Social Roles, Environment, and Gender Differences in Disability and Function in Egypt and Tunisia

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ABSTRACT

Research on gender disparities in child survival and health is abundant, yet similar studies in later life are limited. We compare levels of disability among women and men in Egypt and Tunisia and examine whether underlying illnesses, family structure, and living conditions account for observed differences. Adjusted levels of functional limitation are higher for women than men, but adjusted levels of disability are comparable. In Egypt, differences in disability are sensitive to family and environmental controls, and differences in functional limitation are sensitive to family controls. Findings caution against sole use of reported health in studies of gender and aging in patriarchal settings.

INTRODUCTION

Ten years ago, Susan Watkins observed that the study of gender in demography was limited by a focus that reinforces conventional views of what is important about women (e.g., reproduction and maternal behavior) and of the ages at which women matter (e.g., 15–50 years), noting that women "disappear from view" after menopause (Watkins 1993: 559). Much has changed in the discipline of demography since the anniversary issue of this volume in 1993: Recognition of the implications of the demographic and epidemiologic transitions for morbidity change has sparked an interest in the determinants of disparities in health, including gender-related factors (Caldwell 1986; Langford and Storey 1993; Myers, Lamb, and Agree 2003). With some exceptions (e.g., Gage 1994; Gragnolati, Elo, and Goldman 1999), much of this work in the non-Western world has concentrated on disparities in child health and survival (e.g. Hill and Upchurch 1995; Kishor 1993; Pande 1999), and after South Asia, some of the largest disadvantages among girls persist in the Middle East (Hill and Upchurch 1995; Yount 1999, 2001, 2003, forthcoming). In such settings, gender inequalities in health and survival also may be present during adulthood, both as a result of the cumulative disadvantage that accrues for females across all ages (e.g., O'Rand 1996; Rudkin 1993), and also because priorities in the allocation of food, money, and health care within families may rank older women behind other members (e.g., Gittelsohn 1991). Myers, Lamb, and Agree (2003) have hypothesized that levels of disability may be higher among older men than women in settings at the earlier stages of the epidemiologic transition and in which excess female mortality prevails in childhood and early adulthood. To date, however, demographers have shown little interest in the effects of gender on later-life health in this region. Here, we adapt a model of the disablement process to explore these questions in two Middle Eastern countries. Specifically, which measures of function and disability are most appropriate to

study gender differences in health in later life? And, do men have higher levels of disability in later life in settings where females experience an excess risk of mortality due to male preference?

GENDER AND THE DISABLEMENT PROCESS

The term "disability" refers to an individual's limitation in performing socially defined roles (Verbrugge and Jette 1994). In surveys, disability often is measured as a person's reported degree of difficulty performing activities of daily life that are necessary for survival (ADLs) (e.g., ability to feed oneself, dress, transfer in and out of bed, bathe or shower, use the toilet) and instrumental activities of daily life that are necessary to maintain a dwelling in a specific sociocultural context (IADLs) (e.g., ability to use the telephone, get to distant places, shop for food, prepare meals, handle money). By contrast, physical functional limitations are restrictions in performing generic actions that indicate the ability of the body to do purposeful "work" (Verbrugge and Jette 1994). Measures of reported functional limitation ideally assess actions that are independent of the social and physical demands of the immediate environment and often are measured in surveys as a person's reported level of difficulty performing discrete physical tasks, such as kneeling, lifting weights, reaching, and climbing stairs (Nagi 1976).

In models of the disablement process, chronic and acute conditions affect basic and instrumental activities of daily life through their effects on specific bodily systems (impairments) and basic physical and mental actions (functional and cognitive limitations). Fixed and modifiable personal and environmental risk factors can retard, reverse, or hasten this process (Verbrugge and Jette 1994). A common predisposing "risk factor" in studies of disability is gender. Evidence from industrialized countries suggests that, compared to older men, older women more often experience disability and functional limitation, longer durations of disability and proportionately more remaining years of life disabled (e.g., Arber and Cooper 1999; Ferrucci

et al. 2000; Leveille et al. 2000; Leveille, Resnick and Balfour 2000; Melzer et al. 2000; Oman, Reed and Ferrara 1999; Sauvaget et al. 1999; Verbrugge 1985, 1989). Women's greater disability in such settings often is attributed to a higher prevalence of and greater individual susceptibility to certain underlying pathologies and impairments (Andersen et al. 1999; Annandale and Hunt 1990; Brayne et al. 2001; Dunlop et al. 2002; Freedman, Aykan and Martin 2001, 2002; Haavio-Manila 1986; Lahelma et al. 1999; Macintyre, Hunt and Sweeting 1996; Shriver et al. 2000; Verbrugge 1976; Wingard et al. 1989).

Myers et al (2003) argue, however, that differences by gender in later-life disability may vary with the stage of the epidemiologic transition and prevailing level of male preference in society. At the early stages of the epidemiologic transition, when infectious diseases and poor nutrition may account for a high percentage of the total burden of disease, girls may have levels of morbidity and mortality that equal or exceed those of boys, in part due to the preferential allocation of food and health care to male children. Under such circumstances, older men may have higher levels of disability than older women because poor nutrition and compromised health increase the risks of girls and young women to infectious-disease and maternal mortality, and as a result, only the healthiest women survive into later life.

Responses of women and men to questions about disability also may be sensitive to the gender-specific nature of the activity and to differences in the institutional and social environments in which women and men conduct their daily lives, however (Rahman and Liu 2000). Contextual variation in the degree to which roles and living conditions are gendered therefore make existing measures of disability potentially problematic in comparative research (Kovar 1991; Liang, Gu and Krause 1992). For some combination of the above reasons, research in Bangladesh shows that women report higher levels of limitation than men in activities of daily

living (ADL) at similar levels of observed physical performance (Rahman and Liu 2000). Because responses to questions about functional limitations should be less subject to gender roles and living conditions, these questions should provide more comparable and reliable indicators of underlying differences in the functional health of older women and men.

(Figure 1)

Figure 1 adapts the model of the disablement process of Verbrugge and Jette (1994) to address the exogenous institutional, familial, and biological factors as well as the endogenous behavioral and interpersonal factors that affect differences by gender in functional limitation and disability. Part 1 highlights the main pathway from pathology to impairments, functional limitations, and disablement, as described by Verbrugge and Jette (1994). Part 2 refers to the endogenous behavioral and environmental changes that the onset of disability can trigger and that in turn can alter the impact of functional limitations on the ability of older adults to perform socially defined roles. Part 3 refers to the exogenous biological, cognitive, psychological, and genetic predispositions as well as related exogenous demographic characteristics (age, sex, race) that influence the progression from pathology to disablement. Part 4 refers to the exogenous, structural features of the family (e.g., availability of a spouse, children, and other relatives) that influence this progression. Part 5 refers to exogenous social institutions, such as access to health insurance, access to preventive and curative medical care, laws and regulations, social class, occupation, and access to buildings and public transportation that can accelerate, retard, or reverse the disablement process. Part 6 emphasizes that observed differences in disability among women and men arise from differences by sex in underlying predispositions to certain pathologies, impairments, and functional limitations and from differences by gender in the public opportunities, private living conditions, and familial arrangements that influence the course of

the disablement process.

Because social environments and roles are explicit in the definition of disability, we expect differences by gender in public opportunities, family structure, and private living conditions to account for a large proportion of observed differences by gender in reported difficulty to perform basic and instrumental activities of daily living. By contrast, because differences by gender in physical functional limitation presumably measure underlying differences in the variables that predispose females and males to such limitation, we expect observed differences by gender in physical functional limitation to be less sensitive to disparities in public opportunities, private living conditions, and family structure.

With these considerations in mind, we compare levels of functional limitation and disability among older women and men using survey data collected in 1989–1990 in settings in Egypt and Tunisia. These settings represent contexts in which mortality from infectious diseases was still high, where girls' excess mortality persisted, and where opportunities, roles, and living conditions were highly gendered relative to the West. At the same time, substantial variability in women's public and private rights in these two settings permit assessment of the extent to which common indicators of physical function and disability are comparable across different normative environments. Our focus on Egypt and Tunisia also is important because of the dearth of research on gender and aging in the Middle East despite increasing rates of population aging and evidence of women's disadvantage in access to medical care at various stages of the life course (Yount 1999, 2001, 2003, forthcoming; Yount, Agree and Rebellon 2002). We proceed first by comparing the unadjusted difference in basic and instrumental activities of daily living and functional limitation among older women and men in these two settings. We then compare the extent to which exogenous measures of acute and chronic illness, family structure, public

opportunities, and private living conditions account for differences by gender in reported basic and instrumental activities of daily living and physical functional limitation.

STUDY SITES

The sites on which this analysis is based include four governorates in Egypt and three governorates in Tunisia in which surveys were undertaken in 1989–1990. Changes in survival from 1950–1955 to 1990–1995 were marked for women and men in both settings. In Egypt, life expectancy at birth increased from 44 to 65 years among women and from 41 to 62 years among men; In Tunisia, these figures rose from 45 to 69 years among women and from 44 to 67 years among men (United Nations [UN] 2002; UNDP 2002). By 1990, older women in both places more often reported having difficulty walking (Andrews 1998), and adjusted measures of reported difficulty performing selected activities of daily living were higher among women than men in Egypt (Lamb 1997). Estimates for 1999 suggest further that women live as many or more years of life disabled (5.7 versus 5.6 years in Egypt and 7.2 versus 5.0 years in Tunisia, on average) so that estimates of disability-adjusted life expectancy at birth are lower for women than men in 1999 (58 versus 59 years in Egypt and 61 versus 62 years in Tunisia) (UNDP 2002). Despite these changes, estimates for the period 1978–1988 suggest that girls still experienced higher post-neonatal and early child (1–4) mortality than boys in both settings, and particularly in Egypt (51 versus 42 post-neonatal deaths per 1000 in Egypt, 29 versus 25 post-neonatal deaths per 1000 in Tunisia; 47 versus 38 early-child deaths per 1000 in Egypt, 19 versus 18 early-child deaths per 1000) (Aloui, Ayad and Fourati 1989; Sayed et al. 1989). Diarrhea also continued to be the primary cause of death among children under five years (Langsten and Hill 1994; Aloui et al. 1989), and in Giza, Egypt, maternal mortality accounted for 20 percent of deaths to women of reproductive age in 1985–1986 (Kane et al. 1992).

Differences between women and men in their educational attainment and opportunities for employment also were marked in both settings. The percentage of adults (aged 15 years and older) who were literate was higher in 1990 than in 1980 but remained higher among men than women. In Egypt, 60% of men compared to 34% of women were literate in 1990, and in Tunisia, 72% of men compared to 46% of women were literate (World Bank Group 2002). During this period, women also comprised less than one-third of the documented labor force (27% in Egypt, 29% in Tunisia). Despite lower levels of education and employment among women in both settings, laws in Tunisia encouraged wives to contribute financially to the family if they had sufficient means, whereas laws in Egypt allowed men to forbid their wives to work if working interfered with women's other responsibilities to the family.

Families in Egypt and Tunisia have been and continue to be the main source of support for older adults, and ties among kin remain strong even though patterns of coresidence differ across the two settings. In 1995 in Egypt, 55% of ever-married women aged 15 – 49 years resided with the husband's family at the start of the marriage (El-Zanaty et al. 1996). In Tunisia, trends toward nuclear living are well documented, but Holmes-Eber (1997) points out that women in Tunis often reside near kin and visit their own and their husband's extended family. A high prevalence of patrilocal, endogamous marriage in both settings enables a large percentage of married daughters to be available to provide assistance (Casterline and El-Zeini, 2003; El-Zanaty et al. 1996).[1] Offspring in both settings may provide more care to older women than men, however, because women often outlive their spouses and have more contact with their children (Imamoglu and Imamoglu 1999; Silverstein and Bengtson 1991).

Although families are the main support for older adults both settings, laws regarding marriage have been more gender equitable in Tunisia than in Egypt since the 1950s, and this

difference may affect the networks of support on which frail older women and men rely. Marriage in Tunisia requires the explicit consent of both parties, whereas surveys in Egypt suggest that over 75% of women of reproductive age did not select their first spouse (El-Zanaty et al. 1996). Polygamy is illegal in Tunisia and, although rare in Egypt, its practice there is admissible as long as husbands notify existing and intended wives. Extrajudicial repudiation of a spouse is prohibited in Tunisia, whereas until 2000, an Egyptian husband could verbally repudiate his wife and an Egyptian wife could seek divorce only through judicial process and in cases of harm or fault of the husband.[2] Tunisian laws pertaining to inheritance require written, signed wills and favor spouses and descendants over extended (male) relatives (Charrad 2001), whereas relevant laws in Egypt give preference in inheritance to husbands, sons, and collateral (male) relatives over wives, daughters, and female relatives (Yount 1999). Because women's rights in marriage are weaker in Egypt than in Tunisia, the availability of children and extended natal kin who can provide financial and hands-on support may be especially important for older Egyptian women.

The Egyptian and Tunisian governments have differed in their contributions to social security and the health sector in ways that affect the accessibility of insurance and services to older adults. In Egypt, primary care facilities have been available since the 1960s, and doctors have held private practice hours in public facilities since the 1970s. An array of public health insurance facilities, teaching hospitals, primary care facilities, and private hospitals and clinics exist (particularly in urban areas), and health insurance facilities house clinics at which medications for diabetes are provided for free (Kamel et al. 1999). Although older adults have access to various sources of care, disparities in access and use persist. For example, the establishment of geriatric units and expansion of eligibility to use health insurance facilities

began only in the 1990s, and senior pensions in Egypt provide minimal support to a limited pool of beneficiaries (Social Security Administration [SSA] 1999). Women also use preferred sources of preventive and curative care less often than do men at various stages of the life course. Compared to boys, girls are fully immunized less often (Yount 1999, 2001), have lower odds of receiving private curative care (Yount 1999), receive less investment in curative care per illness episode (Yount forthcoming), and less often receive standard care for the management of illness (Yount 2003). Compared to older men, older women more often report visits to doctors and use of prescribed medications (Andrews 1998), but adjusted odds of visiting doctors are lower for women than men (Yount, Agree and Rebellon 2002).

By contrast, the Tunisian government has spent a higher percentage of its gross domestic product in the health sector (5.1 versus 3.8) and has invested heavily in public health infrastructures, although access remains greater in urban than rural areas (Aloui et al. 1989). Also, old-age pensions and survivor benefits are more generous (SSA 1999), and differences by gender in use of services are less pronounced in Tunisia than in Egypt. Compared to boys, girls have a similar adjusted probability of receiving private curative treatment but significantly lower adjusted odds of being fully immunized and receiving any medical treatment (Obermeyer and Cardenas 1997). Compared to men aged 60 years and older, older women more often report visits to doctors and use of prescribed medications, but odds of visiting doctors are comparable for women and men after adjusting for underlying illnesses, economic status, and availability of social support (Yount, Agree and Rebellon 2002).

This comparison suggests that, by the late 1980s and early 1990s, girls' excess mortality and mortality from infectious and maternal causes persisted (particularly in Egypt), and that the segregation of men and women between the public and private spheres remained pronounced in

both settings. At the same time, family laws in Tunisia created a normative environment that more strongly favored women's access to the public sphere and gender equity in the private sphere. Older adults in Tunisia also had access to a wider range of public services, particularly in the urban areas, and differences by gender in the use of medical care at "dependent" stages of the life course were less pronounced in Tunisia than in Egypt. Given these two contexts, we expect estimates of differences by gender in reported disability to be more sensitive to social roles and living conditions in Egypt than in Tunisia. If reported physical functional limitation assesses the capacity to perform tasks that are independent of social roles and living environments, then differences by gender in reported physical functional limitation should be less sensitive to adjustment for these variables in both settings. With these considerations in mind, we assess whether, in Egypt and Tunisia during 1989–1990, older men had higher levels of disability and functional limitation than older women after accounting for differences by gender in underlying illness, family structure, and roles and opportunities in the public and private spheres.

DATA

Data for this analysis come from the *World Health Organization Collaborative Study on Social and Health Aspects of Aging* that was conducted during 1989–1990 in Bahrain, Egypt, Jordan, and Tunisia (Andrews 1998). A low response rate in Bahrain (80%) and a high percentage (19) of respondents in Jordan with missing data on variables of interest further justify our choice of Egypt and Tunisia for analysis. Samples in Egypt and Tunisia consist of noninstitutionalized women and men aged 60 years and older. Multistage, stratified cluster sampling procedures were used to identify eligible participants. The Egyptian sample was drawn from the governorates of Cairo, Giza, Qaliubia, and Minia, the first three of which are largely urban or periurban, contiguous governorates located in Northern Egypt and the last of which is a

more rural governorate located about 200 kilometers south of Cairo. These governorates comprised about 31% of the total Egyptian population at the time of survey, and an additional sample was drawn from a Bedouin sector of Fayoum governorate. The sample in Tunisia was drawn from three governorates in the district of Tunis, representing about 21% of the total Tunisian population at the time of survey. The extent to which the Tunisian sample was rural at the time of data collection is unknown. Roughly equal numbers of persons aged 60–64, 65–69, 70–74, and 75 years and older were sampled to obtain adequate numbers of the oldest old. Response rates were around 99% in both study sites, which are comparable in level to national surveys that were conducted at similar times (Aloui et al. 1989; El-Zanaty et al. 1993).

Data were collected through personal interviews with older subjects and coresident proxies when respondents were deemed to be cognitively impaired on the basis of their scores on a modified Mini-Mental Status Exam (Andrews 1998). Proxies completed about five percent of interviews in both sites, so any reference to "respondent(s)" hereafter includes eligible older adults or proxies who are reporting on their behalf. Interviewers used standard schedules and asked questions about demographic characteristics, employment, economic resources, housing conditions, satisfaction with living conditions, social integration and support, living arrangements and family networks, risk behaviors, self-reported health, psychological status, morale, recent visits to health professionals, medications currently used, and use of assistive devices. Questions about physical functional limitation and basic and instrumental activities of daily living were adapted from existing instruments (Katz 1983; Lawton 1975; Nagi 1976). This analysis is based on ever-married older adults with complete information on outcomes and covariates of interest. The final, weighted samples include 474 women and 548 men in Egypt and 554 women and 632 men in Tunisia.[3]

Dependent Variables

Dependent variables in this analysis include four items measuring physical functional limitation, seven items measuring basic activities of daily living, and five items measuring instrumental activities of daily living. Measures of functional limitation include reported level of difficulty (0=none, 1=some, 2=a lot, 3=unable) to pull or push objects, stoop or kneel, lift weights, and reach or extend arms. Measures of difficulty performing basic activities of daily living (0=can do without help, 1=can do with help, 2=unable to do) include eating, dressing or undressing, caring for appearance, walking, getting in and out of bed, bathing or showering, and going to the toilet. Measures of difficulty performing instrumental activities of daily living (0=can do without help, 1=can do with help, 2=unable to do) include using the phone, going to places too far to walk, going shopping, preparing meals, and handling money. In the first phase of the analysis, each item is analyzed separately because the extent to which individual activities are gendered may vary. In the second phase, we analyze scores for physical functional limitation and basic and instrumental disability, which we construct by summing responses to questions about level of difficulty performing physical tasks (possible range 0–12), basic activities of daily living (possible range 0–14), and instrumental activities of daily living (possible range 0–10).

Independent Variables

The main independent variable in this analysis is respondent's gender. Exogenous predisposing risk factors include underlying illnesses, cognitive limitations, and respondent's age, as well as functional limitation in models for disability. A summative scale indicating the number of reported medical conditions measures acute and chronic illnesses.[4] Although respondents could report on 16 conditions, the maximum number actually reported was 8 in Egypt and 9 in Tunisia. Use of a proxy respondent measures gross cognitive limitation, and the respondent's score on a

20-point modified Mini-Mental Status Exam indicates the level of cognitive limitation.[5] Although use of a proxy respondent and respondents' scores on the modified MMSE are correlated, the former variable also controls for other reasons that respondents who scored 15 or higher on the modified MMSE are interviewed by proxy. Included in models for difficulty performing basic and instrumental activities of daily living is the 0–12 measure for physical functional limitation, described above. Respondent's age captures unmeasured underlying medical conditions as well as changes in social roles associated with advancing age.

Exogenous measures of family structure and social support include whether the respondent is widowed, number of living sons and daughters, and number of surviving siblings of the respondent. Exogenous measures of opportunities in the public sphere include childhood residence, educational attainment, self or spousal ownership of the home in which the respondent resides, and prior lifetime occupation. Measures of private living conditions include current residence (urban, rural) and amenities, including clean water, toilet, facilities to cook, facilities to bathe or shower, washing machine, refrigerator, telephone, television, and radio.

ANALYTIC METHODS

First, we describe the characteristics of women and men in each study site, as well as reported levels of physical functional limitation and difficulty performing basic and instrumental activities of daily living by gender and study site. Estimates and *p*-values are calculated using normalized probability weights and are adjusted to account for the age-stratified, cluster sample design (Rao and Scott 1981, 1984).

Also taking design effects into account, we estimate several multivariate models to test our research hypotheses. We fit a series of ordinal logistic regression models to estimate the cumulative probability that respondent *i* reports as much or more difficulty with each of the

functional tasks F_{ip} (p = 1,…, 4), basic activities of daily living B_{iq} (q = 1,…, 7), and instrumental activities of daily living I_{ir} (r = 1,…, 5)

$$\text{ologit}(F_{ip}) = \beta_0 + \beta_1 G_i + \sum_{j=2}^{5} \beta_j U_{ij} + \sum_{j=6}^{9} \beta_j S_{ij} + \sum_{j=10}^{15} \beta_j L_{ij} \quad (1)$$

$$\text{ologit}(B_{iq}) = \beta_0 + \beta_1 G_i + \sum_{j=2}^{6} \beta_j U_{ij} + \sum_{j=7}^{10} \beta_j S_{ij} + \sum_{j=11}^{16} \beta_j L_{ij} \quad (2)$$

$$\text{ologit}(I_{ir}) = \beta_0 + \beta_1 G_i + \sum_{j=2}^{6} \beta_j U_{ij} + \sum_{j=7}^{10} \beta_j S_{ij} + \sum_{j=11}^{16} \beta_j L_{ij} \quad (3)$$

where G_i denotes gender of the respondent i, U_{ij} denotes measures of reported underlying illness, cognitive impairment, and age of the respondent (as well as physical functional limitation in models of disability). S_{ij} denotes exogenous family structure and support variables, and L_{ij} denotes public opportunities and private living conditions. Using ordinal logistic regression, we examine the unadjusted, partially adjusted, and fully adjusted effects of gender on the cumulative probability of reporting as much or more difficulty with each measure of physical functional limitation and basic and instrumental activities of daily living. Unadjusted effects of gender are sequentially adjusted for underlying illnesses, limitations, and age; these variables plus family structure; and these variables plus public opportunities and private living conditions. Finally, we use linear regression to estimate unadjusted, partially adjusted, and fully adjusted effects of gender on the 0 – 12 scale for physical functional limitation, the 0 – 14 scale for difficulty in basic activities of daily living, and the 0 – 10 scale for difficulty in instrumental activities of daily living. Observed changes in the relative odds/scores for each outcome for women versus men in the presence of controls provide tests of our research hypotheses.

Potential problems of lack of representativeness, omitted variable bias, and feedback merit mention. First, because the samples were not drawn in the same manner, data from the

study sites cannot be pooled to test for differences in parameter estimates across settings. Instead, we compare estimated coefficients from stratified analyses. Second, neither dataset includes indicators for governorate or locality within governorate, so these variables are not included in the analysis, and urban-rural residence may in part capture contextual differences across governorates, particularly in Egypt. Third, cross-sectional data limit assessment of whether observed associations between covariates, physical functional limitation, and difficulty with daily activities arise due to selection (e.g., the more disabled less often marry) or causal effects of covariates (Lillard and Panis 1996; Murray 2000). In the Egyptian site, however, only five percent of the sample is never married, and only one percent reports being divorced or separated. In the Tunisian site, these percentages are less than one. Therefore, we restrict the analytic samples to ever-married respondents and estimate the effect of widowhood and other exogenous covariates on measures of physical function and disability. We also exclude endogenous risk factors that are expected to influence the disablement process (Part 2, Figure 1). This procedure does not eliminate the problem of selection and restricts generalization to ever-married older adults in these settings; however, if residual effects of selection operate similarly for women and men, then observed differences by gender in the effects of these variables should be unbiased.

RESULTS

Characteristics of Study Samples

(Insert Table 1)

Table 1 compares background characteristics of women and men in each study site. Significance tests not shown in Table 1 are provided in the text. Differences by gender in the number of reported medical conditions are significant in both sites, and compared to men, women more often report having (had) at least three acute or chronic medical conditions (26

versus 17 percent in Egypt, $p < 0.001$; 39 versus 22 percent in Tunisia, $p < 0.001$). Level of cognitive limitation also differs significantly by gender in Tunisia, with older women more often reporting at least some limitation (94 versus 84 percent, $p < 0.001$). A higher percentage of women than men also is interviewed by proxy in Tunisia (5 versus 3). In both sites, women are widowed markedly more often than men (80 versus 17 percent in Egypt; 58 versus 11 percent in Tunisia), but less often have two or more living sons (52 versus 65 percent in Egypt, $p < 0.001$; 70 versus 77 percent in Tunisia, $p < 0.01$) and two or more living daughters (49 versus 56 percent in Egypt, $p < 0.05$; 65 versus 73 percent in Tunisia, $p < 0.01$). Over 40% of older women and men in Egypt and over 60% in Tunisia have at least two siblings. Differences by gender in educational attainment and ownership of assets are marked, with women less often having any education in both sites (36 versus 45 percent in Egypt, $p < 0.01$; 8 versus 26 percent in Tunisia, $p < 0.001$) and less often reporting that they or their spouse owns their place of residence (59 versus 68 percent in Egypt; 73 versus 82 percent in Tunisia). Neither residence in childhood nor current residence differ by gender in either site, but women report substantially less often than men that their prior lifetime occupation was skilled (3 versus 23 percent in Egypt; 2 versus 38 percent in Tunisia). Women and men in both sites have access to similar numbers of major amenities. In Egypt, however, women report at least marginally more often than men having access to facilities for bathing and cooking (not shown) and to all amenities about which questions were asked (39 versus 33 percent). No such differences are observable in Tunisia. These findings suggest that, compared to men, women in both sites report higher levels of underlying morbidity and have markedly different family structures in later life. Women's higher access than men to cooking and bathing facilities in Egypt but not in Tunisia is consistent with the more rigid gender roles and spheres in Egypt.

Differences by Gender in Physical Function and Disability

(Table 2)

Table 2 shows the distribution of women and men by measures of physical functional limitation and basic and instrumental activities of daily living by study site. Significant differences not shown in Table 2 are provided in the text. Differences by gender in all functional tasks are highly significant in both sites. Compared to men, women consistently report any and higher levels of difficulty performing each of the four physical functions (not shown). For example, 15% of women compared to 8% men in Egypt ($p < 0.001$) and 10% of women compared to 6% of men in Tunisia ($p < 0.05$) report that they are unable to lift weights. Mean scores for functional limitation also are higher for women than men in both sites. Comparing estimates qualitatively across study sites, Egyptian older adults tend to report any and higher levels of difficulty performing each of the physical functions compared to Tunisian older adults.

All differences by gender in difficulty performing basic activities of daily living are significant in Egypt, but not in Tunisia. Compared to men, women in Egypt more often report requiring help or being unable to perform all of the basic activities of daily living, but women in Tunisia significantly more often report needing help or being unable to bathe or shower only and marginally more often report needing help or being unable to dress. Overall mean scores for difficulty with basic activities of daily living are higher for women than men in both sites, however (1.3 versus 0.7 in Egypt; 1.1 versus 0.9 in Tunisia).

Compared to men, women in Egypt and Tunisia more often report needing help or being unable to perform four of the five instrumental activities of daily living (using the telephone, going places too far to walk, going shopping, and handling own money). In Egypt, the distributions of women and men by reported level of difficulty to prepare meals are marginally

significantly different, with 70% of women and 67% of men reporting that they require no help. In Tunisia, these distributions are significantly different, with 71% of women compared to 60% of men reporting that they require no help to prepare meals. Mean scores for difficulty with instrumental activities of daily living are significantly higher for women than men in both settings (2.8 versus 1.9 in Egypt, and 3.4 versus 2.0 in Tunisia).

Multivariate Analysis of Physical Functional Limitation and Disability

Table 3 shows unadjusted (Column 1), partially adjusted (Columns 2 and 3), and fully adjusted (Column 4) odds that women compared to men in Egypt report difficulty with individual physical functional tasks and basic and instrumental activities of daily living. Compared to men, women's unadjusted odds of reporting difficulty with physical functional tasks range from 2.1 to 2.8 times higher (Column 1). *P*-values for estimated Wald statistics are highly significant after adjusting for reported underlying medical conditions and cognitive impairments, suggesting improvements in all model fits; however, the factor by which women's and men's odds of functional limitation differ do not change substantially in the presence of these controls (Column 2). Adjusting additionally for widowhood and the availability of children and siblings significantly improves all model fits and reduces the relative odds that women report specific functional limitations (Column 3). In the case of reaching or extending arms, for example, these relative odds fall from 1.9 (1.5–2.5) to 1.3 (0.9–1.8), and women's and men's odds of reporting greater difficulty to reach or extend arms are no longer significantly different. Adjusting for public opportunities and private living conditions (Column 4) significantly improves all model fits, but does not substantially alter the factor by which odds of reporting specific physical limitations differ for women and men.

For all basic activities of daily living except caring for one's appearance, women in

Egypt have significantly higher unadjusted odds than men of reporting greater difficulty to perform the activity (1.5 – 3.3) (Column 1). All odds ratios except for those pertaining to eating become insignificantly different from 1.0 after controlling for reported underlying medical conditions and functional and cognitive limitations. Adjusting also for widowhood and the availability of siblings and children does not significantly improve model fits, but women's relative odds of reporting greater difficulty with selected activities (dress/undress, walk, go to the toilet) again become at least marginally significantly greater than 1.0. Adjusting further for public opportunities and private living conditions significantly improves the fits of four models and tends to increase women's relative odds of reporting greater difficulty to eat and to dress. Women's and men's fully adjusted odds of reporting greater difficulty to care for appearance, walk, get in and out of bed, and bathe/shower are not significantly different, whereas women have higher fully adjusted odds than men of reporting difficulty to eat, dress, and go to the toilet.

For all instrumental activities of daily living except preparing meals, women have significantly higher unadjusted odds than men of reporting greater difficulty to perform each activity (1.6 – 3.3) (Column 1). After adjusting for reported medical conditions and physical and cognitive impairments, all odds ratios are reduced but, except for preparing meals, remain significantly greater than 1.0. Adjusting for widowhood and number of surviving children and siblings at least marginally improves all model fits but has variable effects on women's relative odds of reporting difficulty with each instrumental activity. For example, the relative odds of reporting greater difficulty to use the telephone are reduced and become insignificant, whereas the relative odds of reporting greater difficulty to handle money tend to increase. Adjusting for public opportunities and private living conditions significantly improves all model fits and, except for preparing meals and going shopping, tends to increase women's relative odds of

reporting greater difficulty to perform each instrumental activity. Women's and men's fully adjusted odds of reporting greater difficulty to use the telephone are not significantly different, whereas women have significantly higher fully adjusted odds than men of reporting difficulty to go to distant places, to go shopping, and to handle money. Women have persistently lower fully adjusted odds than men of reporting greater difficulty to prepare meals.

(Table 3)

Table 4 shows unadjusted (Column 1), partially adjusted (Columns 2 and 3), and fully adjusted (Column 4) odds that women compared to men in Tunisia report difficulty with physical functional tasks and basic and instrumental activities of daily living. Women's unadjusted relative odds of reporting difficulty with physical functional tasks range from 2.4 to 2.8 (Column 1). Adjusting for reported underlying medical conditions and cognitive impairments significantly improves all model fits, and the factors by which women's and men's odds of functional limitation differ are substantially reduced but remain significant in the presence of these controls (Column 2). For example, women's relative odds of reporting greater difficulty to pull or push objects declines from 2.4 (95% CI 1.9–3.1) to 1.4 (95% CI 1.1–1.9). Adjusting additionally for widowhood and the availability of children and siblings significantly improves the fits of two models but does not substantially alter women's relative odds of reporting greater difficulty with specific functional tasks (Model 3). Adjusting for public opportunities and private living conditions (Model 4) does not consistently improve model fits and does not substantially alter the factor by which odds of reporting greater difficulty with specific physical limitations differ for women and men.

Except for bathing, where women have higher unadjusted odds than men of reporting greater difficulty (OR=2.1), women and men have similar unadjusted odds of reporting greater

difficulty to perform all other basic activities of daily living (odds ratios range from 0.8 to 1.5) (Column 1). The odds ratio for difficulty bathing becomes insignificantly different from 1.0 after controlling for reported underlying medical conditions and physical and cognitive limitations, and odds of reporting greater difficulty in selected activities (care for appearance, walk, and get in and out of bed) are significantly lower for women than men after adjusting for these variables. Adjusting additionally for widowhood and the availability of siblings and children does not significantly improve model fits and does not substantially alter women's relative odds of reporting greater difficulty with any basic activity. Adjusting further for public opportunities and private living conditions at least marginally improves the fits of two models but does not alter women's relative odds of reporting greater difficulty with any basic activity. Women's and men's fully adjusted odds of reporting greater difficulty to eat, dress, bathe, and go to the toilet are not significantly different, whereas women have lower fully adjusted odds than men of reporting greater difficulty to care for their appearance, walk, and get in and out of bed.

For all instrumental activities of daily living except preparing meals, women have significantly higher unadjusted odds than men of reporting greater difficulty to perform each activity (odds ratios range from 3.2 to 5.1) (Column 1). All odds ratios are reduced but, except for difficulty preparing meals, remain significantly greater than 1.0 after adjusting for reported medical conditions and physical and cognitive limitations. Adjusting for widowhood and number of surviving children and siblings does not consistently improve all model fits, has no effect on women's relative odds of reporting greater difficulty to use the telephone and prepare meals, but tends to increase women's relative odds of reporting greater difficulty to go to distant places and handle money. Adjusting for public opportunities and private living conditions significantly improves the fits of two models, but does not substantially alter women's relative odds of

reporting greater difficulty to perform each instrumental activity. Women's and men's fully adjusted odds of reporting greater difficulty to use the telephone are not significantly different, whereas women have significantly greater fully adjusted odds than men of reporting difficulty to go to distant places, shop, and handle money. Women have persistently lower fully adjusted odds than men of reporting greater difficulty to prepare meals.

(Table 4)

Figure 2 presents unadjusted, partially adjusted, and fully adjusted scores for women relative to men of reporting difficulty with functional tasks and basic and instrumental activities of daily living in study sites in Egypt (left) and Tunisia (right). The solid, horizontal lines in both graphs indicate no difference in scores for women relative to men. In Egypt, women have 1.7, 0.5, and 0.9 higher unadjusted scores than men of reporting functional limitation and difficulty with basic and instrumental activities of daily living, respectively. After adjusting for reported medical conditions and physical and cognitive limitations, scores for difficulty with basic and instrumental activities of daily living are similar for women and men, and although the difference by gender in scores for physical functional limitation is smaller, scores remain higher for women than men, on average. The difference in reported functional limitation continues to decline with adjustment for family structure and environmental variables, but women continue to have 1.0 higher fully adjusted functional limitation scores than men, on average. By contrast, adjustment for family structure and environmental variables tends to increase the difference in women's and men's scores for basic and instrumental activities of daily living, although fully adjusted scores for these sets of activities are not significantly different for women and men.

In the study site in Tunisia, women have 1.4, 0.3, and 1.5 higher unadjusted scores than men of reporting physical functional limitation and difficulty with basic and instrumental

activities of daily living, respectively. Compared to men, scores for women are lower for difficulty with instrumental activities of daily living, similar for difficulty with basic activities of daily living, and higher for functional limitation after adjusting for reported medical conditions and cognitive (and physical) limitations. Differences by gender in scores for physical functional limitation and basic and instrumental activities of daily living are not sensitive to adjustment for family structure and public opportunities and private living conditions in Tunisia.

DISCUSSION

This study adds to demographic research on mortality and morbidity among older adults by focusing on functional limitation and disability, which are important indicators of well-being in later life and may increasingly contribute to the global burden of disease over the course of the epidemiologic transition (Murray and Lopez 1997). This study also enhances our understanding of sources of variation in reported functional limitation and disability among women and men by making the separate roles of "sex" and "gender" more explicit in models of the disablement process (Verbrugge and Jette 1994) and by comparing differences in the effect of gender on physical function and disability across contexts. Given the attention that demographers have paid to gender disparities in health and survival in early life, this study addresses unstudied questions about gender disparities in health in later life in settings where girls' disadvantage in survival and care are known (Obermeyer and Cardenas 1997; Yount 1999, 2001, 2003, forthcoming).

Findings for Egypt and Tunisia shed important light on the questions that are posed at the outset of this paper. At face value, findings show that reported levels of functional limitation are significantly higher for women than men in both settings, even after adjusting for medical, social, and environmental factors. By contrast, compared to older men, older women in Tunisia have either similar or lower levels of difficulty with basic activities of daily living, whereas older

women in Egypt have either similar or higher levels of difficulty with these activities. Women in both settings have higher adjusted difficulty with instrumental activities that typically fall within a man's domain of daily activity in more patriarchal settings (e.g., going places too far to walk and handling money) and lower adjusted difficulty with instrumental activities of that typically fall within a woman's domain of daily activity in such settings.

These findings – and particularly those pertaining to functional limitation and ADLs in Egypt – contradict the expectation of Myers et al. (2003) that older men should exhibit higher levels of disability than older women in settings that are at the earlier stages of the epidemiologic transition and in which girls' poorer nutrition and access to health care may cause higher risks of mortality during early life and the childbearing years. Findings with respect to instrumental activities of daily living suggest, however, that the socialization of women and men in more patriarchal settings may influence their reporting on function and health. For example, estimates of difficulty with basic and instrumental activities of daily living are highly sensitive to reports of illness and physical and cognitive limitations in Tunisia and Egypt. In Egypt, variables measuring public opportunities and private living conditions have significant effects on several individual measures of difficulty with basic daily activities and all measures of difficulty with instrumental daily activities, and variables measuring family structure have at least marginally significant effects on individual and composite measures of difficulty with instrumental daily activities. Women's relative odds of reporting greater difficulty with selected basic daily activities increase in magnitude and regain significance in the presence of social and environmental controls, and women's relative odds of reporting greater difficulty with selected instrumental daily activities also increase in magnitude after controlling for these variables. By contrast, although family structure and living conditions have some effect on individual and

composite estimates of difficulty with basic and instrumental daily activities in Tunisia, the factors by which individual and composite scores differ for women and men do not consistently change in the presence of these controls. The greater sensitivity of estimated gender differences in disability to social and environmental controls in Egypt may be due to the more rigid gender roles and more segregated living conditions of women and men in this setting.

Regarding physical functional limitations of older women and men, results for Tunisia support and results for Egypt contradict our expectations about the sensitivity of these measures to social and environmental variables. In Tunisia, individual and composite estimates of physical functional limitation as well as estimated differences by gender in physical function are sensitive to reports of underlying illness and are insensitive to measures of family structure, public opportunities, and private living conditions. In Egypt, these individual and composite measures are highly sensitive to measures of underlying illness as well as social and environmental variables. Also, estimated differences by gender in level of physical functional limitation are insensitive to measures of underlying illness but sensitive to measures of family structure. Variation in the effects of adjusting for underlying illness on the factors by which scores for physical functional limitation differ for women and men could indicate variation across contexts in women's and men's reporting of illness (Gijsbers van Wijk et al. 1991; Hibbard and Pope 1986; MacIntyre 1993; Verbrugge 1985) in addition to differences by sex in the propensity to be ill. Moreover, reports of physical function and disability may be equally subject to gender roles and expectations in more patriarchal settings, despite the intention of measures of physical function to assess underlying health independently of social roles and living conditions. These findings caution against sole use of self-reported health and support the added use of more objective measures in studies of gender and aging in such settings. With these more objective

measures, we may be better able to document variation in the underlying health of older women and men across different epidemiologic, demographic, and social contexts. In so doing, we also will continue to expand the view in demography of what is important about women and the ages at which women matter.

NOTES

[1] In Egypt, 39% of marriages were to a cousin or other blood relative into the 1990s, and in Tunisia, 47% of ever-married women who were first married between 1984 and 1988 were married to a blood relative (Casterline and El-Zeini 2003; El-Zanaty et al. 1996).

[2] "Harm" includes emotional and material harm arising from long absence or imprisonment of the husband or infliction with a serious disease, for example. Because harm can be variously interpreted, some women have had difficulty obtaining a divorce on these grounds.

[3] Of the 1,180 older adults in the original sample in Egypt, 61 never-married respondents, 30 respondents with incomplete information on covariates, and 65 respondents with incomplete information on items measuring functional limitation and basic and instrumental activities of daily living were excluded from the analysis, resulting in an unweighted sample size of 1,024 (401 women, 623 men). Of the 1,236 older adults in the original sample in Tunisia, 11 never-married respondents, 18 respondents with incomplete information on covariates, and 21 respondents with incomplete information on items measuring functional limitation and basic and instrumental activities of daily living were excluded from the analysis, resulting in an unweighted sample size of 1,186 (555 women, 631 men).

[4] Hypertension, heart attack, other heart problem, diabetes, arthritis, falls, foot problems, bone problems, ulcers, infectious or parasitic diseases, burns, stroke, tuberculosis, other lung conditions, cancer, other injuries

[5] In a comparative study of older adults in Taiwan and the United States, cognitive functioning is a more powerful predictor of IADL than ADL impairments (Ofstedal, Zimmer and Lin 1999). See Ofstedal et al. (1999) for a more detailed analysis of the effects of cognitive function on ADL and IADL limitation.

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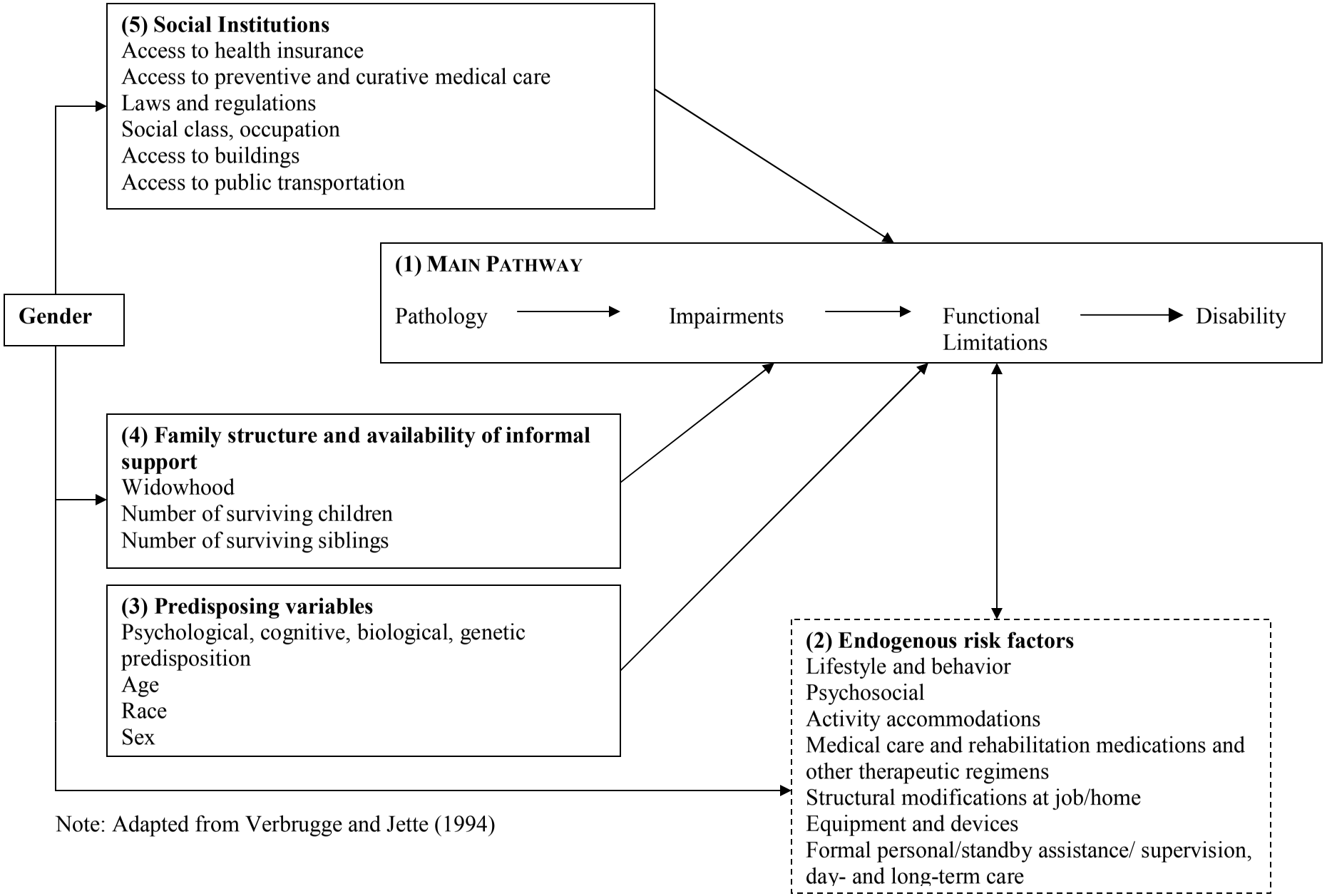
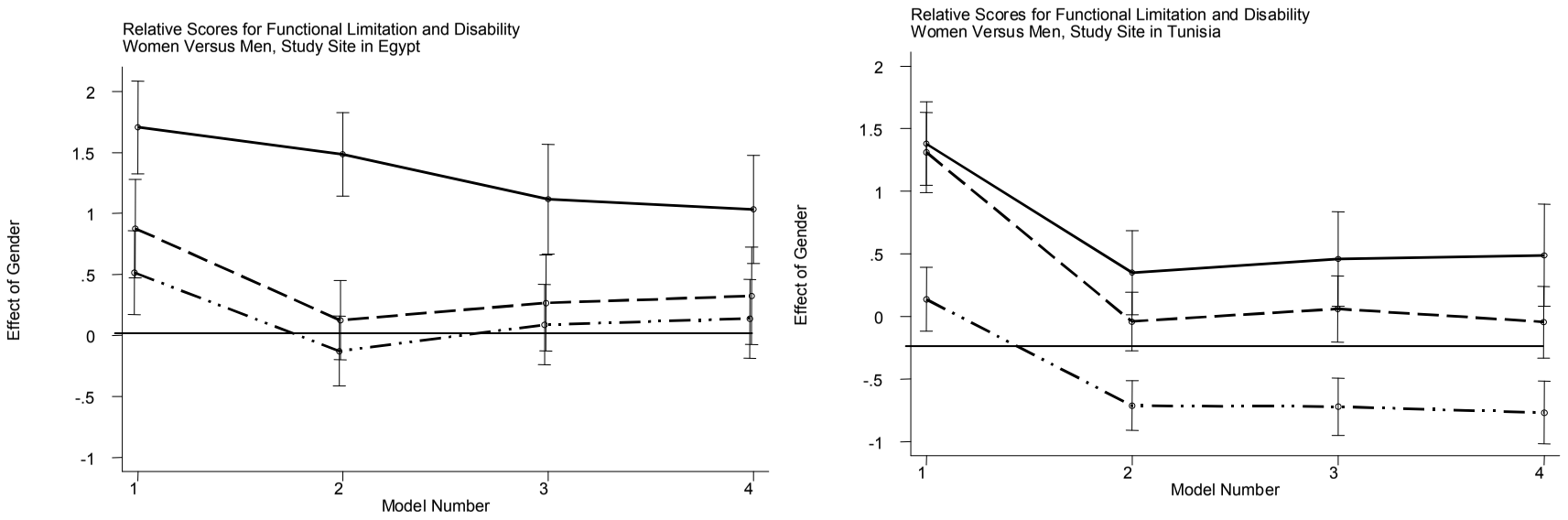
FIGURE 1. Gender and The Disablement Process



Note: Adapted from Verbrugge and Jette (1994)

FIGURE 2. Unadjusted and Adjusted Relative Scores for Functional Limitation and Difficulty with Basic and Instrumental Activities of Daily Living, Women Versus Men, Study Sites in Egypt and Tunisia



Note:

Model (1): Gender Only

Model (2): M(1) plus index of medical conditions and cognitive impairment, proxy respondent, age group, and functional limitation (ADL and IADL models only)

Model (3): M(2) plus living sons, living daughters, living siblings, widowed

Model (4): M(3) plus education, urban residence, childhood residence, home ownership, prior skilled occupation, and access to utilities & amenities

Functional limitation

ADLs

IADLs