Differences in Self-reported Disability Among

Older Women and Men in Ismailia, Egypt

Zeinab Khadr[1]

Kathryn M. Yount[2]

[1] Social Research Center, American University in Cairo, Cairo, Egypt; [2] Emory University, Atlanta, GA USA;

Introduction

Evidence from industrialized countries suggests that, compared to older men, older women more often experience functional impairments and activity limitations, longer durations of disability, and proportionately more remaining years of life disabled (e.g., Arber and Cooper 1999; Leveille et al. 2000; Leveille, et al 2000; Oman, et al., 1999; Verbrugge 1985). Some scholars have attributed women's greater disability to a higher prevalence of and a greater susceptibility to certain underlying pathologies and impairments (e.g., Andersen et al. 1999; Dunlop et al. 2002; Goldman et al. 2004; Shriver et al. 2000; Wingard et al. 1989). "Disability" in Western and non-Western populations, however, often has been measured by self-report in surveys of community-dwelling older adults. As a result, women's greater observed disability may capture not only their greater susceptibility to some underlying pathologies and impairments, but also their greater propensity to report disability (Verbrugge 1985; Yount and Agree 2005). Contextual variation in social roles and living conditions further complicates cross-cultural analyses of reported disability of women and men (Kovar 1991; Liang, et al, 1992). Despite recent attempts to address these questions in non-Western contexts (Rahman 2002; Yount and Agree 2005), previous studies either were not able to include objective measures of performance or did not consider other social, economic, and health-related differences between women and men that may account for differences in reporting. Here, we assess, in community-dwelling adults aged 50 years and older in Ismailia, Egypt, whether objective tests of physical performance account for differences between women and men in reported levels of difficulty performing ADLs, upper extremity physical tasks, and lower extremity physical tasks. Controlling for objective measures of performance, we assess whether other socioeconomic and health-related factors account additionally for differences between women and men in these three dimensions of disability.

This analysis addresses a persistent gap in research on older adults in Egypt. Building on prior research in Bangladesh and Egypt (Rahman 2002; Yount and Agree 2005), this analysis also is the first to include both objective measures of performance and an array of socioeconomic characteristics to evaluate the full range of factors that may account for differences in women's and men's reported disability in a highly gender-stratified, non-Western setting.

Background

In most settings, women have longer life expectancies at birth compared to men, yet women tend to exhibit higher levels of morbidity and disability (Portrait et al., 2001; Manton and Land, 2000; Kaplan & Erickson, 2000; Beckett, 2000; Crimmins et al., 1997; Crimmins et al.; 1989). Underlying reasons for these differences have been extensively examined by researchers over the last 20 years in many Western industrialized settings and only lately in some developing countries. In assessing these differences, researchers more frequently relayed on self-reported health status and disability since they are widely used in large population-based health surveys and are easily administered by interviewers in large-scale surveys at low costs. Furthermore, many studies have shown that these subjective measures are good predictors of many health outcomes, such as functional status decline, nursing home placement and mortality in diverse population (Ferrucci et al., 1991; Reuben, et al., 1992; Bernard et al., 1997). Nevertheless, self-reported health status and disability may be inaccurate since they encompass, in addition to an objective assessment of health and disability, other individual differences such as differences in interpreting capabilities and levels of difficulties, as well as differences in role expectations and traditional practices within specific social and physical contexts (Zimmer, 2002; Sherman and Reuben, 1998).

In assessing gender differences in self-reported disabilities and physical function, researchers have argued that these differences are attributable to intrinsic biological differences between women and men. Therefore, differences in objective performance measures should account for these differences. As a result, interest in using standardized physical performance tests in population-based surveys has escalated (Guralnik, et al, 1989). These tests provide a more precise tool to assess older adults' ability to execute specific tasks that simulate practices in daily life (Onder et al., 2002; Reuben & Siu, 1990; Daltroy et al., 1995). These performance-based measures have been found to be good predictors, but are not perfectly correlate with self-reported measures of functional status (Rahman & liu, 2000; Simonsick et al., 2001; Sherman and Reuben1998; Merrill et al, 1997). Simonsick and colleagues (2001) showed that self-reported measures that capture several levels of difficulty with basic lower-extremity physical tasks such as walking ¼ mile, walking across a small room, climbing 10 steps without resting, and stooping and crouching, might be viable substitutes for lower-extremity functional limitation when performance testing is not possible. Sherman and Reuben (1998) found in sample of a community-dwelling elders reasonable correlations between two common measures for performance-based, namely National Institute on Aging (NIA) battery and Physical Performance test (PPT), and three self-reported functional status (r=0.37-0.50). Onder and colleagues (2005) using data from the Women's Health and Aging Study (WHAS) showed that physical performance measures of lower extremity function significantly predict the onset of progressive ADL, mobility, and upper extremity disability; whereas measures of upper extremity performance were less consistently associated with the onset of disability in these tasks.

Investigation of the effects of gender on the association of self-reported and performance-based physical limitations shows that older women tend to report higher functional limitations than men do, even after controlling for objective measures of physical function (Rahman and Liu 2000, Merrill et al, 1997; Arber & Cooper, 1999). Merrill and colleagues (1997) using data from the United States, attributed differences between self-reported and objective measures of physical limitations among community-dwelling women and men to women's more intrinsically higher levels of disability status. In Bangladesh, women reported higher levels of ADL limitations than did men at the same levels of objective physical functional ability, and the authors attributed these differences to gender biased reporting of investigated ADLs within the context of rural Bangladesh (Rahman and Liu 2000).

Other scholars have argued that gender differences in reported levels of disability and functional limitations are attributable to the higher prevalence of disability-causing diseases in women compared to men (Johnson and Wolinsky, 1993; Fried et al., 1994; Merrill et al., 1997; Verbrugge, 1985, 1989; Wingard, 1984). Many studies have shown that women tend to report more non-fatal chronic health conditions, such as arthritis, rheumatism, hemorrhoids, migraines, as well as more acute health conditions such as upper respiratory infections and gastroenteritis (Guralnik and Simonsick, 1993; Kaplan and Erickson, 2000; Verbrugge, 1985). In Jamaica, women more often have reported non-fatal chronic diseases such as varicose veins, constipation, arthritis, anemia, hypertension, diabetes, chronic enteritis and colitis, all of which can lead to various forms of disability (Strauss et al, 1993). Men, on the other hand, more often reported life-threatening conditions such as coronary heart disease, emphysema, cancer, cirrhosis of the liver and kidney disease (Verbrugge, 1985; Ross and Bird, 1994). In Egypt, women report significantly more than men do 10 out of 16 health conditions (Khadr, 2002). Women more often report hypertension, heart attack, arthritis, rheumatism, diabetes, tuberculosis, foot problems, and stomach ulcers (Khadr 2002; Yount and Agree, 2004). In the previous year before the study, women suffered from 1.3 health conditions while the average for men was 1.02 (Khadr 2002). Among institutionalized older persons in Egypt, diabetes, hypertension, rheumatism, arthritis, and eye problems were the most prevalent diseases among elderly women; meanwhile coronary heart diseases and chest diseases were more prevalent among older men (Hegazy 2004). It is well documented in health literature that incidences of arthritis, stroke and osteoporoses increase the risk of disabilities (Peek & Coward, 1999; Huges & Dunlop, 1995; Manton, 1986; Manton et al., 1993; Verbrugge et al., 1991; Verbrugge et al., 1989). In the United States, women with arthritis typically experience higher rates of arthritis related ADL disabilities than do men (Verbrugge 1995). Peek and Coward (1999), in their study of 749 noninstitutionalized elderly with arthritis over a period of 30-month period, showed that at the bivariate level, women were more likely than men to develop ADL disability. Nevertheless, they showed that socioeconomic factors account for these gender differences in ADL but not in instrumental activities of daily living (IADL) due to the gendered nature of the latter group of activities.

Another group of scholars has argued that cognitive impairment significantly affects older adults' self-reported scale of ADL, gross functional mobility, physical performance tests (Scherr, et al., 1988; Gill et al., 1996; Frisoni et al, 2000). Gill and colleagues (1996), using a sample of 775 persons age 72 years and older who experience no disability in activities of daily living, showed that cognitive impairment independently increases the probability of developing functional dependence over observation period of 1 and 3 years. They concluded that over a period of 3 three years, the worst cognitively impaired individuals in their sample showed double the likelihood of developing functional dependence in ADL compared to the best cognitive group of individuals controlling for age, gender, health conditions and functional status. Some scholars that the impact of cognitive impairment on physical function differs by the type of the activities involved (Barberger-Gateau and Fabrigoule, 1997). Tabbarah and colleagues (2002) examined this relationship between cognitive ability and physical tasks using data from the MacArthur Research Network on Successful Aging Community Study, which involved 762 high functioning Americans aged 70-79 years monitored over a period of 85 months. They concluded that declines in cognitive ability are strongly associated with decreasing ability to perform both attentional demanding tasks such as balancing, one leg stand with eye open and closed and fast walk as well as routine physical tasks such as completing five chair stands and walking at a normal pace). Studies examining gender differences in cognitive ability and their impact on reported physical function are nearly non-existent. However, two studies in Egypt and Tunisia have reported that older women exhibit mildly lower cognitive ability compared to men (Yount & Agree, 2000; Yount & Khadr, 2005).

Other scholars have attributed gender differences in self-reported health measures to differences in social structural opportunities. Many studies have underscored the vulnerable status of older women compared to men on many demographic, economic and social attributes relate to health status. Compared to men, women more often have less education; less access to the formal labor market and social security safety net, in particular medical insurance; are widowed; live alone and/or are institutionalized (Chan, 1997; Crimmins et al., 1997; Rice, 2000; Ross and Wu, 1995), and such differences are especially pronounced in Egypt (Yount & Agree, 2004a, 2004b; Yount & Agree, 2005). The socioeconomic status of older adults is strongly associated with the risk of experiencing chronic conditions and mortality (Seeman and Chen, 2002; Guralnik et al, 1993; Kaplan et al., 1993). Ross and Bird (1994) showed that high income and full time employment, which arguably reflects success, achievement, and increased selfesteem, in turn affects an individual's perception of their own health. Camacho and colleagues (1993) showed a significant positive association between an older adult's education and performance in 18 self-maintenance, mobility and physical performance tasks. Strong associations between education, socioeconomic indicators, and various reported health dimensions including function ability also are documented in more industrialized countries (Rogers, 1992; Robert & House, 1996). Seeman and Chen (2002) revealed that socioeconomic attributes, in particular high levels of income, were strongly related to changes in reported function ability for subjects with no prevalent health conditions, but did not show any effects on subjects with a history of chronic health conditions (except those with a history of cancer). In a national sample of older adults in Taiwan, education negatively affected the probability of moving from an independent state to a state of functional limitation within a four–year period (Zimmer et al., 1998).

Another group of scholars has argued that differences in women and men reports of illness and disabilities may be the result of differences in their prior use of health care. These scholars contend that women are socialized more so than are men to seek preventive (and curative) services (Green & Pope, 1999; Nathanson, 1977; Verbrugge, 1985), and women's greater exposure to the health care system may lead to greater knowledge about their health status. Consistently, women in Canada consult family physicians more often than do men (Birch, Eyles & Newbold, 1993). In a population-based survey of over 17,000 Canadian adults aged 60 years and older, women more often reported preventive health behaviors (less frequent use of alcohol, more frequent designation of a driver after social events, and more frequent use of sunscreen) and more frequent eye exams, but women and men did not differ in their frequency of blood-pressure checks, dental visits, flu shots, physical exams, and routine check-ups; in the follow-up year, however, women were more likely to improve a range of preventive health behaviors, and more often sought a medical exam (Newsomet et al, 2004). Among adults 15 years and older in an urban population of Rio Grande county, Brazil, women were significantly more likely than men to have a regular doctor, even after accounting for socioeconomic, demographic, and underlying health conditions (Mendoza-Sassi & Beria, 2003). In a clinic-based population in rural Nepal, women more often have sought traditional healers first for undiagnosed tuberculosis, leading to greater delays than men in seeking formal health care (Yamasaki-Nakagawa et al 2001).

A final group of scholars has argued that differences in men's and women's social support may underlie differences in their reported disability (Yount & Agree, 2005). Evidence from Western and non-Western settings has shown that men rely more on wives for care, and that women rely more on children and have more varied networks of support (Allen, 1994; Hoodfar, 1997; MacRae, 1995; Moen, et al, 1995; Wu & Pollard, 1998). Enhanced social integration, ties, and contacts also have been associated with lower mortality and higher function (Seeman, 1996; Seeman, et al., 1993; Seeman, et al., 1987; Verbrugge et al., 1994), and such protective effects have occurred at lower network sizes for men than women (Berkman & Syme, 1979). Gender differences in social support may directly affect reporting on disability if responses to questions on disability are biased by men's and women's available support. In a community-based sample of older adults in Egypt, including measures of family structure in models predicting any difficulty executing physical tasks and performing instrumental daily activities [IADLs] reduced differences between women and men in the frequency of these measures of disability (Yount & Agree, 2005). The authors showed further that widowed Egyptian women live in child-headed households at over twice the rate of widowed Egyptian men, and that controlling only for widowhood substantially reduced the effect of “gender” on odds of reporting difficulty executing physical tasks and performing IADLs. Thus, the different living arrangements of widowed Egyptian women and men may affect their reporting on difficulty performing IADLs *and* executing physical tasks, even though the latter indicator is meant to measure disability in a standard environment.

Gender differences in social support also may operate indirectly on their reporting of disability by affecting men and women’s use of health care. The protective effects of social support may operate by enhancing the quality of care at home and thereby reducing the need for formal care, or may encourage the use of preventive and curative services. In Taiwan, marriage has been negatively associated with institutionalization and positively associated with visits to physicians, but variation by gender in the effects of marriage was not assessed (Zimmer, et al., 2001). Among patients undergoing cardiac rehabilitation and referral in Toronto, Canada, support from adult children positively influenced the attendance of women more than that of men (Lieberman, et al, 1998).

Despite the contributions of prior research, which was largely based on Western and industrialized countries, factors accounting for differences between women and men self-reported physical health are not fully understood. More importantly, similar investigations in developing countries are constrained by limited data addressing these issues and represent a substantial gap in knowledge in these countries. Based on the above discussion, we can depict the framework underlying the current analysis (Fig. 1). The framework acknowledges the strong explanatory role of gender differences in objective measures of physical function on gender differences of self-reported disabilities and functional limitations. It further recognizes the importance of other factors beyond these objective measures, which includes health conditions, use of health care, socioeconomic resources and social support in explaining these gender differences. Given this framework, the main objectives of the current analysis are to assess the extent to which objective measures of physical functioning can account for gender differences in self reported disabilities. We further investigate the explanatory role of the other factors in accounting for gender differences in self-reported disabilities and physical limitations beyond the objective measures of physical ability among elder population in one rural and one urban district in Ismailia, Egypt.

(Fig. 1)

Data and Methods

Data for this research are drawn from a study on aging, health and gender, which was conducted in Ismailia governorate in Egypt.

Study setting, fieldwork, and sample

Ismailia governorate is located in Lower (Northern) Egypt and houses approximately 844,000 residents (CAPMAS, 2004). Since 2001, virtually all households have had access to electricity, and a somewhat higher percentage of households in Ismailia than in all Lower Egypt has had access to piped water (93.0% vs. 89.6%). In 2000/2001, real GDP per capita and rates of literacy among adults aged 15 years and older were higher in Ismailia than in all Lower Egypt (5,989 Egyptian pounds [LE] vs. LE 5,059; 72.8% vs. 64.8%). Although women's literacy rates and representation in the labor market have been higher in Ismailia than in other Lower Egyptian governorates (63.6% vs. 53.1%; 17.3% vs. 16.2%), rates of literacy and work-force participation among women aged 15 years and older have achieved only 70.5% and 21.0% of similar rates among men. The governorate has had fewer physicians, nurses, beds, and health units per capita compared to all of Lower Egypt (Unless indicated, figures presented in this paragraph come from the Egypt Human Development Report 2002–2003 (United Nations Development Programme [UNDP] & Institute for National Planning [INP], 2003)).

The target sample for this study was 450 women and 450 men distributed evenly across the ages of 50–59, 60–69, and 70 years and older. A complete household census was conducted in one rural and one urban district in Ismailia governorate to generate the sampling frame for the study. Within groups of women and men, the following sampling fractions were used to select participants for the study: 1:1 for adults aged 70 years or older, 1:2 for adults aged 60–69 years, and 1:3 for adults aged 50–59 years.

Based on the sampling frame developed from the household census, 1,182 age-eligible adults were invited to participate in the study. Of these 1,182, 1,053 (88.1%, including 527 men and 526 women) consented to participate and completed a baseline interview. The distribution of participants in the baseline interview, by gender, age, and residence, is provided in Table 1. The 511 men and 506 women who scored 10 or more points on a 20-point modified Mini Mental Status Exam [M-MMSE] participated in the interview on their own behalf. Twelve of the 15 men and 19 of the 21 women who scored less than 10 on the M-MMSE were invited to identify a person living nearby who knew them well and who could respond on their behalf. For 3 men and 2 women who scored less than 10 on the M-MMSE, the field supervisor deemed them able to respond for themselves based on responses, from someone knowing the older adult well, to questions about the older adult's ability to care for himself or herself. Thus, 'respondent' refers to any self-reporting older adult or any proxy who reported on an older person's behalf.

(Table 1)

In the baseline interview, interviewers asked respondents to report on the following topics: socio-demographic characteristics; occupational and marital history; exchanges of goods and money with coresident and non-coresident children in the prior year; current levels of difficulty executing physical tasks, basic activities of daily living (ADLs), and instrumental activities of daily living (IADLs); experiences of acute and chronic illnesses; illness-specific medical care; general use of outpatient and inpatient services in the 4 and 12 months before interview; and current use of medications.

Between 1 and 2 months after the baseline interview, all age-eligible study participants who gave separate consent were invited to participate in a series of in-home upper- and lower-extremity tests of physical performance. Appendix 1 provides a description of each physical performance test and test-specific exclusion criteria, which followed recommended guidelines (Guralnik *et al.*, 1995). Lower-extremity tests included single and repeated chair stands to measure transferability and leg strength; measured walks to assess usual and rapid-pace walking speed; and side-by-side, semi-tandem, and full-tandem stands to measure balance. Upper-extremity tests included grip strength, pinch gauge, overhead lift, internal and external shoulder rotations, and timed completion of the Purdue pegboard to assess fine-motor dexterity and coordination. These tests have been administered successfully in a moderately to severely disabled, community-dwelling population of older women in the United States (Guralnik *et al.*, 1995). A local geriatrician who was trained in the administration of these tests instructed Egyptian project staff in their conduct.

Notably, 120 of the 1,053 older adults who participated in the baseline interview did not participate in either the in-home tests, yielding 933 participants in all components of the study. Non-participants in the in-home tests were more often male, working, self-supporting, wealthier, and insured. Non-participants also less often had cognitive limitations, reported any difficulty executing physical tasks, and used outpatient services in the four months preceding the baseline interview. Otherwise, observed characteristics of participants and non-participants were similar (age distribution, residence, education, marital status, household headship, living arrangements, smoking status, self-rated health, number of reported illnesses, scores for reported difficulty with ADLs and IADLs, whether any nights were spent in hospital in the prior 4 months, and baseline use of medication).

The final analytic sample includes ever-married adults aged 50 years and older with complete baseline, and physical performance tests. Of the 1,182 eligible adults, the analytic sample excludes 129 non-participants in the baseline interview, 120 non-participants in the in-home physical performance tests, 9 never-married participants, and 41 participants with item non-response for selected covariates, yielding an unweighted analytic sample of 883 (400 men, 483women), or a weighted sample of 872 (416 men, 457 women). Weights were calculated using the inverse of the sampling fractions so that the age-sex distribution of the sample for each district conformed to the distribution of the population aged 50 years and older in the district, by five-year age groups and sex, according to the most recent (1996) census.

Dependent variables

The dependent variables in the following analysis were scales of self-reported disabilities in activities of daily living (ADLs) and self reported functional limitations. These scales are measured using three different scales. The first scale was based on older adults reports of the level of difficulty experienced in basic activities of daily living (ADLs). Older adult ability to perform five ADLs was ascertained using a modified version the Katz ADL (Katz, 1970). Accordingly, respondents were asked if they have any difficulty in eating, dressing, transferring in and out of bed or chair, bathing, and reaching and using toilet. Each item was scored dichotomously based on a question “Do you have any difficulty in…….” If the respondent reported having difficulty, they were asker further to indicate the level of difficulty “How much difficulty do you have in …………….” and was allowed the following response categories (1=some difficulty, 2=a lot difficulty and 3=unable to do it). A summative summary scale was derived based on the levels of difficulty experienced by the older adult. The summary scale was further categorized into three broad classes (no disability, 1-2 and 3 or more) to measure the ability or experiencing any disability in the realm of personal care.

Functional limitations were measured in two ways: Upper extremity range of motion (ROM) and Lower extremity gross mobility limitations (GM). Items included in these measures were obtained in response of two questions “Do you have any difficulty in…….” and if the respondent reported having difficulty, he/she was asked to indicate the level of difficulty “ How much difficulty do you have in …………….” and was allowed the following response categories (1=some difficulty, 2=a lot difficulty and 3=unable to do it). Each item was then scored on a four level variable; 0=having no difficulty, 1=have some difficulty, 2=have a lot of difficulty and 3unable to do it at all. Simonsick and colleagues (2001) proposed a scale that measures of severity of disability in their study of older disabled women. Our measures of physical limitations adopt the same methodology with some modifications in the lower extremity gross mobility to fit for our sample of general population compared to their disabled sample.

Range of motion limitation was measured using items on extending arms for hand shakes, fingering small objects, raising arms above shoulders, and carrying 5 Kilograms. A summative scale was constructed using these scores of these items and giving them the same weight since they do not overlap in their domains of motion. The summary scale was further categorized into three-level scale (0, 1-2 and 3+).

Goss mobility items included ability to walk in general, ability to walk a 100 meter without resting, climbing 10 stairs without resting and stooping, kneeling and crouching. Except for stooping, kneeling and crouching, each item followed the same four-level categorization that was used in activities of range of motion. For stooping, kneeling and crouching, a dichotomous categorization was adopted since this activity depends on walking ability. The respondent was given score 0 if he/she has no difficulty and 1 if he/she report having some difficulty or unable to do it. A summary gross mobility limitation scale was constructed by summing the scores for the different items indicated. It was further categorized into three-level scale (0 difficulty, 1-2 and 3+).

Independent variables

The main focus of the current analysis is the differences between women and men in levels of reported activities of daily living and upper extremity range of motion and lower extremity of gross mobility, denoted F_i.   Since age is highly correlated to levels of disability, control for age was included in all models. Respondent's age was classified in three broad categories (50-59, 60-69 and 70or more years). According to Fig (1) independent variables were classified in the five main broad groups of variables.   Objective physical performance measures and cognitive ability were assess by three scales, two for physical performance namely upper extremity range of motion scale (UX_i) and lower extremity gross mobility scale (LX_i) and one for cognitive ability. To construct the two physical performance scales, summary scales for each physical performance test were constructed similar to those proposed by Guralnik and colleagues (1994) and have proved high validity and reliability.   For tests that produce time-for-completion output (measured walk, Purdue pig, chair stands) or equipment-specific readings output (grip strength, pinch gauge), five-category summary scales were constructed with 0 assigned to individuals who were unable or refuse to participate and scores 1 through 4 for the quartiles of the performance output (Guralnik, 1994). For the other tests that require satisfactory completion (e.g. overhead lift, shoulder rotation and balance stands), the scale was constructed by assigning 0 to individuals who were unable or refuse to participate, and assigning consecutive ranks for the different levels of completing those tests. For the upper extremity range of motion scale (RM_i), scores for six individual summary scales; namely dominant hand-grip strength, dominant hand pinch gauge, right shoulder external rotation, right shoulder internal rotation, overhead lift and right hand and Purdue pig were summed up and the sum was further classified into quartiles. Exclusion of some upper extremity tests from this scale, such as non-dominant hand or left hand tests was the result of the high correlation[1] between these tests and similar ones in the scale with similar tests (0.90 for grip strength, 0.7 for pinch gauge, 0.96 for internal shoulder rotation, 0.95 for external shoulder rotation, and 0.72 for Purdue pig). Lower extremity gross mobility scale (GM_i) was constructed by summing up summary scales for stand balance, gait speed and chair stands and categorizing the sum in quartiles. Balance summary scale was based on the respondent's ability to stand for 10 seconds in three different positions, namely side by side; semi tandem and full tandem. Accordingly, the respondent was assigned 0 for being unable to hold any stands for 10 seconds, 1 for being able to hold side by side or semi-tandem stand for 10 seconds, and 2 for being able to hold semi-tandem and full tandem stand for 10 seconds. Gait speed scale was the sum of the summary scales for the best time in two trials of 3-meter usual walk and the summary scale for 3 meters fast walk. Higher scores for both upper extremity range of motion and lower extremity gross mobility are indicative of higher physical ability.

[1] Using Pearson correlation coefficient for continuous measures and gamma for ordinal measures

Cognitive function scale was constructed based on individual's scores in the 20-points Mini Mental State Evaluation (MMSE) in which they were classified into three categories (less than 10, 10-14 and 15-20).

For health conditions and illnesses, separate indicators were derived for each self reported illnesses which include hypertension; diabetes; lung diseases; heart diseases; arthritis, rheumatism or osteoarthritis; osteoporosis; stroke; cancer. The indicator is assigned 1 if the respondent reported having the disease and 0 otherwise.

Use of health status H_i is measured in terms of having health insurance, use any health services within the last 4 months and spending at least on night in the hospital. Socioeconomic resources E_i of the respondent is measured in terms of his/her school attainment (none, any primary, more than primary), household wealth index (owning 0-5, 6-12, 13 or more of the 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), and residence (rural versus urban). Social support SS_i is measured in terms of the respondent's marital status (married versus others) and number of living children as well as and main source of income (self, self and other relative and others only).

Analytic Strategies

Reported disability and physical limitations were compared for older women and men and for women and men by age group. Attributes of older adults classified according to components of Fig. 1 were compared for older women and men. These attributes include socioeconomic status (E_i), social support (SS_i), reported health conditions and illnesses (D_{ij}) and (P_i), access and use of health care service (H_i) and objective cognitive ability (C_i). Distributions of objective physical ability were also compared for women and men by age group. Chi-squared (χ^2) tests for independence were computed as well as tests of differences between men and women proportions for the various categories of the different variables. Adjustment for the stratified sample design in point estimates and standard errors were considered (Rao and Scott, 1981, 1984).

Ordinal logistic regression was implemented to estimate unadjusted, partially adjusted and fully adjusted log odds and odds for women versus men gender differences in the three reported disability and physical limitations scales. Partially adjusted models accounted separately for objective measures of physical and cognitive ability (physical performance measures and cognitive ability), self reported illnesses, access and use of health care services, socioeconomic resources and social support.

The ordered logit model can be defined as follows

$$Y = \beta' x + \varepsilon,$$

where,

Y	a latent or an unobserved continuous variable
x	a vector of independent variables and
ε	a logistically distributed random error.

What we actually observe is y, where,

$$y_i = j \quad \text{if} \quad \mu_{j-1} \leq Y \leq \mu_j \qquad \text{for} \quad j = 1,\ldots,J$$

where,

μ_j unknown parameters to be estimated with β.

The systematic component has the following form given the parameters μ_j and β and the explanatory variables x_i

$$\Pr(Y \leq j) = \Pr(y \leq \mu_j) = \frac{\exp(\mu_j - \beta' x)}{1 + \exp(\mu_j - \beta' x)},$$

Therefore $$\Pr(Y = j) = \frac{\exp(\mu_j - \beta' x)}{1 + \exp(\mu_j - \beta' x)} - \frac{\exp(\mu_{j-1} - \beta' x)}{1 + \exp(\mu_{j-1} - \beta' x)}.$$

(Agresti, 1990)

Adjustments for the stratified sample design were also considered for both the estimated coefficients and their standard errors. Changes in the magnitude and significance for the gender log odds and odds ratios with consecutive adjustment for each component in Fig.1 and for all components highlight the effects of these components on women and men differences in self-reported physical disability

Results

Table 2 shows the main attributes of older women and men in the sample. Women showed similar age distribution as men, with 14.5% and 17.4% aged 70 years and older. Current and childhood residence were similar for women and men, with almost one third of older men and women are currently living in urban areas and about 50% were urban residence in their childhood. With regard to socioeconomic resources, women exhibit high levels of vulnerability compared to men. Women were significantly less educated than men were, with 73.2% of women are illiterate compared to 44.6% of men (73.2% versus 44.6%). Although there were no substantial differences between women and men with regard to household wealth index, women were more likely to rely on others solely for income (32.6% versus 7.4%). Furthermore, women were more likely to be widows (43.3 % versus 7.2%), although both men and women had the same average number of living children.

(Table 2)

Pattern of self-reported morbidity was significantly different between women and men. Women were more likely to experience function-impairing illnesses such as hypertension (48.1% versus 28.8%), arthritis (55.6% versus 34.5%) and Osteoporosis (4.7% versus 0.7%). Furthermore, women experience more illnesses than men do. Table 2 shows that the experience of two or more illnesses was more prevalent among women compared to men (48.1% versus 23.5%). With regard to psychological status and depression experience, women were more likely to be highly depressed with 30% of them are classified in the highest quartile of the depressive scale compared to only 16% of men.

In the light of their higher levels of self reported morbidity and depression, women were more likely to report higher percentages of use of medication (63.2% versus 51.6%) and greater use of out patient medical services in the four months before the interview (76.8% versus 69.5%), but similar rates of hospitalization during the same period (4.9% versus 5.6%). This high utilization of medical service was not matched with access to health insurance. Women have substantially lower access to health insurance than men (10.2% versus 53.3%). Table 2 also shows that high level of cognitive ability was less prevalent among women compared to men (45.7% versus 75.5%).

Table 3 presents the percentage distribution of the summary scales for self reported difficulties in activities of daily living, upper extremity range of motion activities and lower extremity gross mobility for older women and men overall and by age group (Appendix 2 compares, for women and men over all and by age group, levels of difficulties reported in activities of daily living, upper extremity range of motion and lower extremity gross mobility). In general, table 3 shows that the distribution of the summary scale for difficulties in activities of daily living was different between women and men except for the ages 60-69. Overall and as early as age 50, women were less likely to report "no difficulties" in these activities compared to men. In contrast, the differences between women and men in levels of difficulties widened as they become older. While no substantial differences can be observed between women and men levels of difficulties through age 69 years, by age 70 and older, the gender gap increases significantly with more women classified in the highest levels of difficulties compared to men (30.1% vs. 14%).

(Table 3)

For the upper extremity range of motion summary scale, table 3 shows that the distribution of women and men differs significantly on this scale with women more prone to report having some difficulties in these activities. This pattern of gender differences in difficulties was consistent over all age groups with the severity of the difficulties increasing by age. While women and men aged 50-59 years show similar levels of large difficulties (4.1% vs. 3.3%), larger differences between women and men are observed among those aged 70 years and older (26.2% vs. 11%).

For lower extremity gross mobility activities, overall and across all age groups, women and men are substantially different in their reported levels of difficulties, with women exhibiting higher tendency to report higher levels of difficulties in these activities compared to men. Furthermore, the differences between women and men in reporting the highest levels of difficulties in this scale escalated with age (26.0% vs. 5.6% for ages 50-59 years, 42.2% vs. 18.6% for ages 60-69 years and 63.6% vs. 14.8% for ages 70 years and older).

Table 4 overall and by age group compares the distributions of women and men on their performance scales (Appendix 3 presents overall comparisons between men and women and by age group for each activity in the physical performance test). It clearly shows that women were more likely to score worse on these performance tests for both upper and lower extremities. However, the distributions of the scales for upper extremities were similar among women and men aged 50-59 years and differences in these distributions start to emerge at age 60 years and older. This is also confirmed with the significantly higher percentages of women classified in the lowest quartile of the scale and the significantly lower percentages of them classified in the highest quartile compared to men in the two age groups 60-69 years old and 70 years and older.

(Table 4)

For the lower extremity summary scale, women maintain their lower performance compared to men in these activities. Table 4 also shows that the distributions of women and men on this scale differ across age. While women and men differences in these distributions were substantially large for the age groups 50-59 years and 60-69 years, they exhibited similar distributions for those aged 70 years and older. Nevertheless, the percentages of women who scored on the lowest quartile were considerably larger than those for men overall and all age groups (20.8% vs. 8.8% for ages 50-59 years, 31.1% vs. 19.5% for ages 60-69 years, 56.4% vs. 35% for ages 70 years and older and 29.2% vs.17.4% for the whole sample).

In sum, previous tables show that women these two districts in Ismailia were more likely to be disadvantaged socially, economically and with regard to their levels of morbidity. Compared to men, women are more likely to be uneducated, widows, depending on others for financial support, experience more illnesses that are chronic, exhibit lower cognitive abilities and have less access to health insurance coverage. With regard to their physical function status, women were more likely to report higher levels of difficulties in their daily activities and to perform worse on the physical performance tests compare to men. Although the pattern of women and men differences are not consistent across the different scales, the overarching theme is the increase in these differences by age except for the lower extremity performance scale for which the differences diminish with age.

Unadjusted, partially adjusted and full adjusted odds and log odds of gender based on the ordinal logistic regression for three summary scales of reported disability and functional limitations are presented in table 5. For all three scales, the unadjusted odds revealed substantially gender differences in these scales. Women were more likely to report higher levels of disabilities and difficulties in ADL, upper extremity rang of motion and lower extremity gross mobility.

For activities of daily living, women showed a probability as high as 1.8 that of men to report difficulties in activities in daily living. With control for age, the likelihood for disabilities among women increases to 2.23 that for men. With controls for age, inclusion of upper extremity and lower extremity scales in the model substantially attenuates gender differences and the odds of reporting difficulties by gender are reduced to 1.45. Gender differences in objective measures of cognitive ability also account for some of the gender effects on reported disabilities in ADL. The combination of objective measures of both physical performance and cognitive ability eliminate gender differences in self-reported difficulties in ADL.

For self-reported upper extremity range of motion scale, women were more likely 2.6 times to report difficulties in these activities compared to men. Once more, controls for age exacerbate these gender differences and the odds of difficulties for women increase to 3.1. Controls for age and physical performance scale diminishes gender differences and reduce the probability of reporting difficulties in range of motion activities among women to 2.2 times that among men, while controls for age and cognitive ability reduces the odds to 2.5 only. The joint effects of age and all objectively measured physical function and cognitive ability substantially diminish the odds of difficulties for women in both magnitude and significance to 1.90. Beyond controls for objective measures of physical function and cognitive ability, controls for all self- reported illnesses decrease the odds substantially both in significance and magnitude to 1.75. Further investigation for the separate of effects of arthritis, stroke and osteoporosis reveals that although all three illnesses reduce the odds of gender differences in self-reported difficulties in range of motion activities, self-reported arthritis dominated the effect of reported illnesses. Similar female odds were observed with controls for age, objective measures of physical function and cognitive ability and all self-reported illnesses (1.75) and those with control for age, objective measures of physical function and cognitive ability and self-reported arthritis (1.75). Higher female odds of self reported difficulties in ROM activities reach their lowest levels with controls for social support factor beyond controls for age, objective measures of physical function and cognitive abilities (female odds =1.68). In sum, we can conclude that beyond controls for age and objective measures of physical and cognitive ability, gender differences in social support and self-reported arthritis account for a substantial portion of the gender differences in self-reported difficulties in ROM activities.

Although the fully adjusted odds of female remain high (1.86), they became insignificant. This is an indication that the considered factors in this model was able to account for all differences between women and men in their self-reported difficulties in ROM activities.

For lower extremity gross mobility (GM) activities, women were almost 4 times more likely to report difficulties in these activities compared to men. These odds were further aggravated with controls for age for which the odds reach as high as 4.7. Controls for age, and objective measures of functional and cognitive ability reduces women's odds to 3.25. Further controls for self-reported illnesses account for a decline of 0.64 in the female odds of self reported difficulties in GM activities and the odds reaches 2.6. Once more, arthritis accounts for the majority of the effects of self-reported illnesses. Control for arthritis decrease female odds by 0.45 compared to 0.64 with controls for all illnesses. Although controls for other factors beyond age and objective measures of function and cognitive abilities affect women odds of self reported difficulties in GM activities, social support excreted the largest effects on these odds. Social support reduces women's probability to report difficulties in GM activities to 2.6 times those for men, although the odds remain highly significant. Only with controls for all factors in the fully adjusted model, females' odds are reduced in both magnitude and significance, although they maintain their high value (2.14) and significance.

Discussion

The current study aimed to understand the main mechanism underlying gender differences in self- reported physical disability among older population in Ismailia governorate in Egypt. Similar to previous studies (Guralnik et al., 1989; Merrill et al.,1997; Rahman & liu 2000), it acknowledges the strong biological dimension embedded within self-reported physical status. However, it further recognizes that self-reported physical function as a subjective measure is influenced with the specific health, social and economic dimensions of the older adults' lives. Considering the fact that older women and men are substantially different on these dimensions, particularly in developing countries, raise the important question regarding the extent to which dimensions can contribute to explain gender differences in self-reported disabilities.

The current study uses data from the first comprehensive data set on older adult in the Arab countries that in addition to addressing various dimensions of older adults' lives, it incorporated objective measure of both physical and cognitive abilities of older adults. The physical performance tests in this study enabled us to account for biological gender differences in physical function and underscore the importance of other factors in capturing gender differences in self-reported disabilities.

Findings of this study have shown that compared to men, women were more vulnerable on the various factors identified to strongly related to physical limitations such as health conditions, access to health care, socioeconomic attributes and social support. Women were also more prone to report higher levels of difficulties and functional limitations as well as to score worse than men do in physical performance tests and cognitive evaluation instrument.

The study revealed that accounting only for age and objective measures for physical and cognitive ability eliminates gender differences in reported difficulties in ADL. In other words, self-reported difficulties in ADL can provide a good tool in evaluation older adults' performance of these activities.

Age and objective measures of physical and cognitive ability diminished but did not eliminate gender differences in reported difficulties in upper extremity range of motion and lower extremity gross mobility. Separate accounts for self- reports of arthritis and social support capture considerable portion of gender differences self-reported differences in these activities.

Finally, in full multivariate models that adjust for the various dimensions related to self reported physical function including objective measures of physical and cognitive abilities, health conditions and illnesses, access to health care and socioeconomic resource, women and men had similar odds of reporting difficulties in the upper extremity range of motion activities, but women maintained their odds in lower extremities gross mobility activities. Findings for upper extremity range of motion activities stress the importance of considering health conditions in particular physical impairing illnesses and social support aspects in evaluating self-reported disability. The persistent gender differences in lower extremity gross mobility clearly show that the factors in the framework were insufficient to account for all gender differences in these activities. These persistent gender differences can be attributed to the insensitivity of the objective and reported measure of gross mobility to gender specific roles in the context of Egypt. With age, older women in Egypt attain a gender specific social status that relative impede their activities in particular their mobility compared to men. This is slightly confirmed with controls for age that exacerbate gender differences in all activities considered in the current study and raise women odds of difficulties in gross mobility to almost five time those of men.

Some limitations in the current study merits mentioning. One of the major limitations of the current study is the absence of Body Mass Index (BMI), which accounts for some of the older adult physical ability to perform. Body weight has been found to be strongly associated with lower extremity disabilities (Simonsick et al. 2001). Egyptian women are more likely to be overweight, which can restrict their gross mobility activities and explain the persistent gender differences in these activities.

Another limitation is the cross-section nature of the data that limited our efforts to capture the impact of many factors that have been identified in the literature to affect self-reported measures of disabilities such as psychological status, risky behavior including smoking and the proper impact of social support systems. Examinations of the effects of concurrent psychological status and smoking behavior of older adults on gender differences of self-reported disabilities in the current study revealed that both factors account for some of these differences(not shown: available upon request).

Findings of the current emphasize the need for context sensitive research that addresses gender differences in the multidimension concept of elderly well being and their underlying social, economic, health related and biological factors in the rapidly aging region of the Arab countries in order to guide future social policies that achieve gender equity in the region

References

Allen, S. M. 1994. "Gender differences in spousal caregiving and unmet need for care." Journal of Gerontology **49**, S187–S195.

Andersen, K., L.J. Launer, M.E. Dewey, L. Letenneur, A. Ott, J.R. Copeland, et al. 1999 Gender differences in the incidence of AD and vascular dementia: The EURODEM Studie*s*. EURODEM Incidence Research Group. Neurology **53**, 1992-1997.

Arber ,S. and H. Cooper. 1999. "Gender differences in health in later life. The new paradox?" Social Science and Medicine **48**:61-76

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

Barberger-Gateau P & C. Fabrigoule. 1997. "Disability and cognitive impairment in the elderly." Disability Rehabilitation, **19(5)**:175-193.

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.L., J.E.Kincade, T.R. konrad, ????. 1997. "Predicting mortality from community surveys of older adults: The importance of self-rated functional ability." Journal of Gerontology: Social Science, **52B**, S155-S163.

Birch, S., Eyles, J. & Newbold, K. B. 1993. "Equitable access to health care: Methodological extensions to the analysis of physician utilization in Canada." Health Economics **2**, 87-101

Bruce, M.L, T. E. Seeman, S.S.Merrill, and D.G. Blazer. 1994. "The impact of depressive symptomatology on physical disability: MacArthur Studies of successful aging." American Journal of public health, **84**: 1796-1799.

Camacho, T.C., W.J. Strawbridge, R.D. Cohen, G.A. Kaplan. 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.

Crimmins, E. M., Y. Saito and D. Ingegneri. 1989. "Changing Mortality Life Expectancy and Disability Free Life Expectancy in the United States." Population and Development Review **15(2)**: 235-267.

Crimmins, E. M., Y. Saito and D. Ingegneri. 1997. "Trends in Disability Free Life Expectancy in the United States, 1970-1990." Population and Development Review **23**: 555-572.

Daltroy, L.H., C.B. Phillips, H.M. Eaton. 1995. "Objectively measuring physical ability in elderly person: the physical capacity evaluation." American journal of Public Health, **85**:558-560.

Dunlop, D. D., Manheim, L. M., Sohn, M. W., Liu, X. & Chang, R. W. 2002 "Incidence of functional limitation in older adults: The impact of gender, race, and chronic conditions." *Archives of Physical and Medical Rehabilitation* **83,** 964–971

Ferrucci, L., J.M.Guralnik, A. Baroni, G. Tesi, E. Antonini, & N. Marchionni. 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-M56.

Gill T.M., G.S. Williams, E.D. Richardson & M.E. Tinetti. 1996. "Impairments in physical and cognitive status as predisposing factors for functional dependence among nondisabled older persons." Journal of Gerontology: Medical Science, **51**, M283-M288.

Goldman N., Korenman, S. & Weinstein, R. 1995. "Marital status and health among the elderly." Social Science and Medicine **40**, 1717–1730.

Goldman, N. & Hu, Y. 1993. "Excess mortality among the unmarried: A case study of Japan." Social Science and Medicine **36**, 533–546.

Goldman, N., Weinstein, M., Cornman, J., Singer, B., Seeman, T. & Chang, M. C. 2004. "Sex differentials in biological risk factors for chronic disease: estimates from population-based surveys." Journal of Women's Health (Larchmt) **13**, 393–403.

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

Guralnik, J.M., K.C. Land, D. Blazer; G.G. Fillenbaum and L.G. Branch. 1993. "Educational status and active life expectancy among older black and whites." New England Journal of Medicine, **329**:110-116.

Guralnik, J.M., L.G. Branch, S.R. Cummings &J.D. Curb. 1989. "Physical performance measures in aging research." Journal of Gerontology: Medical Science, **44**, M141-M146.

Hoodfar, H. 1997. Between Marriage and Market: Intimate Politics and Survival in Cairo. University of California Press, Berkeley.

Johnson, R. J. and F. Wolinsky. 1993. "The Structure of health status among older adults: Disease, disability, functional limitation and perceived health." Journal of Health and Social Behavior, **34(2)**:105-121.

Kaplan, G.A., W.J.Strawbridge, T.Camacho, & R.D. Cohen. 1993. " Factors associated with changes in physical functioning in the elderly : A six years prospective study." Journal of Aging and Health, **5**:140-153.

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

Khadr, Z. A. 1997. Living Arrangements and Social Support Systems of the Older Population in Egypt. Unpublished Ph.D. Dissertation. University of Michigan.

Khadr, Z.A. 2002. "Perceived Morbidity and Disability among Older Egyptians: Levels and Correlates." The Egyptian Population and Family Planning Review. ISSR. Cairo University **35(2):** 1-21.

Leveille, S. G., Penninx, B. W., Melzer, D., Izmirlian, G. & Guralnik, J. M. 2000. "Sex differences in the prevalence of mobility disability in old age: The dynamics of incidence, recovery, and mortality." Journal of Gerontology: Social Sciences **55**, S41–S50.

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

MacRae, H. M. 1995. "Women and caring: Constructing self through others." Journal of Women and Aging **7**, 145–167.

Manton, K. G, G. C. Myers, and G. R. Andrews. 1987. "Morbidity and Disability Patterns In Four Developing Nations: Their Implications for Social and Economic Integration of The Elderly." Journal of Cross-Cultural Gerontology **2**: 115-129.

Manton, K. G. 1982. "Changing Concepts of Morbidity and Mortality in the Elderly Population." Milbank Memorial Fund Quarterly, Health Society **60**: 183-244.

Manton, K. G. and K. C. Land. 2000. "Active Life Expectancy Estimates for the U.S Elderly Population: A Multidimensional Continuous-Mixture Model of Functional Change Applied to Completed Cohorts." Demography **37(3):** 253-265.

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

Nathanson, C. 1977. "Sex, illness and medical care: A review of data, theory, and method." Social Science and Medicine **11**, 13–25.

Onder, G., B. W. Penninx, L.Ferrucci, L. Fried. J. Guralnik, and M. Pahor. 2005. "Measures of physical performance and risk for progressive and catastrophic disability: results from the women's health and aging study." Journal of Gerontology: Medical Science, **60**, M74-M79.

Onder, G., B.W. Penninx, P. Lapuerta, L. Fried, G.V. Ostir, J.M. Guralnik, & M.Pahor. 2002. "Changes in physical performance over time in older women: The women's health and aging study." Journal of Gerontology: Medical Science, **57**, M289-M293.

Ormal, J. F.V. Rijsdijk, M. Sullivan, E.V. Sonderen, and GG.I. Kempen. 2002. "Temporal and reciprocal relationship between IADL/ADl disability and depressive symptoms in later life." Journal of Gerontology: Psychological Science **57**, P338-347

Penninx, B.W., J.M. Guralnik, L. Ferrucci, E. M. Simonsick, D.J. Deeg and R.B. Wallace. 1998. "Depressive symptoms and physical decline in community dwelling older persons." Journal of American Medical Association, **297**:1720-1726.

Pinquart, M. and Sorensen, S. 2001. Gender differences in self concept and Psychological well being in old age: a meta analysis." Journal of Gerontology: Psychological Science **56**, P195-213

Portrait, F. , M. Lindeboom and D. Deeg. 2001. "Life Expectancies in Specific Health Status and Mortality of Older Persons." Demography **38(4)**: 525-536.

Rahman, M. O. & J_H Liu. 2000. "Gender differences in functioning for older adults in rural Bangladesh. The impact of differential reporting." Journal of Gerontology: Medical Science, **55A**, M28-M33.

Raij, M., G.V. Ostir, K.S. Markides and J. Goodwin. " the interaction of cognitive and emotional status on subsequent physical functioning in older Mexican Americans: Findings from the Hispanic Established Population for the Epidemiologic study of the elderly." Journal of Gerontology: Medical Science, **57A**, M678-682.

Reuben, D.B., A.L. Siu. 1990. "An objective measure of physical function of elderly out patient. The physical performance test" Journal of American Geriatric Association, **38**:1105-1112.

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

Reuben, D.B., T.E. Seeman, E. Keeler, R.P. Hayes, L. Bowman, A. Sewall, S.H. Hirsch, R.B. Wallace, & J. M. Guralnik. 2004. "Refining the categorization of physical functional status: The added value of combining self reported and performance bases measures." Journal of Gerontology: Medical Science, **59A**, M1056-M1061.

Robert, S. and J.S. House. 1996. "SES differentials in health by age and alternative indicators of SES." Journal of Aging and Health, **8**:359-388.

Roger, R. G. 1992. "Living and dying in the USA: Socioeconomic demographic determinants of death among blacks and whites." Demography, **29**:287-303.

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

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

Seeman, T. E., Berkman, L. F., Kohout, F., Lacroix, A., Glynn, R. & Blazer, D. 1993 "Intercommunity variations in the association between social ties and mortality in the elderly: A comparative analysis of three communities." Annals of Epidemiology **3**, 325–335.

Seeman, T. E., Kaplan, G. A., Knudsen, L., Cohen, R. & Guralnik, J. M. 1987 "Social network ties and mortality among the elderly in the Alameda County study." American Journal of Epidemiology **12**, 714–723.

Seeman, T., and X. Chen. 2002. "Risk and protective factors for physical functioning in older adults with and without chronic conditions: MacArthur Studies of successful aging." Journal of Gerontology: Social Science, **57B**, S135-S144.

Sherman, S.E., D. Reuben. 1998. "Measures of functional status on community dwelling elders." Journal of General Internal Medicine, **13**: 817-823.

Shriver, S. P., H.A. Bourdeau, C.T. Gubish, D.L. Tirpak, A.L. Davis, J.D. Luketich & Siegfried, J. M. 2000. "Sex-specific expression of gastrin-releasing peptide receptor: Relationship to smoking history and risk of lung cancer." Journal of the National Cancer Institute **92**, 24-33.

Strauss, J., P.J. Gertler, O. Rahman, and K. Fox. 1993. "Gender and Life –Cycle Differentials in the Patterns and Determinants of Adult Health." The Journal of Human Resources **28(4)** Special Issue: Symposium on Investments in Women's Human Capital and Development: 791- 837.

Tabbarah, M., E.M. Crimmins, & T.E. Seeman. 2002. "The relationship between cognitive and physical performance: MacArthur Studies of Successful Aging." Journal of Gerontology: Medical Science, **57A**, M228-M235.

Verbrugge, L .M. 1989. "The Twain Meet: Empirical Explanation of Sex Differences in Health and Mortality." Journal of Health and Social Behavior **20:** 282-304.

Verbrugge, L. M. 1985. “Gender and Health: An Update on Hypotheses and Evidence.” Journal of Health and Social Behavior **26:** 156-182.

Verbrugge, L. M., J. M. Reoma and A.L. Gruber-Baldini. 1994. “Short-Term Dynamics of Disability and Well-Being.” Journal of Health and Social Behavior **35(2)**: 97-117.

Wingard, D. 1984. “The sex differential in morbidity, mortality and life style.” Annual Review of Public Health, **5**:433-458.

Wray, L. & C. Blaum. 2001. “Explaining the role of sex on disability: A population based study.” The Gerontologist, **41(4)**:499-510.

Wu, Z. & M.S. Pollard. 1998. “Social support among unmarried childless elderly persons.” Journals of Gerontology Series B: Psychological Sciences and Social Sciences **53**, S324–S335**.**

Yamasaki-Nakagawa M, K. Ozasa , N. Yamada, K. Osuga, A. Shimouchi , N. Ishikawa, D.S. Bam, and T Mori. 2001. Gender difference in delays to diagnosis and health care seeking behaviour in a rural area of Nepal. Int J Tuberc Lung Dis. **5(1):**24-31.

Yount, K. M. 2001 “Girls’ excess mortality in the Middle East in the 1970s and 1980s: Patterns, correlations and gaps in research.” Population Studies **55**, 291–308.

Yount, K. M. 2003a “Provider bias in the treatment of diarrhea among boys and girls in Minia, Egypt.” Social Science and Medicine **56**, 753-768.

Yount, K. M. 2003b “Gender bias in the allocation of curative care in Minia, Egypt.” Population Research and Policy Review **22**, 267–295.

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

Yount, K. M. & E.M Agree. 2005. “Differences in disabilities among older women and men in Egypt and Tunisia.” Demography, **42**:169-187

Yount, K. M. & Z. A. Khadr. (Forthcoming). “ABiosocial model of medication use among older women and men in Ismailia, Egypt.” Journal of Biosocial Science.

Zimmer, Z., J.N.Natividad, M. B. Ofstedal and H.-S. Lin. 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**: 361-411. The University of Michigan Press. Ann Arbor, Michigan.

Zimmer, Z., X. Liu, A. Hermalin, and Y. Chuang. 1998. “Educational Attainment and transitions in functional status among older Taiwanese.” Demography, **35(3)**:361-375,

Table 1. Percentage distribution of men and women aged 50 years and older who participated in the baseline interview of the study, by age group and residence in two districts in Ismailia, Egypt

	Men			Women		
	Urban	Rural	Total	Urban	Rural	Total
50-59	47.8	52.1	48.8	52.2	46.9	50.7
60-69	33.9	34.1	34.0	32.4	36.0	33.7
70+	18.3	13.8	17.2	15.4	17.1	15.6
(*n*, weighted)	(381)	(144)	(525)	(364)	(164)	(528)

Table 2. Characteristics of Women and Men Aged 50+ Years, Ismailia Egypt

	Men	Women		
(n, weighted)	416	457	*p*[a]	*p*[b]
Demographic characteristics				
Age group (50-59)	44.6	54.2	*ns*	*ns*
60-69	38.0	31.4		*ns*
70+	17.4	14.5		*ns*
Residence urban (reference: rural)	70.8	68.1	*ns*	
Proxy respondent	1.9	3.3	*ns*	
Economic resources				
Education (none)	44.6	73.2	***	***
Primary	37.5	24.0		***
More than primary	17.9	2.8		***
Household standard of living (< 6 assets, durables of 17 possible)[c]	24.0	31.0	*ns*	*ns*
6-12	36.7	37.5		*ns*
13-17	39.3	31.5		*ns*
Social relationships and support				
Marital Status (currently married)	90.8	53.0	***	***
Divorced	1.9	3.7		*ns*
Widowed	7.2	43.3		***
Mean number of living children	5.0	5.1	*ns*	
Source of income (self)	78.9	41.6	***	***
Children/other relatives/others	7.4	32.6		***
Self and children/other relatives/others	13.7	25.8		***
Self-perceived health and reported illness/disability				
Smoking status (current)	52.7	5.1	***	***
Previous	27.0	6.8		***
Never smoked	20.2	88.1		***
Reported illnesses				
Hypertension	28.8	48.1	***	
Diabetes	14.3	18.8	*ns*	
Heart diseases	6.1	9.6	†	
Lung diseases	5.4	5.0	*ns*	
Stroke	6.7	3.7	†	
Arthritis	34.5	55.6	***	
Osteoporosis	0.7	4.7	**	
Cancer	0.4	0.5	ns	
Number of reported illnesses (none of 8 reported)	39.8	20.9	***	***
1	36.7	31.0		*
2	13.3	31.9		***
3-8	10.2	16.2		*

(Continue)

(n, weighted)	Men 416	Women 457	*p*[a]	*p*[b]
Use of biomedical health services				
Any health insurance (reference: no)	53.3	10.2	***	
Using medication (reference: no)	51.6	63.2	***	
Any outpatient services last 4 months (reference: no)	69.5	76.8	***	
Any nights in hospital last 4 months (reference: no)	5.6	4.9	*ns*	
Objective mental status				
MMSE score (< 10 of 20)	1.5	2.6	***	*ns*
10-15	23.1	51.8		***
16+	75.5	45.7		***

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

[a] † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$, for X^2 test of independence accounting for sample design.

b † p < .10. * p < .05. ** p < .01. *** p < .001, 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

Table 3. Levels of difficulties reported by the respondent with activities of daily living, upper extremity range-of motion and lower extremity gross mobility, women and men Aged 50 Years and Older, Ismailia, Egypt

	50-59				60-69				70+				Total			
	men	women	p^a	p^b	men	women	p^a	p^b	men	women	p^a	p^b	men	women	p^a	p^b
weighted n	185	247			158	143			72	66			416	457		
ADL summary measure (no disability)[c]	96.4	88.5	*	*	82.2	71.4	ns	*	70.1	54.3	*	*	86.4	78.2	*	*
1-2	2.6	8.3			10.8	15.2			15.3	15.6			8.0	11.5		
2-15	1.0	3.2		ns	7.0	13.4		ns	14.0	30.1		***	5.6	10.3		†
ROM summary measure (no disability)[d]	92.1	72.5	**	***	79.6	61.1	**	**	64.2	36.8	**	***	82.5	63.8	***	***
1-2	4.6	23.3			15.3	28.4			24.8	37.1			12.2	26.9		
3-12	3.3	4.1		ns	5.1	10.4		†	11.0	26.2		*	5.3	9.3		†
GM summary measure (no disability)[e]	79.0	36.8	***	***	54.4	23.4	***	***	41.6	15.2	***	***	63.1	29.4	***	***
1-2	15.2	37.2			27.0	34.4			29.0	21.2			22.1	34.0		
3-10	5.8	26.0		***	18.6	42.2		***	29.5	63.6		***	14.8	36.6		***

a † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$, for X^2 test of independence accounting for sample design.

b † p < .10. * p < .05. ** p < .01. *** p < .001, test of difference in two proportions accounting for sample design.

c This scale is constructed by summing up summary scales for eating, dressing, getting in and out of bed or chair, bathing and reaching and using toilet. All activities used the four-level categorization levels of difficulties

d This scale is constructed by summing up summary scales for reaching out to shake hands, fingering small objects, reaching overheald and carrying and lifting 5 kilograms. All activities used the four-level categorization levels of difficulties

e This scale is constructed by summing up summary scales for walking, walking 100 meter, climbing 10 steps without resting and stooping,courching and kneeling. All activities used the four-level categorization levels of difficulties except for stooping crouching and kneeling which was included as a dichotomous variable that indicate having any difficulties in this activities.

Table 4. Distribution of older adults according to upper extremity and lower extremity summary scales of performance tests by men and women by age group in two districts in Ismailia, Egypt

	50-59				60-69				70+				Total			
	men	women	p^a	p^b	men	women	p^a	p^b	men	women	p^a	p^b	men	women	p^a	p^b
weighted n	185	247			158	143			72	66			416	457		
Summary measure of upper extremity[c]																
1	8.8	17.6	ns	†	13.5	33.5	***	**	24.4	55.5	***	***	13.3	28.1	**	***
2	20.2	30.0			23.1	36.5			43.9	29.4			25.4	31.9		
3	17.0	16.0			20.5	9.7			11.7	11.1			17.4	13.3		
4	54.0	36.4		†	42.9	20.3		***	2.0	3.9		***	43.9	26.7		*
Summary measure of lower extremity[d]																
1	8.8	20.8	***	**	19.5	31.1	***	†	35.0	56.4	†	**	17.4	29.2	*	**
2	15.5	33.1			20.3	31.8			27.4	25.8			19.4	31.7		
3	33.1	21.1			26.0	17.2			13.7	10.6			27.0	18.3		
4	42.6	25.0		**	34.2	19.9		*	23.9	7.2		**	36.2	20.8		***

[a] † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$, for X^2 test of independence accounting for sample design.

b † p < .10. * p < .05. ** p < .01. *** p < .001, 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 strenghth, dominant hand pinch strenghth, right shoulder external and internal rotation, over head lift and right hand purdue pig. This sum was further classified in quartiles (1-9, 10-12, 13, 14-18)

d summary measure for lower extremity is constructed by summing up the socres of the scales for stand balance, gait speed and chair stands. The sum was further classified in quartiles (0-5, 6-8, 9-10, 11-14)

Table 5. Unadjusted, partically adjusted and fully adjusted odds and log odds of reporting difficulty with Activities of Daily Living, Upper extremity range of motion and Lower extremity gross mobility, women and men aged 50 years and older, Ismailia, Egypt[a]

Covariates	ADLs						Upper Extremity Range-of-Motion						Lower Extremity Gross Mobility					
	OR	*B*	p^b	*SE B*	*95%CI*		*OR*	*B*	p^b	*SE B*	*95%CI*		*OR*	*B*	p^b	*SE B*	*95%CI*	
F (female gender) only	1.79	0.58	*	0.28	0.07	1.09	2.59	0.95	***	0.24	0.48	1.43	3.82	1.34	***	0.22	0.91	1.
F + (1)	2.23	0.80	***	0.20	0.41	1.19	3.13	1.14	***	0.20	0.75	1.54	4.71	1.55	***	0.18	1.19	1.
F + (2)	1.45	0.37	†	0.21	-0.06	0.79	2.20	0.79	***	0.20	0.39	1.19	3.53	1.26	***	0.19	0.88	1.
F + (3)	1.92	0.65	**	0.21	0.23	1.07	2.48	0.91	***	0.21	0.48	1.34	4.14	1.42	***	0.19	1.05	1.
F + (4)	1.35	0.30	ns	0.21	-0.13	0.72	1.90	0.64	**	0.21	0.23	1.06	3.25	1.18	***	0.19	0.79	1.
F + (4) + (5)	1.30	0.26	ns	0.22	-0.19	0.72	1.75	0.56	**	0.21	0.15	0.97	2.80	1.03	***	0.19	0.64	1.
F + (4) + (6)	1.49	0.40	†	0.23	-0.05	0.86	2.14	0.76	***	0.22	0.33	1.20	3.46	1.24	***	0.19	0.85	1.
F + (4) + (7)	1.26	0.23	ns	0.21	-0.19	0.65	1.82	0.60	**	0.20	0.20	1.01	3.13	1.14	***	0.19	0.76	1.
F + (4) + (8)	1.26	0.23	ns	0.25	-0.28	0.74	1.75	0.56	*	0.22	0.12	0.99	2.61	0.96	***	0.20	0.55	1.
F + (4) + (9)	1.32	0.28	ns	0.23	-0.19	0.76	2.16	0.77	**	0.24	0.29	1.25	3.22	1.17	***	0.21	0.74	1.
F + (4) + (10)	1.35	0.30	ns	0.21	-0.12	0.72	1.93	0.66	**	0.23	0.19	1.12	3.42	1.23	***	0.20	0.85	1.
F + (4) + (11)	1.02	0.02	ns	0.25	-0.49	0.52	1.68	0.52	*	0.24	0.03	1.01	2.59	0.95	***	0.18	0.60	1.
F + all covariate	1.02	0.02	ns	0.29	-0.56	0.60	1.86	0.62	†	0.32	-0.01	1.26	2.14	0.76	**	0.23	0.31	1.

a These odds and log odds are based on ordinal logistic regression models

[b]+ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. Adjusted for age-gender stratified sample design

(1) = age group

(2) = age group + Upper extremity performance scale + lower extremity performance scale

(3)= age group + Objective cognitive function

(4) = age group + Upper extremity performance scale + lower extremity performance scale + objective cognitive function.

(5) = Arthritis

(6) = Stroke

(7) = Osteoporosis

(8) = All self reported illnesses (hypertension, diabetes, lung diseases, heart diseases, arthritis, rheumatism or osteoarthritis, osteoporosis, stroke, cancer)

(9) = Health insurance+ hospitalization last 4 months+ health services last 4 months.

(10) = education + residence + index of wealth

(11) = Marital status + number of living children+ source of income

Appendix1. Procedure description and equipment required for home-based tests of physical performance conducted in two districts in Ismailia, Egypt[a]

	Description	Exclusion criteria
Lower extremity		Unilateral hip/AK amputation - performance on opposit Bilateral paralyses, lower extremities Bilateral hip/AK amputation, bilateral hip replacement l months
Standing balance:	Timed measurements of side-by-side, semi-tandem, full-tandem stands.	
Measured walks:	Timed 3-meter walks assess usual and rapid-pace walking speed. Two trials recorded; best trial to be used for analysis.	Paralyses, inability to walk
Single chair stand:	Measures transferability.	Unable to stand unaided
Repeated chair stands:	Provides an indicator of leg strength.	Unable to stand unaided
Upper extremity		≤3 months status post upper extremity joint, abdominal, surgery
Grip strength:	Administration according to manufacturer's directions. Three trials of kilograms of pressure applied to be recorded for three trials with each hand using the Jamar adjustable grip hand dynamometer. (model PK-7498, Fred Sammons, Burr Ridge, IL)	Acute flareup of wrist/hand (e.g., arthritis, tendonitis)
Pinch strength:	One trial with each hand using a standard 0 – 60 kg pinch gauge. (model 81441, Adaptability, Colchester, CT)	
Overhead lift:	Participant seated in straight-backed chair with Purdue Pegboard in lap to support a 10-lb weight 1.5 lb collapsible polyethylene jug, filled with 10-lb of water placed on top of peg board. Participant instructed to use both arms to lift the jug from her lap to eye level, then over her head, fully extending her arms. Categories: can lift overhead with arms fully extended, can lift to eye level, can lift higher than 1 in but not to eye level, cannot lift higher than 1 in.	≤3 months status post upper extremity joint, abdominal, surgery

Purdue Pegboard:	One trial with each hand of a timed test designed to assess fine motor dexterity and coordination Participant picks up small steel pegs one at a time from a well (with 15 pegs) in a pegboard and places them sequentially into 10 holes as quickly as possible until all holes or filled or until 1 minute elapses.	Blind, bilateral upper-extremity paralyses, bilateral hand amputation
Shoulder rotations:	(External) Participant places hand behind head at ear level with fingers touching, forearms parallel to floor, and elbows pointing out. (Internal) Participant places hand behind back at waist level or higher with fingers touching in the middle of the back near the spine. Scoring: fully successful, partially successful, or unable for each side separately.	

[a]Excludes stopwatch, measuring lengths, accessories and general supplies

Appendix 2. Levels of difficulties reported by the respondent with activities of daily living, upper extremity range-of motion and lower extremity gross mobility, women and me
Aged 50 Years and Older, Ismailia, Egypt

Activities of Daily Living

	50-59			60-69			70+			Total	
	men	women	p^a	men	women	p^a	men	women	p^a	men	women
weighted n	185	247		158	143		72	66		416	457
Eating (no dis.)	99.5	99.0	ns	95.2	99.5	*	94.9	90.2	ns	97.1	97.9
some difficulty	0.0	0.0	ns	2.2	0.0	ns	0.0	1.4	ns	0.8	0.2
a lot of difficulty	0.5	1.0	ns	2.2	0.5	ns	5.1	4.2	ns	2.0	5.6
unable	0.0	0.0	ns	0.4	0.0	ns	0.0	4.2	ns	0.1	0.6
Dressing (no dis.)	99.5	95.6	*	89.0	86.1	ns	86.2	70.6	***	93.2	89.5
some difficulty	0.0	1.8	ns	5.8	6.9	ns	2.8	7.6	ns	2.7	4.3
a lot of difficulty	0.5	1.6	ns	2.2	4.5	ns	7.8	12.7	*	2.4	4.1
unable	0.0	0.0	ns	3.0	2.5	ns	3.1	9.1	†	1.7	2.1
Getting out of bed or chair (no dis.)	97.4	95.4	ns	91.8	92.2	ns	87.5	75.2	***	93.6	92.5
some difficulty	0.5	2.4	ns	4.7	3.4	ns	1.2	8.4	**	2.2	3.5
a lot of difficulty	1.6	2.2	ns	1.3	3.0	ns	8.6	11.5	ns	2.7	3.8
unable	0.5	0.0	ns	2.2	1.4	ns	2.7	4.9	ns	1.5	1.2
Bathing (no dis.)	98.5	91.5	**	87.4	76.7	*	77.6	58.6	***	98.7	82.1
some difficulty	1.0	4.9	*	6.1	12.3	*	7.4	11.9	ns	4.0	8.3
a lot of difficulty	0.5	2.4	ns	3.5	6.4	ns	10.2	16.0	*	3.3	5.6
unable	0.0	1.2	*	3.0	4.6	ns	4.8	13.5	*	2.0	4.0
Reaching and using the toilet (no dis.)	99.0	96.2	ns	94.3	89.6	†	87.0	74.4	***	95.1	90.9
some difficulty	0.5	2.2	ns	0.0	3.0	ns	2.0	11.1	**	0.6	3.8
a lot of difficulty	0.5	1.0	ns	4.0	5.0	ns	6.7	9.5	†	2.9	3.5
unable	0.0	0.6	ns	1.7	2.4	ns	4.3	5.0	ns	1.4	1.8

Upper Extremity Range of Motion											
Reaching out to shake hands (no dis.)	99.5	100.0	ns	99.2	98.5	ns	98.4	95.4	ns	99.2	98.9
some difficulty	0.5	0.0	ns	0.0	0.0	ns	4.0	1.0	ns	0.3	0.1
a lot of difficulty	0.0	0.0	ns	0.0	0.0	ns	1.2	1.3	ns	0.2	0.2
unable	0.0	0.0	ns	0.8	1.5	ns	0.0	2.3	*	0.3	0.8
Fingering small objects (no dis.)	98.3	98.6	ns	98.7	96.1	ns	94.1	92.4	ns	97.7	96.9
some difficulty	1.2	0.8	ns	0.9	1.0	ns	1.2	2.6	ns	1.1	1.1
a lot of difficulty	0.5	0.0	ns	0.0	2.9	*	3.5	2.7	ns	0.8	1.3
unable	0.0	0.6	ns	0.4	0.0	ns	1.2	2.3	ns	0.4	0.7
Reaching overhead (no dis.)	97.4	94.3	ns	95.2	94.4	ns	92.1	83.5	*	95.6	92.8
some difficulty	0.0	2.7	†	1.3	1.1	ns	2.8	5.0	ns	1.0	2.5
a lot of difficulty	0.9	2.4	ns	2.2	3.5	ns	3.9	6.4	ns	2.0	3.3
unable	1.7	0.6	ns	1.3	1.1	ns	1.2	5.1	*	1.4	1.4
Lifting or carrying 5 kilograms (no dis.)	94.7	76.1	***	83.1	63.0	**	65.5	39.1	***	85.2	66.7
some difficulty	1.5	7.1	*	6.2	11.4	ns	11.0	12.9	ns	5.0	9.3
a lot of difficulty	3.8	14.4	***	6.0	19.7	**	14.1	29.6	***	6.4	18.2
unable	0.0	2.4	*	4.7	5.9	ns	9.4	18.4	ns	3.4	5.8
Lower Extremity Gross Mobility											
Walking[c] (no dis.)	85.9	58.5	***	61.9	44.1	*	60.7	37.2	***	72.5	50.8
some difficulty	7.2	26.7	**	22.0	24.9	ns	15.7	19.4	ns	14.3	25.1
a lot of difficulty	6.9	14.2	*	12.6	25.5	ns	14.5	33.0	***	10.4	20.5
unable	0.0	0.6	ns	3.5	5.5	ns	9.1	10.4	ns	2..9	3.6
Walking 100 meters (no dis.)	95.4	75.5	***	88.9	68.1	***	75.0	48.0	**	89.3	69.2
some difficulty	2.0	9.4	**	3.0	11.2	***	5.1	13.8	*	2.9	10.6
a lot of difficulty	2.6	13.3	**	3.9	16.2	***	15.2	28.4	*	5.5	16.4
unable	0.0	1.8	†	4.3	4.4	ns	4.7	9.8	*	2.5	3.8
Climbing 10 steps without rest (no dis.)	97.1	86.6	*	88.9	65.0	***	69.0	47.9	†	89.1	74.2
some difficulty	1.0	7.0	*	3.0	11.9	*	7.5	11.1	ns	2.9	9.1
a lot of difficulty	1.9	4.6	ns	4.2	17.6	***	18.0	30.9	ns	5.6	12.5
unable	0.0	1.8	†	3.9	5.5	ns	5.5	10.1	ns	2.4	4.2

Stooping, crouching, or kneeling (no dis.)	88.9	54.7	***	76.8	40.6	***	60.8	29.1	**	79.4	46.6
some difficulty	10.1	24.2	*	14.6	29.3	*	8.3	20.9	**	11.5	25.3
a lot of difficulty	1.0	15.7	***	5.6	26.1	***	19.6	34.7	†	6.0	21.7
unable	0.0	5.4	**	3.0	4.0	ns	11.3	15.3	ns	3.1	6.4

[a] † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$, for X^2 test of independence accounting for sample design.

b † p < .10. * p < .05. ** p < .01. *** p < .001, test of difference in two proportions accounting for sample design.

[c] refers to walking in general without any help or use of any aiding instrument

Appendix 3. Percentage of older adults who participated in physical performance tests and average test scores for participants, men and women by age group in two districts in Ismailia, Egypt

	50-59				60-69				70+				Total	
	men	women	p^a	p^b	men	women	p^a	p^b	men	women	p^a	p^b	men	women
weighted n	185	247			158	143			72	66			416	457
Upper Extremity Tests														
Grip strength, dominant hand														
Unable	3.6	4.6		ns	4.8	7.8		ns	4.3	14.4		*	4.2	7.0
Less than median (median=24)	18.2	67.2		***	21.0	79.2		***	55.6	73.4		**	25.8	71.9
More than median	78.2	28.2		***	74.2	13.0		***	40.0	12.2		***	70.0	21.1
Grip strength, nondominant hand														
Unable	4.2	4.4		ns	6.3	9.2		ns	5.9	18.5		**	5.3	8.0
Less than median (median=22)	17.7	67.9		***	25.2	76.7		***	51.0	73.5		**	26.4	71.5
More than median	78.0	27.6		***	68.5	14.1		***	43.1	7.9		***	68.3	20.5
Pinch gauge, dominant hand														
Unable	1.7	2.0		ns	3.9	1.5		ns	3.6	10.0		†	2.8	3.0
Less than median (median=7)	36.7	76.0		***	39.7	84.3		***	63.4	82.0		**	42.4	79.5
More than median	61.7	22.0		***	56.4	14.2		***	33.1	8.0		***	54.7	17.5
Pinch gauge, nondominant hand														
Unable	3.3	1.4		ns	3.2	3.0		ns	3.1	11.9		**	3.2	3.4
Less than median (median=6)	24.6	60.6		***	28.7	71.4		***	46.6	72.9		***	30.0	65.8
More than median	72.1	37.8		***	68.0	25.6		***	50.3	15.2		***	66.8	30.8
External shoulder rotation, right shoulder														
Unable	4.5	2.4		ns	5.0	8.9		ns	8.3	16.8		1.0	5.3	6.5
Incomplete	1.0	9.2		*	2.6	11.3		*	7.1	14.4		ns	2.7	10.6
Complete	94.5	88.4		†	92.4	79.8		†	84.6	68.8		*	92.0	82.9
External shoulder rotation, left shoulder														
Unable	4.5	4.8		ns	4.6	6.9		ns	9.9	20.1		ns	5.4	7.6
Incomplete	2.0	9.3		**	3.4	10.9		*	9.4	17.1		†	3.8	11.0
Complete	93.5	85.8		ns	92.0	82.2		*	80.6	62.8		*	90.7	81.4
Internal shoulder rotation, right shoulder														
Unable	5.6	5.2		ns	5.7	13.9		†	8.3	18.5		*	6.1	9.8
Incomplete	1.5	6.6		*	6.9	7.8		ns	8.3	13.4		ns	4.7	8.0

Complete	92.9	88.2	ns	87.4	78.3	†	83.4	68.1	**	89.1	82.2
Internal shoulder rotation, left shoulder											
Unable	6.6	7.0	ns	7.9	12.4	ns	9.5	21.8	**	7.6	10.8
Incomplete	1.5	6.9	†	6.4	9.8	ns	10.2	14.4	ns	4.9	8.9
Complete	91.9	86.1	ns	85.7	77.8	ns	80.3	63.8	*	87.5	80.3
Could not lift > 1 inch	8.3	12.4	ns	11.7	26.5	*	24.4	45.3	***	12.4	21.6
Lifted >1 inch but not to eye level	1.2	4.2	ns	0.4	3.4	*	3.5	6.2	ns	1.3	4.3
Lifted to eye level	2.6	7.6	†	6.1	10.8	*	12.2	12.5	ns	5.6	9.3
Lifted overhead	87.9	75.7	†	81.8	59.3	**	59.9	36.0	***	80.7	64.8
Purdue Pegboard, right hand											
Unable	7.1	2.1	*	10.9	12.4	ns	22.7	28.4	ns	11.3	9.1
Less than median	36.4	46.8	ns	40.2	50.0	ns	50.4	59.1	ns	40.2	49.6
More than median	56.5	51.1	ns	48.9	37.6	ns	26.9	12.5	*	48.5	41.3
Purdue Pegboard, left hand											
Unable	7.1	2.8	†	12.6	12.4	ns	22.3	30.7	ns	11.9	9.8
Less than median	34.4	43.8	ns	42.8	53.3	*	50.8	54.0	ns	40.4	48.3
More than median	58.5	53.4	ns	44.6	34.3	†	26.9	15.3	**	47.7	41.9
Lower Extremity Tests											
Stand balance											
Side-by-side stand for 10 seconds	99.0	97.6	ns	94.2	82.3	**	81.2	65.6	**	94.1	88.2
Semi-tandem stand for 10 seconds	96.2	90.6	*	86.5	72.6	*	69.8	54.6	†	87.9	79.7
Full tandem stand for 10 seconds	91.7	78.9	**	80.4	63.3	*	62.4	48.0	*	82.3	69.5
Balance summary scale											
Unable to do any stand	1.0	2.4	ns	5.7	17.2	**	18.8	34.4	**	5.9	11.6
Side-by-side or semi-tandem stand	7.3	18.7	**	13.9	19.6	ns	19.3	17.5	ns	11.9	18.8
semi-tandem and full tandem	91.7	78.9	**	80.4	63.3	*	61.9	48.0	*	82.2	69.5
Gait speed											
First usual walk, 3 meters	95.0	97.3	ns	94.8	88.2	*	84.3	73.7	*	93.1	91.0
Average time	3.5	4.6	*	4.2	4.7	ns	4.5	5.9	**	3.9	4.8
Second usual walk, 3 meters	95.0	97.3	ns	94.4	88.2	*	83.9	73.3	**	92.9	91.0
Average time	3.2	4.0	†	3.8	4.5	ns	4.2	5.3	*	3.7	4.3
Fast walk, 3 meters	95.0	96.7	ns	94.0	86.2	*	82.3	69.1	**	92.4	89.4
Mean time	16.8	18.7		17.6	19.0	ns	18.8	20.8	ns	17.4	18.9
Chair stands summary measure											
Unable or less than 5 stands	11.0	35.2	***	25.9	40.3	†	42.8	57.8	**	22.2	40.1

Slow stands (>(median=17.25))	37.1	34.9	ns	37.1	29.3	ns	32.9	28.8	ns	36.4	32.3
Quick stands (<(median=17.25))	51.8	29.9	**	37.1	30.4	ns	24.3	13.4	ns	41.4	27.6

[a] † $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$, for X^2 test of independence accounting for sample design.

b † p < .10. * p < .05. ** p < .01. *** p < .001, test of difference in two proportions accounting for sample design.

Figure 1. Health-related and socioeconomic factors explaining gender differences in reported disability among older adults