population of community-dwelling women and men aged 50 years or older. Items pertaining to ROM included level of difficulty (0 = *none*, 1 = *some*, 2 = *a lot*, and 3 = *unable*) extending arms to shake hands, fingering small objects, raising arms above the shoulders, and carrying 5 kg. The scores for each item were summed, and the sum was divided into three ordered categories (0 = *no difficulty in any activity*, 1 = *some or a lot difficulty with one activity* [scored 1–2], 2 = *unable to perform one activity or some and a lot of difficulty with at last two activities* [scored 3–12]). Items pertaining to GM included the level of difficulty to walk generally, to walk 100 m without resting, to climb 10 stairs without resting, and to stoop, kneel, or crouch. For the last item, respondents were assigned a zero if they reported no difficulty or a one if they reported any difficulty, because this activity depended on the ability to walk. All other items had possible scores of 0–3. Scores for these items were summed, and the sum was divided into three ordered categories (0 = *no difficulty in any activity*, 1 = *some difficulty in one activity* [scored 1–2], 2 = *unable to perform one activity or some and a lot difficulty performing at least two activities* [scored 3–10]).

Explanatory variables.—The main explanatory variable was gender (woman *vs* man). Because age is highly correlated with levels of disability, a control for age group was included in all models (50–59, 60–69, ≥70 years). Finally, three groups of variables were included sequentially in the analysis to capture: objective physical performance, reported morbidity and health care use, and socioeconomic status and social relationships.

Objective measures of physical performance included two summary measures for the results of tests of upper-extremity ROM (ROMTEST) and lower-extremity GM (GMTEST). Respondents' performance on each physical test was scored according to standard guidelines (Guralnik et al., 1994). For tests with time-to-completion output (measured walk, Purdue pegboard, and chair stands) or equipment-specific readings (grip strength and pinch gauge), individuals were assigned a score of 4 if they were unable to participate, and scores of 0–3 for their quartile of

performance with 0 indicating the best timing or performance and 3 indicating the worst timing or performance. For tests that required satisfactory completion (overhead lift, shoulder rotation, and standing balance), individuals who were unable to participate received a score of 4, and others were assigned consecutive ranks for the completion of those tests with 0 indicating best performance and 3 worst performance. For tests of upper-extremity ROM, scores for grip strength (dominant hand), pinch gauge (dominant hand), right shoulder external rotation, right shoulder internal rotation, overhead lift, and Purdue pegboard (right hand) were summed and divided into quartiles. For tests of lower-extremity GM, scores for standing balance (0–2), gait speed (0–4), and chair stands also were summed and divided in quartiles. The scale for balance was based on the respondent's ability to stand in side-by-side, semitandem, and full-tandem positions each for 10 s (2 = *unable to hold any stand for 10 s*, 1 = *able to hold side-by-side or semitandem stand for 10 s*, 0 = *able to hold semitandem and full-tandem stand for 10 s*). The score for gait speed was based on two activities namely a 3-m usual walk and a 3-m fast walk. Each activity was performed twice and the best time for each activity was scored as 4 for *unable to walk*, 0–3 for the *quartiles for walking time* with zero indicating best timing quartile and three indicating worst timing quartile. The general score for the gait speed was the sum of the scores for the two activities. Higher scores for ROMTEST and GMTEST indicated higher levels of physical disability (for a comparison between the self-reported physical activities and the corresponding measure of physical tests, see Appendix).

Measures for underlying morbidity included the number of doctor-diagnosed illnesses reported from a list of selected conditions (hypertension; diabetes; lung diseases; heart diseases; rheumatism, arthritis, or osteoarthritis; osteoporosis; stroke; cancer). Measures of health care access and use included the respondents' possession of health insurance and use of any health service or spending at least one night in the hospital during the 4 months before baseline.

Measures for socioeconomic status included the respondents' schooling (0 = *none*, 1 = *any primary*, 2 = *more than primary*), household standard of living (having 0 = 0–5, 1 = 6–12, 2 = 13–17 assets or amenities). These assets and amenities included finished flooring; source of water and having tap, sink, and soap inside the house; flushing toilet; radio; television; video recorder; land telephone; mobile telephone; fan; water heater; refrigerator; washing machine; bicycle; car and main source of income (0 = *self*, 1 = *self and others*, 2 = *others only*). Finally, measures of social relationship included marital status (1 = *married*, 0 = *formerly married*), continuous number of living children, living arrangement (0 = *alone or with spouse only*, 1 = *with unmarried children*, 2 = *with married children*, 3 = *with others*), and place of residence (1 = *rural*, 0 = *urban*).

Analytic strategies.—Descriptive statistics for self-reported ADL, ROM, and GM as well as objective physical performance ROMTEST and GMTEST were compared for older women and men, overall and by age groups. Then, chi-squared (χ^2) tests for independence and tests of difference in proportions were computed for specific categories of all covariates. Point estimates and standard errors accounted for the age–gender-stratified sample design (Rao & Scott, 1981, 1984).

Ordinal logistic regression was used to estimate the unadjusted, partially adjusted, and fully adjusted proportional log odds and odds, for women versus men, of self-reporting difficulty with ADLs, ROM, and GM. Partially adjusted models sequentially added controls for (a) age, (b) objective measures of physical performance, (c) morbidities and health care use and access, and (d) social and economic factors. All regression coefficients and standard errors were adjusted to account for the age–gender-stratified sample design as well as the clustering within the same household (Rogers, 1993; Williams, 2000). Changes in the magnitude and significance of the coefficient for gender with sequential adjustment for sets of covariates indicated the extent to which each set accounts for differences between women and men in their self-reported difficulty with ADLs, ROM, and GM. To test the proportional odds assumption of the ordered logit, we performed the Brant Test (Brant, 1990), the results of which indicated that the proportionality assumption held for all models (available from authors upon request).

Results

Characteristics of the Sample

The age distribution of women and men differed significantly, with women more likely to be younger (58.5 years) than men (60.6 years) (Table 1). Place of residence was similar for women and men, with around 52% of older adults living in urban areas. Compared with men, women more often had no schooling (72% *vs* 49%) and relied mainly on others for income (35% *vs* 7%). No differences between women and men in the score for household standard of living were apparent. On average, women and men had about five living children, but women more often were widowed (42% *vs* 6% for men).

Regarding self-reported morbidity and access to/use of health care, women more often reported illnesses such as hypertension (47% *vs* 25%), arthritis (53% *vs* 35%), osteoporosis (4% *vs* 0.8%), and heart diseases (9% *vs* 5%), and a higher percentage reported two or more illnesses (43% *vs* 20%). Compared with men, women also more often reported using outpatient care in the prior 4 months (77% *vs* 67%); however, crude rates of hospitalization in the prior 4 months were similar for women and men. Women less often reported having health insurance (8.0% *vs* 52%) despite their more frequent use of outpatient care.

Table 1. Characteristics of Women and Men Aged 50 years and Older, Ismailia, Egypt

	Women	Men	
Weighted (*n*)	435	448	*p*[a]
Demographic characteristics			
Age group (50–59)	63.2	53.3	**
60–69	24.7	32.0	
70+	12.1	14.7	
Residence urban (reference: rural)	53.9	50.1	Ns
Economic resources			
Education (none)	72.2	49.4	***
Primary	25.3	33.5	
More than primary	25.5	17.1	
Household standard of living (<6 assets, durables of 17 possible)[c]	34.3	30.4	Ns
6–12	37.6	38.5	
13–17	28.1	31.1	
Source of income (self)	38.7	75.4	***
Children/other relatives/others	35.4	7.0	
Self and children/other relatives/others	25.9	17.6	
Social relationships and support			
Head or spouse of the household (reference:none)	27.5	96.4	***
Marital status (currently married)	55.5	93.4	***
Divorced	2.3	1.5	
Widowed	42.2	6.1	
Living arrangements (alone/spouse only)	14.3	10.1	***
Unmarried children only	62.5	85.7	
Any married children	19.2	2.9	
Other	4.0	1.3	
Number of living children (0 child)	5.2	2.1	Ns
1–3	18.4	21.6	
4–6	51.7	54.5	
7 and more	24.7	21.8	
Self-perceived health and reported illness/disability			
Self-rated health (poor or very poor)	28.6	22.3	***
Good	64.5	60.8	
Very good or excellent	6.9	16.9	
Reported illnesses			
Hypertension	46.5	24.9	***
Diabetes	17.2	10.7	*
Heart diseases	9	5.1	*
Lung diseases	4.5	5.7	ns
Stroke	4.0	6.3	
Arthritis	52.8	35.0	**
Osteoporosis	4.0	0.8	**
Cancer	0.4	0.8	Ns
Number of reported illnesses (none of 8 reported)	22.5	42.1	***
1	32.4	37.6	
2	31.4	11.6	
3–8	13.7	8.7	
Use of biomedical health services			
Any health insurance (reference: no)	8.4	51.5	***
Any outpatient services last 4 months (reference: no)	76.9	66.7	***
Any nights in hospital last 4 months (reference: no)	5.3	5.7	ns

Notes. For dichotomous variables, percentages for the non-reference category only are provided, and the name of the reference group is indicated in parentheses.

[a]**p* < .05. ***p* < .01. ****p* < .001, ns = not significant, for chi-squared test of independence accounting for sample design.

[b]**p* <.05. ***p* <.01. ****p* <.001, ns = not significant, test of difference in two proportions accounting for sample design.

[c]This scale is based on owning following items: finished flooring; source of water and having tap, sink, and soap inside the house; flushing toilet; radio; television; video recorder; land telephone; mobile telephone; fan; water heater; refrigerator; washing machine; bicycle; car.

Self-Reported Physical Limitations by Gender and Age

Significant differences were observed between women and men in self-reported difficulty with ADLs, ROM, and GM, especially among the oldest adults (≥70 years) (Table 2). Specifically, women reported more difficulty with ADLs in general, but these overall differences resulted only from gaps among adults 70 years and older (Table 2), with proportionately more women than men reporting the greatest difficulty at this

Table 2. Levels of Difficulties Reported by Older Adult for Activities of Daily Living (ADL), Upper-Extremity Range of Motion (ROM), and Lower-Extremity Gross Mobility (GM), Women and Men Aged 50 years and Older, Ismailia, Egypt

	50–59				60–69				70+				Total			
	Women	Men	p^a	p^b	Women	Men	p^a	p^b	Women	Men	p^a	p^b	Women	Men	p^a	p^b
Weighted (n)	275	239			107	143			53	66			435	448		
ADL summary measure (no disability)[c]	87.5	95.4	ns	ns	69.4	82.4	ns	ns	58.3	67.8	ns	*	79.5	87.2	*	*
1–2	9.3	3.1			15.9	10.8			14.6	17.1			11.6	7.6		
2–15	3.2	1.5		ns	14.7	6.8		ns	27.1	15.1		**	9.0	5.2		*
ROM summary measure (no disability)[d]	74.5	90.8	*	*	58.5	97.8	**	**	42.2	62.3	***	**	66.7	83.1	***	***
1–2	20.8	6.1			29.8	14.0			33.7	26.6			24.6	11.6		
3–12	4.7	3.1		ns	11.6	6.3		ns	24.1	11.1		***	8.7	8.7		ns
GM summary measure (no disability)[e]	37.9	77.4	***	***	23.4	55.2	***	***	16.5	41.5	***	***	31.7	65.0	***	***
1–2	36.1	15.6			32.5	25.8			23.1	27.1			33.6	20.5		
3–10	26.0	7.1		**	44.1	19.0		**	60.4	31.4		***	34.7	14.5		***

Notes. [a]*p <.05. **p <.01. ***p <.001, ns = not significant, for chi-squared test of independence accounting for sample design.

[b]*p <.05. **p <.01. ***p <.001, ns = not significant, test of difference in two proportions accounting for sample design.

[c]This scale is constructed by summing scores for difficulty with eating, dressing, getting in and out of bed or chair, bathing and reaching and using toilet. All activities used the four-level categorization for levels of difficulty.

[d]This scale is constructed by summing scores for difficulty reaching out to shake hands, fingering small objects, reaching overheald and carrying and lifting 5 kg. All activities used the four-level categorization levels of difficulties.

[e]This scale is constructed by summing scores for difficulty walking, walking 100 m, climbing 10 steps without resting and stooping, courching and kneeling. All activities used the four-level categorization for degree of difficulty (0 = *none*, 1 = *some*, 2 = *alot*, 3 = *unable*) except for stooping crouching and kneeling which was included as a dichotomous variable that indicate having any difficulties in this activities.

Table 3. Distribution of Older Adults According to Upper-Extremity and Lower-Extremity Summary Scales of Performance Tests, Women and Men Aged 50 Years and Older, Ismailia, Egypt

	50–59				60–69				70+				Total			
	Women	Men	p^a	p^b	Women	Men	p^a	p^b	Women	Men	p^a	p^b	Women	Men	p^a	p^b
Weighted *n*	(275)	(239)			(107)	(143)			(53)	(66)			(435)	(448)		
Summary measure of upper extremity (ROMTEST)[c]																
1	36.4	54.0	ns		20.3	42.9	***	***	4.0	2.0	***	***	26.7	43.9	**	*
2	16.0	17.0			9.7	20.5			11.1	11.7			13.3	17.4		
3	30.0	20.2			36.5	23.1			29.4	43.9			31.9	25.4		
4	17.6	8.8			33.5	13.5		**	55.5	24.4		***	28.1	13.3		***
Summary measure of lower extremity (GMTEST)[d]																
1	24.4	41.0	**	*	19.4	35.4	ns	*	8.5	23.3	ns	**	21.2	36.6	***	***
2	21.2	32.7			14.2	24.0			11.4	13.7			18.3	27.1		
3	31.9	17.4			31.8	21.2			26.3	25.5			31.4	19.8		
4	22.5	8.9		*	33.6	19.5		ns	53.8	37.5		ns	29.1	16.5		**

Notes. [a]*p < .05. **p < .01. ***p < .001, ns = not significant, for chi-square test of independence accounting for sample design.

[b]*p < .05. **p < .01. ***p < .001, ns = not significant, test of difference in two proportions accounting for sample design.

[c]Summary measure for upper extremity is constructed by summing up the scores of the scales for dominant hand grip strength, dominant hand pinch strenghth, right shoulder external and internal rotation, over head lift, and right hand Purdue pegboard. This sum was further classified in quartiles (1–5, 6, 7–9, 10–18).

[d]Summary measure for lower extremity is constructed by summing up the scores of the scales for stand balance, gait speed, and chair stands. The sum was further classified in quartiles (0–3, 4–5, 6–8, 9–14).

age (27% *vs* 15%). Compared with men overall, women less often reported *no difficulty* with ROM (e.g., 67% *vs* 83%). Although at age 50–59 years, similar percentages of women (5%) and men (3%) reported the highest levels of difficulty with ROM, at older ages, significantly more women (24%) than men (11%) reported severe difficulty with ROM. Differences were generally largest for difficulty with GM. Compared with men at all ages, women more often reported difficulty with GM, and the gap in the percentages reporting the greatest difficulty with GM between women and men was larger at older ages (26% *vs* 7% at ages 50–59; 44% *vs* 19% at ages 60–69; 60% *vs* 31% at ages 70 years or older).

Objective Physical Performance by Gender and Age

Compared with men, women generally scored worse on objective tests of upper- and lower-extremity functioning (Table 3). Differences in upper-extremity performance (ROMTEST) were insignificant at ages 50–59 years, but these differences were larger at older ages. Specifically, more than twice as many women than men ranked in the highest (worst) quartile of upper-extremity functioning among 60–69 year old (34% *vs* 14%) and those 70 or older (56% *vs* 24%). At all ages, women ranked more often than men in the highest (worst) quartile for lower-extremity functioning (GMTEST) (23% *vs* 9% at ages 50–59 years, 34%

Table 4. Unadjusted, Partially Adjusted, and Fully Adjusted Odds of Reporting Difficulty With Activities of Daily Living (ADL), Upper-Extremity Range of Motion (ROM), and Lower-Extremity Gross Mobility (GM), Women and Men Aged 50 Years and Older, Ismailia, Egypt[a]

	ADLs			ROM			GM		
Covariates	OR	p^b	95% CI	OR	p^b	95% CI	OR	p^b	95% CI
Gender only	1.77	*	(1.23, 2.51)	2.39	***	(1.72, 3.32)	3.71	***	(2.77, 4.95)
Gender + age	2.20	***	(1.49, 3.25)	2.86	***	(1.99,4.10)	4.53	***	(3.29, 6.17)
Gender + age + physical performance	1.54	ns	(1.01, 2.36)	2.05	**	(1.38, 3.10)	3.53	***	(2.53, 4.90)
Gender + age + physical performance + health status and access to health services	1.39	ns	(0.84, 2.27)	2.23	***	(1.39, 3.59)	2.62	***	(1.79, 3.86)
Gender + age + physical performance + health status and access to health services + Socioeconomic resources	1.40	ns	(0.79, 2.51)	2.15	**	(1.24, 3.73)	2.21	***	(1.41, 3.46)

Notes. [a]These odds are based on ordinal logistic regression models adjusted for age–gender-stratified sample design.
[b]*$p < .05$. **$p < .01$. ***$p < .001$.

vs 20% at ages 60–69 years, 54% *vs* 38% at ages 70 or older, and 29% *vs* 17% for the whole sample), whereas men more often ranked in the lowest quartile for these tests (41% *vs* 24% at 50–59 years, 35% *vs* 19% at 60–69 years, 23% *vs* 9% at 70 years or older, and 37% *vs* 21% for the whole sample).

In summary, Tables 1–3 show that, compared with men in Ismailia, women more often reported higher levels of difficulty with ADLs, and upper- and lower-extremity physical tasks. Furthermore, women performed worse than men on upper-extremity (ROMTEST) and lower-extremity (GMTEST) tests of physical functioning.

Multivariate Analyses of Reported Disability

Table 4 presents a summary of the five models that estimated the unadjusted, sequentially adjusted, and fully adjusted proportional log odds and proportional odds for women versus men of self-reporting more difficulty with ADLs and upper- and lower-extremity physical tasks. In all cases, the unadjusted proportional odds of reporting more physical limitations were higher for women than men (OR = 1.8 for ADLs, OR = 2.4 for ROM, and OR = 3.7 for GM).

Controlling only for age, the proportional odds of self-reporting more disability on all three dimensions remained higher for women than men (OR = 2.2 for ADLs, OR = 2.9 for ROM, OR = 4.5 for GM). Controlling simultaneously for age and objective physical functioning attenuated the differences between women and men in the proportional odds of self-reporting more difficulty with ROM and GM (OR = 2.1 for ROM and OR = 3.5 for GM) and made non-significant the difference in self-reported difficulty with ADLs (OR = 1.5 for ADLs).

Controlling for self-reports of previously diagnosed morbidities and access to/use of health care slightly increased the proportional odds of self-reporting difficulty in ROM (from 2.1 to 2.3). The same controls decreased the proportional odds of self-reporting difficulty in lower-extremity activities (from 3.5 to 2.6). Controlling additionally for social and economic factors markedly reduced the proportional odds of reporting more difficulty with these two types of activities. In fully adjusted models, the proportional odds of reporting more difficulty with ROM and GM remained significantly higher for women than men (OR = 2.2 for both).

Table 5 presents the full main effect models for the three self-reported difficulties with physical activities. As expected, age and objective measures of physical functioning were strongly related to all measures of self-reported disability. In contrast, morbidities of different severity and symptomatology had different associations with the three outcomes. For example, those reporting a prior stroke had 2.5 times higher proportional odds of reporting difficulties with ADLs, ROM, and GM. Those reporting osteoporosis had three times higher proportional odds of reporting difficulties in ADLs and six times higher proportional odds of reporting difficulties with GM. Those reporting doctor-diagnosed rheumatism, arthritis, or osteoarthritis had twice the reported difficulty with GM. Measures of access and use of health care were not associated with any of the outcomes.

For the measures of socioeconomic status and social relationships, only higher standard of living was associated with lower proportional odds of self-reporting difficulties in ADLs and ROM. Furthermore, the proportional odds of self-reporting difficulties in GM increased by 92% among older adults who reportedly relied on mixed sources of income (self and others) for financial support. For social relationships, being married was not associated with self-reported difficulties with ADLs and ROM, but was associated with 40% lower proportional odds of GM difficulty. Living with others was the only residential arrangement that was associated with self-reported disability, and predicted a 79% lower proportional odds of self-reported difficulties with ROM.

Discussion

This analysis assessed the factors accounting for differences between older women and men in reported disability

Table 5. Proportional Odds Ratio of Self-Reporting Difficulty with Activities of Daily Living (ADL), Upper-Extremity Range of Motion (ROM), and Lower-Extremity Gross Mobility (GM), Women and Men Aged 50 Years and Older, Ismailia, Egypt[a]

	ADL			Upper-extremity ROM			Lower-extremity GM		
Variables	OR		95% CI	OR		95% CI	OR		95% CI
Female *vs* male	1.40		(0.79, 2.51)	2.15	**	(1.24, 3.73)	2.23	***	(1.43, 3.46)
Age 50–59 years	1.00			1.00			1.00		
Age 60–69 years	2.46	***	(1.44, 4.20)	1.60	*	(1.03, 2.50)	1.79	**	(1.24, 2.61)
Age 70 years and older	4.13	***	(2.34, 7.30)	3.15	***	(1.93, 5.18)	2.53	***	(1.59, 4.02)
Objective physical limitation									
ROMTEST first quartile	1.00			1.00			1.00		
ROMTEST second quartile	1.03		(0.46, 2.31)	0.63		(0.31, 1.30)	1.76		(1.10, 283)
ROMTEST third quartile	1.06	**	(0.54, 2.09)	1.08		(0.62,1.90)	1.54	*	(1.00, 2.38)
ROMTEST fourth quartile	3.56	***	(1.78, 7.17)	2.77	**	(1.55, 4.98)	3.19	***	(1.92, 5.29)
GMTEST first quartile	1.00			1.00			1.00		
GMTEST second quartile	0.80		(0.38, 1.69)	0.70	ns	(0.37, 1.31)	1.31		(0.82, 2.07)
GMTEST third quartile	1.02		(0.53, 1.96)	1.06	ns	(0.61, 1.83)	1.71	**	(1.14, 2.56)
GMTEST fourth quartile	1.97	*	(1.04, 3.76)	2.31	***	(1.32, 4.07)	3.24	***	(2.00, 5.27)
Health status									
Hypertension	1.33		(0.83, 2.11)	1.36		(0.92, 2.01)	1.81	***	(1.25, 2.61)
Diabetes	1.76		(0.97, 3.21)	1.25		(0.77, 2.03)	1.04		(0.67, 1.62)
Lung diseases	1.52		(0.70, 3.36)	0.89		(0.43, 1.82)	0.48	*	(0.24, 94)
Heart diseases	0.72		(0.36, 1.44)	0.84		(0.43, 1.62)	1.15		(0.67, 1.96)
Stroke	3.40	**	(1.51, 7.67)	4.43	**	(2.13, 9.22)	2.55	*	(1.36, 4.80)
Rheumatism, arthritis, or osteoarthritis	1.15		(0.74, 1.79)	1.39		(0.95, 2.03)	2.32	***	(1.65, 3.28)
Osteoporosis	3.44	*	(1.26, 9.40)	2.35		(0.86, 6.40)	6.47	***	(3.54, 10.95)
Cancer	1.36		(0.20, 9.14)	2.97		(0.49, 17.99)	1.64		(0.44,6.06)
Access to health care									
Having health insurance	1.04		(0.56, 1.92)	0.75		(0.46, 1.23)	1.21		(0.76, 1.92)
Use of any health service in the last 4 months	1.34		(0.76, 2.38)	1.23		(0.75, 2.00)	1.25		(0.82, 1.91)
Hospitalization within the last 4 months	1.12		(0.55, 2.26)	2.38		(1.04, 5.41)	1.04		(0.47, 2.35)
Socioeconomic resources									
No education	1.00			1.00			1.00		
Any primary education	0.99		(0.67, 1.46)	1.04		(0.72, 1.51)	1.22		(0.91, 1.65)
Having 0–5 of household assets or amenities	1.00			1.00			1.00		
Having 6–12 of household assets or amenities	0.54	**	(0.33, 0.89)	0.66	**	(0.43, 1.00)	0.77		(0.51, 1.18)
Having 13–17 of household assets or amenities	0.52	*	(0.26, 1.02)	0.69	*	(0.39, 1.20)	0.73		(0.45, 1.21)
Source of income: Self only	1.00			1.00			1.00		
Source of income: Self and others	1.16		(0.62, 2.18)	1.22		(0.72, 2.07)	1.79	**	(1.11, 2.88)
Source of income: others only	1.13		(0.68, 1.88)	1.04		(0.65, 1.64)	0.75		(0.50, 1.13)
Social relationships									
Married	0.84		(0.51, 1.37)	0.88		(0.57, 1.36)	0.61	**	(0.42, 0.90)
Number of living children	1.02		(0.93, 1.11)	1.00		(0.93,1.08)	1.07		(1.00, 1.15)
Living arrangement: alone or with spouse only	1.00			1.00			1.00		
with unmarried children	0.96		(0.51,1.78)	0.94		(0.54, 1.64)	0.83		(0.48, 1.44)
with married children	0.70		(0.40, 1.23)	1.04		(0.61, 1.76)	0.78		(0.47, 1.29)
with others	0.61		(0.21, 1.75)	0.22	**	(0.07, 0.66)	0.63		(0.25, 1.58)
Rural residence	1.42		(0.85, 2.36)	1.07		(0.69, 1.68)	1.14		(0.79, 1.65)
/cut1	3.26	*	(1.71, 4.80)	2.11	**	(0.91, 3.31)	2.48	*	(1.28, 3.68)
/cut2	4.50	***	(2.95, 6.05)	4.02	***	(2.80, 5.25)	4.22	**	(2.98, 5.47)

Notes. [a]These odds are based on ordinal logistic regression models adjusted for age–gender-stratified sample design.
[b]*$p < .05$. **$p < .01$. ***$p < .001$.

in Ismailia, Egypt. The analysis was based on rich data from an extensive population-based survey of adults 50 years or older that included a full set of in-home tests of physical functioning. Following other research (Guralnik, Branch, Cummings, & Curb, 1989; Merrill et al., 1997; Rahman & Liu, 2000), the analysis showed that objective functional status strongly predicted self-reports of disability. In addition, other attributes including doctor-diagnosed morbidities, access to and use of health care, socioeconomic status, and social relationship were significantly associated with self-reports of disability. Large differences between women and men in all of these attributes raised questions about which variables accounted for gaps in self-reported disability.

Our results showed that, compared with older men, older women more often reported higher levels of difficulty with ADLs, ROM, and GM. Differences between women and men were especially pronounced for self-reported GM

disability. Furthermore, women compared with men performed worse on objective tests of physical functioning and more often reported disabling morbidities and lower socioeconomic status.

Adjusting for age and objective measures of physical performance eliminated differences between women and men in their reported difficulty with ADLs; yet, differences in reported difficulties with ROM and GM remained after adjusting for these objective measures. In the full model that also controlled for reported morbidities and access to/use of health care as well as socioeconomic status and social relationships, the latter variables accounted for the largest proportions of residual gaps in self-reported disability. However, in full models that adjusted for age, objective functioning, and other reported health, economic, and social conditions, women maintained significantly higher proportional odds of reporting difficulty with ROM and GM.

These residual gaps in reported disability may result from unmeasured gaps in men's and women's (a) functional performance, (b) reported morbidity and access to/use of health care, and/or (c) socioeconomic status and social relationships. Most notable are potential unmeasured gaps in BMI. Among adults in the Middle East including Egypt, women are obese more often than men (Galal, 2002; Yount, 2012), and body weight strongly predicts lower-extremity disabilities (Himes, 2000; Simonsick et al., 2001). Thus, unmeasured differences in BMI in this sample may account for residual gaps in reported disability. Many studies in western societies have disclosed the strong relationship between BMI and reported physical limitations. Stenholm and colleagues (2007) argued that obesity can lead to the avoidance of physical activity, which in turn, can contribute to a heightened perception of physical limitation. Larsson and Mattsson (2001a, 2001b) revealed that in comparison with normal weight women, obese women were more likely to perceive more difficulties in performing physical activities and more likely to feel more physical demands and pain with strenuous work even after controlling for their objective measures of physical activities. Other researchers have pointed to gender differences in the psychosocial affect of obesity on personal well being. Compared with men, obese women were more likely to experience anxiety, depressive disordered, and lower self-esteem (Kearney-Cooke, 1999; Osei-Assibey, Kyrou, Saravanan, & Matyka, 2010; Tuthill et al., 2006).

Also notable were unmeasured social roles that may affect men's and women's perceptions of disability. On becoming a mother-in-law or grandmother, for example, older Egyptian women achieve more family power, and may delegate daily chores especially to junior women and grandchildren, limiting their mobility and engagement in household activities (Yount, 2005). In contrast, men often remain family providers into their later years and continue to engage in the labor market (Khadr, 2004). These differences in social roles may confound reports of "disability." Finally, residual gaps in reported disability may result from gendered socialization, which teach women and men to perceive disability differently. In such cases, a residual gap in reported disability would remain after controlling for gaps in other characteristics. That a residual gender gap does not remain for reported difficulty with ADLs suggests that gender gaps in reporting may be less relevant for extreme levels and forms of disability.

To some extent, the results from Ismailia depart from those in other highly gender-stratified settings (Rahman & Liu, 2000). In Bangladesh, for example, gaps in any *reported difficulty* with ADLs persisted after adjusting for age and objective performance (Rahman & Liu, 2000). These differences across settings may be attributed to the greater tendency of Bangladeshi women to over-report ADL disability, variation across studies in the measurement of ADL limitation, or the inclusion of more controls for objective function in the Egyptian sample. The results in Ismailia also departed from those in the United States (Merrill et al., 1997), where differences in GM limitation disappeared after adjusting for age and objective performance. These differences across settings may result from Egyptian women's greater tendency to over-report GM limitations or to higher levels of (unmeasured) obesity in Egyptian women. Together, differences in findings across more (Bangladesh and Egypt) and less (United States) gender-stratified settings suggest that women's and men's reports of physical limitations may be associated with the degree of gender equality in society.

Notably, the cross-sectional nature of these data precluded the inclusion of other variables that have been associated elsewhere with reported disability. Such factors include the early life experiences that predict later-life health and physical functioning, especially in women (Watt et. al., 2009; Kasper et. al. 2008; Hilldson et. al. 2006). Childhood poverty, psychological status, health behaviors, and the quality of social relationships may affect or be affected by health in old age (e.g., Armenian Pratt, Gallo, & Eaton, 1998; Bruce, Seeman, Merrill, & Blazer, 1994; Hilldson et. al. 2006; Kasper et. al. 2008; Ormel, Rijsdijk, Sullivan, Sonderen, & Kempen, 2002; Watt et al., 2009). The distributions of some of these attributes differ for older women and men and the inclusion of these variables in full multivariate models accounted for some but not all of the residual gaps in reported disability (results available on request). To assess the causal relationships among these variables would require repeated measures over time and data on instrumental variables to account for their potential endogeneity.

Together, the findings from this analysis corroborate those from other research in the region (Yount & Agree, 2005) and suggest that collecting self-reports of difficulty with basic ADLs may be an appropriate and cost-effective way to compare actual levels of ADL disability across genders and contexts. However, although self-reports of difficulty with

ROM and GM are meant to capture disability in a standard social environment, group differences in perceptions and social roles may systematically affect the responses to these questions. Thus, in a highly gender-stratified society like Egypt, these self-reported measures may offer insights about differences between women and men in their perceived needs for care; yet, these measures may provide a biased picture of disparities in objective functional status. In this case, in-home tests of physical performance may offer a cost-effective alternative to monitoring levels and disparities in objective functional disabilities in highly stratified settings.

The findings from this analysis have at least three policy implications to meet the needs of older, disabled adults in Egypt. First, older Egyptian women have higher objective functional limitation than men, and so have greater real needs for functional assistance. Such assistance may come in the form of simple technologies to improve mobility and functional independence. Such assistance also may be available in families, who normatively are still expected to provide such assistance. However, as women's schooling attainment and formal work increases, new demands on their time are likely to compete with the real needs of older women (and men) for functional assistance. Thus, surveys of the family members on whom disabled older adults depend would help to quantify potentially growing needs for paid in-home care. Beyond differences in objective functioning, older women also report higher disability, suggesting their potentially greater demands for functional assistance. Potential over-reporting of disability may require educational interventions among older women and men to improve their abilities to assess functional capacities in ways that more closely reflect objective needs for care. Finally, because of gendered socialization, older disabled men may be less likely to report disabilities and to seek assistance for them. Such men may, therefore, be more invisible to the public health infrastructure. For this reason, community outreach and education may be needed at least initially to meet the functional needs of older disabled men.

Funding

This research was supported by grants from the National Institute on Aging (R03-AG021707-01, P.I. Kathryn M. Yount) and the Social Research Center, the American University in Cairo.

Supplementary Material

Supplementary material can be found at: http://psychsocgerontology.oxfordjournals.org/

Acknowledgments

Assistance from Dr Emily Agree and Dr Aryeh Stein in designing the study and assistance of Dr Hoda Rashad in its execution are appreciated. Dr Nadia El Afify's participation in training staff to conduct the in-home tests of physical performance also is appreciated. Finally, the authors thank anonymous reviewers for comments on an earlier version of this article.

Correspondence

Correspondence should be addressed to Zeinab Khadr, Department of Statistics, Faculty of Economics and Political Science, Cairo University, Egypt. E-mail: zeinabk@aucegypt.edu.

References

Al Snih, S., Ray, L., & Markides, K. (2006). Prevalence of self-reported arthritis among elders from Latin America and the Caribbean and among Mexican Americans from the southwestern United States. *Journal of Aging Health*, *18*, 207–223.

Alvarado, B., Zunzunegui, M., Béland, F., & Bamvita, J. (2008). Life course social and health conditions linked to frailty in Latin American older men and women. *Journal of Gerontology: Medical Sciences*, *63A*, 1399–1406.

Armenian, H., Pratt, L., Gallo, J., & Eaton, W. (1998). Psychology as a predictor of disability: A population based follow up study in Baltimore Maryland. *American Journal of Epidemiology*, *148*, 269–275.

Berkman, L., & Syme, S. (1979). Social networks, host resistance and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*, *109*, 186–204.

Bernard, S., Kincade, J., Konrad, T., Arcury, T., Rabiner, D., Woomert, A., … Ory, M. (1997). Predicting mortality from community surveys of older adults: The importance of self-rated functional ability. *Journal of Gerontology: Social Sciences, 52B*, S155–163.

Brant, R. (1990). Assessing proportionality in the proportional odds model for ordinal logistic regression. *Biometrics, 46*, 1171–1178.

Bruce, M., Seeman, T., Merrill, S., & Blazer, D. (1994). The impact of depressive symptomatology on physical disability: MacArthur Studies of successful aging. *American Journal of Public Health*, *84*, 1796–1799.

Camacho, T., Strawbridge, W., Cohen, R., & Kaplan, G. (1993). Functional ability in the oldest old: Cumulative impact of risk factors from the preceding two decades. *Journal of Aging and Health*, *5*, 439–454.

Central Agency for Population Mobilization and Statistics (CAPMAS). (2008). *General census of population, housing and buildings 2006: Final results.* Cairo, Egypt: Author.

Courtenay, W. (2000). Constructions of masculinity and their influence on men's well-being: A theory of gender and health. *Social Science and Medicine*, *50*, 1385–1401.

Engelman, M., Agree, E., Yount, K., & Bishai, D. (2010). Parity and parents' health in later life: The gendered case of Ismailia, Egypt. *Population Studies*, *64*, 165–178.

Ferrucci, L., Guralnik, J., Baroni, A., Tesi, G., Antonini, E., & Marchionni, N. (1991). Value of combined assessment of physical health and functional status in community dwelling aged: prospective study in Florence, Italy. *Journal of Gerontology: Medical Science*, *46A*, M52–56.

Fillingim, R., King, C., Ribeiro-Dasilva, M., Rahim-Williams, B., & Riley, J. (2009). Sex, gender and pain: A review of recent clinical and experimental findings. *The Journal of Pain*, *10*, 447–485.

Galal, O. (2002). The nutrition transition in Egypt: Obesity, undernutrition, and the food consumption context. *Public Health Nutrition*, *5*, 141–148.

Gallagher, N. (1990) *Egypt's other Wars: Epidemics and the politics of public health*. Syracuse, NY: Syracuse University Press.

Green, C., & Pope, C. (1999). Gender, psychosocial factors and the use of medical services: A longitudinal analysis. *Social Science and Medicine*, *48*, 1363–1372.

Guralnik, J., Branch, L., Cummings, S., & Curb, J. (1989). Physical performance measures in aging research. *Journal of Gerontology: Medical Science*, *44*, M141–M146.

Guralnik, J., Land, K., Blazer, D., Fillenbaum, G., & Branch, L. (1993). Educational status and active life expectancy among older black and whites. *New England Journal of Medicine*, *329*, 110–116.

Guralnik, J., Simonsick, E., Ferrucci, L., Glynn, R., Berkman, L., Blazer, D., … Wallace, R. (1994). A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *Journal of Gerontology Series A: Biological Sciences and Medical Sciences, 49*, M85–M94.

Guralnik, J., Fried, L., Simonsick, E., Casper, J., & Lafferty, M. (Eds.). (1995). *The women's health and aging study: Health and social characteristics of older women with disability* (NIH Publication Number 95-4009). Washington, DC: National Institutes of Health, National Institute on Aging.

Hallouda, A., Amin, S., & Farid, S. (1983). *The Egyptian fertility survey (volume II): Fertility and family planning.* CAPMAS and World Fertility Survey, International Statistical Institute.

Hazzouri, A., Sibai, A., Chaaya, M., Mahfoud, Z., & Yount, K. (2010). Gender differences in physical disability among older adults in underprivileged communities in Lebanon. *Journal of Aging and Health*, *23*, 367–382.

Himes, C. (2000). Obesity, disease, and functional limitation in later life. *Demography*, *37*, 73–82.

Hwalla, N. (2006). Nutrition and dietary practice. In Joseph, S. (Ed.). *Encyclopedia of woman and Islamic culture: Family, body, sexuality and health (vol. III).* Boston: Brill Academic Publishers.

Kaplan, R., & Erickson, P. (2000). Gender differences in quality adjusted survival using a health utilities index. *American Journal of Preventive Medicine*, *18*, 77–82.

Katz, S., Ford, A., Moskowitz, A., Jackson, B., & Jaffe, M. (1963). *Studies of illness in the aged. The index of ADL: A standardized measure of biological and psychosocial function*. *Journal of the American Medical Association*, *185*, 914–919.

Khadr, Z. (2004). Work and retirement behavior in old age: The experience of older Egyptian men. *The Egyptian population and family planning review*. Cairo, Egypt: Institute Of Statistical Studies and Research.

Khawaja, M., Dawns, J., Meyerson-Knox, S., & Yamout, R. (2008). Disparities in child health in the Arab region during the 1990s. *International Journal for Equity in Health*, *7*, 24. Retrieved from http://www.equityhealthj.com/content/7/1/24 (accessed on February 19, 2011).

Kinsella, K., & Velkoff, V. (2001). *U.S. Census Bureau Series, An Aging World: 2001*. Series: P95/01-1. Washington, DC: U.S. Government Printing Office.

Larsson, U., & Mattsson, E. (2001a). Perceived disability and observed function limitation obese women. *International Journal of Obesity Metabolic Disorder*, *25*, 1701–1712.

Larsson, U., & Mattsson, E. (2001b). Functional limitations linked to high body mass index, age and current pain in obese women. *International Journal of Obesity Metabolic Disorder*, *25,* 893–899.

Lieberman, L., Meana, M., & Stewart, D. (1998). Cardiac rehabilitation: Gender differences in factors influencing participation. *Journal of Women's Health*, *7*, 717–723.

Matthews, S., Manor, O., & Power, C. (1999). Social inequalities in health: Are there gender differences? *Social Science and Medicine*, *48*, 49–60.

Mendoza-Sassi, R., & Beria, J. U. (2003). Prevalence of having a regular doctor, associated factors, and the effect on health services utilization: A population-based study in Southern Brazil. *Cad Saude Publica*, *19*, 1257–1266.

Merrill, S., Seeman, T., Kasl, S., & Berkman, L. (1997). Gender differences in comparison of self reported disability and performance measure. *Journal of Gerontology: Medical Science*, *52A*, M19–M26.

Murray, C., & Chen, L. (1992). Understanding morbidity change. *Population and Development Review*, *18*, 481–503.

Miller, C., & Newton, S. (2006). Pain perception and expression: The influence of gender, personal efficacy and lifespan socialization. *Pain Management Nursing*, *7*, 148–152.

Nayak, S., Shiflett, S., Eshun, S., & Levine, F. (2000). Culture and gender effects in pain beliefs and the prediction of pain tolerance: Cross-cultural research. *Journal of Comparative Social Science*, *34*, 135–151.

Newsom, J., Kaplan, M., Huguet, N., & McFarland, B. (2004). Health behaviors in a representative sample of older Canadians: Prevalences, reported change, motivation to change, and perceived barriers. *Gerontologist*, *44*, 193–205.

Ormel, J., Rijsdijk, F., Sullivan, M., Sonderen, E., & Kempen, G. (2002). Temporal and reciprocal relationship between IADL/ADl disability and depressive symptoms in later life. *Journal of Gerontology: Psychological Science*, *57*, P338–347.

Obermeyer, C. (1992). Islam, women and politics: The demography of Arab countries. *Population and Development Review, 18*, 33–60.

Osei-Assibey, G., Kyrou, S., Saravanan, P., & Matyka, K. (2010). Self reported psychosocial health in obese patients before and after weight loss. *Journal of Obesity*, Article ID 372463, 6.

Pool, G., Schwegler, A., Theodore, B., & Fuchs, P. (2007) Role of gender and norms and group identification on hypothetical and experimental pain tolerance. *Pain*, *129*, 122–129.

Rahman, M., & Liu, J. (2000). Gender differences in functioning for older adults in rural Bangladesh: The impact of differential reporting. *Journal of Gerontology: Medical Science*, *55A*, M28–M33.

Rao, J., & Scott, A. (1981). The analysis of categorical data from complex sample surveys: Chi-squared tests for goodness of fit and independence in two-way tables. *Journal of the American Statistical Association*, *76*, 221–230.

Rao, J., & Scott, A. (1984). On Chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. *Annals of Statistics*, *12*, 46–60.

Reuben, D., Reubenstein, L., Hirsch, S., & Hayes, R. (1992). The value of functional status as a predictor of mortality: Results of prospective study. *American Journal of Medicine*, *93*, 663–669.

Robert, S., & House, J. (1996). SES differentials in health by age and alternative indicators of SES. *Journal of Aging and Health*, *8*, 359–388.

Rogers, W. (1993). Regression standard errors in clustered samples. *Stata Technical Bulletin, 13*, 19–23. Reprinted in *Stata Technical Bulletin Reprints, 3*, 88–94.

Ross, C., & Bird, C. (1994). Sex stratification and health lifestyle: Consequences for men's and women's perceived health. *Journal of Health and Social Behavior*, *35*, 161–178.

Salinas, J., & Peek, M. (2008). Work experience and gender differences in chronic disease risk in older Mexicans. *Annals of Epidemiology*, *18*, 628–630.

Seeman, T. (1996). Social ties and health: The benefits of social integration. *Annals of Epidemiology*, 6, 442–451.

Sherman, S., & Reuben, D. (1998). Measures of functional status on community dwelling elders. *Journal of General Internal Medicine*, *13*, 817–823.

Simonsick, E., Kasper, J., Buralnik, J., Bandeen-Roche, K., Ferrucci, L., Hirsch, Leveillea, … Fried L. for the WHAS Research Group. (2001). Severity of upper and lower extremity functional limitation: Scale development and validation with self-report and performance-based measures of physical function. *Journal of Gerontology: Social Sciences*, *56B*, S10–S19.

Sinunu, M., Yount, K., & El-Afifi, N. (2008) Formal and informal care of frail older adults in Cairo, Egypt. *Journal of Cross-Cultural Gerontology, 24*, 63–76.

Stenholm, S., Sainio, P., Rantanen, T., Koskinen, S., Jula, A., Heliovaara, M., & Aromaa, A. (2007). High body mass index and physical impairments as predictors of walking limitation 22 years later in adult Fins. *Journal of Gerontology:Medical Science, 62A*, 859–865.

Strauss, J., Gertler, P., Rahman, O., & Fox, K. (1993). Gender and life-cycle differentials in the patterns and determinants of adult health. *The Journal of Human Resources, 28*, 791–837.

United Nations Development Programme (UNDP) and Institute for National Planning (INP). (2008). *Egypt Human Development Report 2007*. Cairo, Egypt: Author.

United Nations. (2009). *World Population Prospects: The 2008 Revision*. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. Retrieved from http://esa.un.org/unpp

Verbrugge, L. (1985). Gender and health: An update on hypotheses and evidence. *Journal of Health and Social Behavior*, *26*, 156–182.

Verbrugge, L., Reoma, J., & Gruber-Baldini, A. (1994). Short-term dynamics of disability and well-being. *Journal of Health and Social Behavior*, *35*, 97–117.

Verbrugge, L., Lepkowski, J., & Konkol, L. Levels of disability among U.S. adults with arthritis. *Journal of Gerontology, 46*, S71–S83.

WHO. (2010). *World Health Statistics 2010*. Retrieved from http://www.who.int/whosis/whostat/2010/en/index.html

Williams (2000). A note on robust variance estimation for cluster-correlated data. *Biometrics*, *56*, 645–646.

Yount, K. (2004). Maternal resources, proximity of services, and curative care of boys and girls in Minya, Egypt 1995/97. *Population Studies, 58*, 345–355.

Yount, K. (2012). Gender and health in the Arab Middle East. In Iman Nuwayhid, Marwan Khawaja, Samer Jubbour and Rita Giacaman (Eds.), *Public health in the Arab world*. Cambridge, UK: Cambridge University Press.

Yount, K., & Agree, E. (2005). Differences in disabilities among older women and men in Egypt and Tunisia. *Demography*, *42*, 169–187.

Yount, K., & Khadr, Z. (2006). A biosocial model of medication use among older women and men in Ismailia, Egypt. *Journal of Biosocial Science*, *38*, 557–603.

Yount, K., & Khadr, Z. (2008) Gender, social change, and living arrangements among older Egyptians during the 1990s. *Population Research and Policy Review*, *27*, 201–225.

Yount, K., Agree, E., & Rebellon, C. (2004). Gender and use of health care among older adults in Egypt and Tunisia. *Social Science and Medicine*, *59*, 2479–2497.

Yount, K., & Sibai, A. (2009). The demography of aging in Arab countries. In Peter Uhlenberg (Ed.), *Chapter 13 in International Handbook of Population Aging*. Dordrecht, The Netherlands: Springer.

Zimmer, Z., Natividad, J., Ofstedal, M., & Lin, H. (2002). Physical and mental health of the elderly. In Hermalin (Ed.) *The wellbeing of the elderly in Asia: A four country comparative study* (Chapter 9, pp. 361–411). Ann Arbor, MI: The University of Michigan Press.