Global Health Matters

This article by Dong and Simon provides us with unique insight into mistreatment of the elderly as both a human rights issue and a public health issue. Chinese culture and customs are not well-known to many people; however, in less than four decades, one-quarter of the world's elderly population will be Chinese. There is a strong bond within Chinese families that spans generations. This bond is being tested and, in many cases, disrupted with the rapid economic changes in China, the new mobility of rural populations, and the influence of Western culture on Chinese culture.

Dong and Simon have completed the first study of the aging Chinese population to examine the association of elder mistreatment and physical function. The metrics and measures used in this study can also translate into other cultures around the global with the same challenges. Despite its limitations, this study provides a starting point for examining this important global public health issue.

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IS IMPAIRMENT IN PHYSICAL FUNCTION ASSOCIATED WITH INCREASED RISK OF ELDER MISTREATMENT? FINDINGS FROM A COMMUNITY-DWELLING CHINESE POPULATION

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Elder mistreatment (EM) is an important public health issue. The World Health Organization has declared that EM is a human rights violation, as a person's most basic fundamental right is to be safe and free of violence.[1] In addition, prior studies indicate EM is associated with significant morbidity and mortality;[2,3] yet, we still have rudimentary knowledge about this pervasive global public health issue. The U.S. National Research Council suggests that rigorous research is needed in all aspects of EM.[4] Unfortunately, our current understanding of the racial/ethnic differences in EM is limited, especially among the Chinese population.

Prior studies in Western countries suggest that the prevalence of EM ranges between 3% and 20% depending on the definition, survey methods used, and population studied.[5–13] Recent studies suggest that the prevalence of EM is between 5% and 10%, and this prevalence is likely to be higher among more vulnerable populations, such as those with cognitive impairment and physical disability.[14–17] However, our knowledge of these issues is more limited in Chinese populations. A previous study in Hong Kong found that EM was common in a Chinese population presenting to an urban medical center.[18] Other studies in Hong Kong have found the prevalence of EM to be 20%.[19] Despite these studies, there is still a gap in our current understanding of EM in Chinese populations.

By the year 2050, estimates suggest that one out of every four of the world's elderly population will be Chinese.[20] This demographic imperative necessitates deeper understanding of the health and aging of older people in China. For thousands of years, Chinese culture has been heavily influenced by Confucian traditions, which greatly emphasize filial piety and provide guidelines regarding obligatory roles and responsibilities of each person in the family.[21] However, as with other countries, Chinese societies are facing enormous challenges as the aging population rapidly increases. In addition, urbanization and modernization have posed great challenges to traditional values and Chinese families, and multigenerational Chinese households are facing an immense burden.[22] Rapidly widening economic gaps in China have also brought remarkable stresses onto Chinese families, especially the aging population. These challenges fundamentally threaten the support system of frail older adults, which may further exacerbate vulnerability and dependency, and reflect conditions that strongly contribute to the increased risk for EM.

Physical function is the cornerstone of geriatric medicine, and impairment has been associated with substantial morbidity and mortality.[23–25] However, our current understanding of the relationship between

physical function and EM has been incomplete. Prior studies in Western countries have found conflicting associations between levels of physical function and the risk of EM.[26–32] The basis for this uncertainty is largely due to differences in EM definitions, survey methodology, uniformity of data collection, and selectiveness of the populations studied. Despite these often contradictory results, we are not aware of any study that has examined the independent association between physical function and EM in a Chinese population. This information is crucial in ascertaining targeted understanding of risk factors associated with EM among Chinese older adults to inform more precise prevention and intervention strategies.

The objectives of this study were to examine (*1*) the independent contribution of impairment in overall physical function to the risk of EM and (*2*) the independent contribution of impairment in specific indicators of physical function to the risk of EM in a community-dwelling Chinese population.

PARTICIPANTS AND METHODS

Setting

This study was conducted among participants who presented to a medical center in NanJing, China, in 2005. The details of this study have been previously described elsewhere.[18] In brief, the study population consisted of rural and urban patients aged 60 years or older who presented to this medical center. Participants were identified in four different medical clinics. When they registered with the clinic nurses, all participants older than 60 years of age were asked if they would like to participate in the study. Research assistants who spoke both Mandarin and the NanJing local dialect then approached the patients, explained the purpose of the study, and requested consent to participate in the study.

Five hundred participants (aged 60 years or older) were approached in the four medical clinics consecutively during the four-week period in July 2005. Of the total eligible participants, 412 agreed to participate. This study did not invite patients who lacked the ability to give informed consent, or those with cognitive impairment (according to family members and/or clinic nurses). The survey was self-administered; it did not involve anyone accompanying the elderly patients, and research assistants were available to answer questions. Survey questions were initially constructed in English and then translated into simplified Chinese by bilingual research assistants and investigators. The questions were then back-translated into English to ensure the proper translation of the survey content.

EM conceptual framework and definition

This study followed the conceptual framework of Socio-Cultural Context suggested by the National Research Council. EM is defined as "intentional actions that cause harm or create a serious risk of harm, whether or not intended, to a vulnerable elder by a caregiver or other person who stands in a trust relationship to the elder; or failure by a caregiver to satisfy the elder's basic needs or to protect the elder from harm."[4] Three major components need to be present to constitute EM: an older person, a trust relationship, and vulnerability. An older person includes all people older than 60 years of age. A trust relationship denotes a care-giving relationship or other familial relationship in which a person has the responsibility of caring for or protecting the interests of older people. Vulnerability, another core concept in EM, refers to physical or emotional dependence on others or impaired ability for self-care or self-protection. This vulnerability refers to the cluster of risk factors (e.g., functional impairment) associated with increased likelihood of EM.

The Socio-Cultural Context model focuses on the comprehensive assessment of vulnerability factors, medical comorbidities, relationships, and socioeconomic status inequity, while considering the sociocultural context and social embeddedness in which EM takes place. This overarching model highlights the importance of these interactions created by the vulnerability and dependency of older adults, especially those with physical impairments. It is fundamentally a model of a transactional process of power and exchange unfolding between an older person's well-being in the context of changes in physical, psychological, and social circumstances.

Social embeddedness refers to the set of people in the social network of the older adult and trusted others, which may overlap. Vulnerability factors refer to physical health status (i.e., medical conditions and physical impairment) and psychological status (i.e., depression and loneliness). Power and exchange dynamics refer to the negotiation of care-giving responsibility and social support needed for the older adults, with respect to the levels of dependency and older adults' needs for assistance in performing daily routines. The interactions among these components may potentially lead to the risk for EM, yet at the same time guide the list of covariates for the proposed analyses.

EM assessment

The EM measures used in this study were derived from the Vulnerability to Abuse Screening Scale (VASS),[33,34] which is a brief screening suitable in an outpatient setting. Questions were asked about ever being afraid

of anyone, hurt or harmed by anyone, called names, forced to do things, neglected or confined, and/or exploited of personal or financial belongings without permission. These questions demonstrated high face validity for mistreatment and moderate-to-good construct validity.[33] The VASS instrument measured domains of dependence, dejection, vulnerability, and coercion and yielded a Cronbach's alpha of 0.31–0.74, indicating moderate-to-good internal reliability and appropriateness for a brief screening instrument.

In addition, further consideration was given to the issues of EM in Chinese culture. The study investigators felt that it was important to be more specific and to explore the EM screening questions in more detail. Additional direct questions were asked regarding being hit, kicked, slapped, and pushed; being insulted; being abandoned; someone taking money or belongings without permission; or having any non-consenting sexual contact of any kind. The study investigators felt that answering positively to any of these extremely direct questions usefully supplemented the original screening questions for EM in China. For the purposes of this study, screening positive on any of the aforementioned questions on the survey was considered self-reported EM. Reliability was further tested for these 13 items and Cronbach's alpha was 0.79, indicating good reliability of the modified VASS instrument. In addition, this modified VASS instrument has been closely correlated with depression, loneliness, and social support, further supporting the convergent validity.[35–37]

Physical function assessment

Physical function implies the assessment of specific activities and tasks; impairment threatens one's ability to live independently. Physical function during common activities of daily living was assessed using two well-established measures of ability to perform common daily activities. The first measure used was the Katz Index of Activities of Daily Living (ADL), which measured limitations in an individual's ability to perform basic self-care tasks.[38] Specifically, the study asked about self-reported abilities and if any help was needed in eating, dressing, bathing, walking, transferring, grooming, incontinence, and toileting. In addition, instrumental activities of daily living (IADL) were assessed by asking participants about their self-reported abilities and if any help was needed in managing money, using the telephone, preparing meals, doing laundry, taking medicine, doing housework, or shopping.[39] The answers were given in categorical format. Our analyses of the Katz ADL measure demonstrated good reliability with Cronbach's alpha of 0.85, and the IADL measure also demonstrated good reliability with Cronbach's alpha of 0.87.

Covariates

The Socio-Cultural Context model also shaped the selection of covariates in the study. Sociodemographic and socioeconomic characteristics included age, gender, education level, and monthly income (in RenMinBi, the official currency of China). We assessed family structure by asking about marital status, number of children, and number of people living in the same household. We asked participants about self-reported medical conditions including coronary artery disease, hypertension, chronic lung disease, diabetes mellitus, kidney disease, liver disease, stomach disease, arthritis, stroke, cancer, or tuberculosis.

We assessed depression based on the five-question Geriatric Depression Scale.[40] Questions were asked regarding feelings of satisfaction with life, boredom, helplessness, wanting to stay home, and worthlessness. Loneliness was assessed using a validated three-question survey,[41] derived from the Revised-University of California at Los Angeles Loneliness Scale. Questions were asked regarding feelings of lacking companionship, being left out of life, and being isolated from others. Social support was assessed using a validated Social Support Instrument.[42,43] Questions were asked regarding the availability of someone to listen and talk to, give good advice, show love and affection, help with daily chores, provide emotional support, and offer trust and confidence.

Statistical analyses

Impairment in physical function (ADL and IADL) was reported separately for participants with EM and without EM. Mean, standard deviation (SD), numbers, and percentages were calculated for both overall ADL and IADL and each of the specific ADL and IADL measures. We used logistic regression models to examine physical function variables associated with EM in this population. Physical function variables were operationalized and analyzed in three different ways: by overall summary of impairment in ADL and IADL as a continuous variable, by categorization of impairment with any ADL and IADL measures, and by each of the specific indicators of ADL and IADL measures. For each approach of physical function, all of the following logistical regression models were performed. The study took a number of potential covariates stepwise into consideration in examining the association between impairment in physical function and EM. In the first step (Model A), the study adjusted for demographic characteristics of age and sex. In the second step (Model B), the study added socioeconomic status and family structure indicators to the prior model by including education, income, marital status, and number of children. In the last step

(Model C), medical conditions as well as psychological and social variables were considered as covariates in addition to those in Model B.

The study examined the association between physical function and EM across age and gender. Age groups were categorized into two groups: younger (60–69 years of age) and older (≥70 years of age). Male vs. female gender were separately analyzed. Models A, B, and C were repeated with the same covariates. Odds ratios (ORs), 95% confidence intervals (CIs), and significance levels were reported for these analyses. Data analyses were performed using SAS®.[44]

RESULTS

There were a total of 412 participants in this study: 267 participants who did not self-report EM and 145 participants who did self-report EM. Those with self-reported EM compared with those without self-reported EM tended to be younger, female, less educated, and poorer. Marital status was similar between the two groups. In addition, caregiver neglect was the most common form of EM, followed by financial exploitation, psychological mistreatment, physical mistreatment, and sexual mistreatment.

Of the 267 participants without self-reported EM, the mean impairment for ADL was 0.6 (SD=1.5) and the mean impairment for IADL was 1.1 (SD=1.9). Of the 145 participants with self-reported EM, the mean impairment for ADL was 0.6 (SD=1.4) and the mean impairment for IADL was 1.3 (SD=2.1). The detailed characteristics of specific ADL and IADL indicators by EM status are shown in Table 1.

In the core model (Table 2, Model A), any impairment in ADL was associated with an increased risk of EM (OR=1.63, 95% CI 1.02, 2.60). However, after considering education, income, marital status, and number of children (Model B), the association was no longer significant (OR=1.40, 95% CI 0.84, 2.33). In the fully adjusted model (Model C), the addition of medical conditions, depression, loneliness, and social support did not alter the nonsignificant association between impairment in physical function and risk of EM. The findings for ADL impairment considered as a continuous variable with EM are presented in Table 2.

The study then performed similar analyses for impairment with IADL with the risk of EM. In the core model (Table 3, Model A), any impairment in IADL was not associated with increased risk of EM (OR=1.52, 95% CI 0.97, 2.39). After considering education, income, marital status, and number of children (Model B), as well as medical conditions, depression, loneliness, and social support (Model C), the results

Table 1. Characteristics of impairment in physical function and elder mistreatment in a community-dwelling Chinese population in NanJing China, 2005

	EM (n=145)	*No EM (n=267)*
Physical function	*ADL impairments* N *(percent)*	*ADL impairments* N *(percent)*
Eating		
Yes	4 (2.8)	10 (3.8)
No	141 (97.2)	254 (95.1)
Dressing		
Yes	8 (5.5)	13 (4.9)
No	136 (93.8)	253 (94.8)
Bathing		
Yes	16 (11.0)	22 (8.2)
No	129 (89.0)	243 (91.0)
Walking		
Yes	7 (4.8)	13 (4.9)
No	138 (95.2)	252 (94.4)
Transferring		
Yes	26 (17.9)	33 (12.4)
No	118 (81.4)	233 (87.3)
Grooming		
Yes	7 (4.8)	13 (4.9)
No	136 (93.8)	251 (94.0)
Incontinence		
Yes	4 (2.8)	8 (3.0)
No	138 (95.2)	255 (95.5)
Using toilet		
Yes	21 (14.5)	37 (13.9)
No	123 (84.8)	228 (85.4)
Physical function	*IADL impairments* N *(percent)*	*IADL impairments* N *(percent)*
Managing money		
Yes	21 (14.5)	25 (9.4)
No	122 (84.1)	241 (90.3)
Using telephone		
Yes	10 (6.9)	13 (4.9)
No	133 (91.7)	253 (94.8)
Preparing meals		
Yes	37 (25.5)	44 (16.5)
No	105 (72.4)	220 (82.4)
Laundry		
Yes	32 (22.1)	52 (19.5)
No	111 (76.6)	211 (79.0)
Taking medicine		
Yes	12 (8.3)	33 (12.4)
No	125 (86.2)	222 (83.2)
Housework		
Yes	29 (20.0)	61 (22.9)
No	112 (77.2)	204 (76.4)
Routine health		
Yes	16 (11.0)	21 (7.9)
No	127 (87.6)	243 (91.0)
Shopping		
Yes	27 (18.6)	36 (13.5)
No	117 (80.7)	230 (86.1)

EM = elder mistreatment

ADL = activities of daily living

IADL = instrumental activities of daily living

Table 2. Association of ADL and elder mistreatment in a community-dwelling Chinese population in NanJing China, 2005

	Odds ratio (95% CI)					
	Continuous ADL			*Any ADL impairment*		
Variable	*Model A*[a]	*Model B*[b]	*Model C*[c]	*Model A*[a]	*Model B*[b]	*Model C*[c]
Age	0.97 (0.94, 1.01)	0.97 (0.94, 1.01)	0.96 (0.92, 0.99)	0.97 (0.94, 1.00)	0.97 (0.94, 1.00)	0.95 (0.92, 0.99)
Sex	0.68 (0.44, 1.04)	0.98 (0.61, 1.56)	0.91 (0.54, 1.51)	0.69 (0.46, 1.07)	0.99 (0.62, 1.59)	0.92 (0.56, 1.54)
Education		0.93 (0.88, 0.99)	0.96 (0.89, 1.02)		0.93 (0.88, 0.98)	0.96 (0.89, 1.02)
Income		1.14 (0.92, 1.43)	1.06 (0.82, 1.35)		1.13 (0.91, 1.41)	1.05 (0.82, 1.35)
Marital status		0.82 (0.49, 1.39)	1.18 (0.65, 2.15)		0.84 (0.50, 1.42)	1.19 (0.66, 2.16)
Number of children		1.12 (0.96, 1.31)	1.17 (0.99, 1.38)		1.11 (0.95, 1.29)	1.16 (0.98, 1.37)
Medical conditions			1.49 (1.17, 1.90)			1.42 (1.12, 1.79)
Depression			1.47 (1.16, 1.90)			1.44 (1.14, 1.83)
Loneliness			0.89 (0.73, 1.11)			0.88 (0.72, 1.09)
Social support			2.41 (1.54, 3.78)			2.48 (1.58, 3.88)
Continuous ADL impairment	1.07 (0.92, 1.23)	1.03 (0.88, 1.21)	0.85 (0.69, 1.04)			
Any ADL impairment				1.63 (1.02, 2.60)[d]	1.40 (0.84, 2.33)	0.86 (0.48, 1.53)

[a]Model A = age and sex

[b]Model B = age, sex, education, income, marital status, and number of children

[c]Model C = age, sex, education, income, marital status, number of children, medical conditions, depression, loneliness, and social support

[d]$p<0.05$

ADL = activities of daily living

CI = confidence interval

Table 3. Association of IADL and elder mistreatment in a community-dwelling Chinese population in NanJing China, 2005

	Odds ratio (95% CI)					
	Continuous IADL			*Any IADL impairment*		
	Model A[a]	*Model B*[b]	*Model C*[c]	*Model A*[a]	*Model B*[b]	*Model C*[c]
Age	0.97 (0.94, 1.00)	0.97 (0.93, 1.00)	0.96 (0.92, 0.99)	0.97 (0.94, 1.00)	0.97 (0.93, 1.00)	0.95 (0.92, 0.99)
Sex	0.67 (0.44, 1.02)	0.97 (0.61, 1.54)	0.94 (0.56, 1.56)	0.65 (0.43, 1.00)	0.96 (0.59, 1.53)	0.94 (0.57, 1.57)
Education		0.93 (0.88, 0.98)	0.96 (0.90, 1.02)		0.93 (0.88, 0.99)	0.96 (0.89, 1.02)
Income		1.14 (0.92, 1.42)	1.06 (0.83, 1.35)		1.15 (0.92, 1.43)	1.05 (0.82, 1.34)
Marital status		0.83 (0.49, 1.41)	1.18 (0.65, 2.14)		0.84 (0.49, 1.41)	1.19 (0.66, 2.16)
Number of children		1.11 (0.95, 1.29)	1.19 (0.99, 1.41)		1.11 (0.95, 1.29)	1.16 (0.98, 1.38)
Medical conditions			1.47 (1.15, 1.87)			1.42 (1.12, 1.79)
Depression			1.45 (1.15, 1.84)			1.44 (1.13, 1.82)
Loneliness			0.90 (0.73, 1.12)			0.88 (0.72, 1.09)
Social support			2.41 (1.53, 3.79)			2.47 (1.57, 3.87)
Continuous IADL impairment	1.10 (0.99, 1.23)	1.04 (0.92, 1.18)	0.91 (0.79, 1.06)			
Any IADL impairment				1.52 (0.97, 2.39)	1.25 (0.76, 2.05)	0.87 (0.49, 1.53)

[a]Model A = age and sex

[b]Model B = age, sex, education, income, marital status, and number of children

[c]Model C = age, sex, education, income, marital status, number of children, medical conditions, depression, loneliness, and social support

IADL = instrumental activities of daily living

CI = confidence interval

Table 4. Association of specific indicators of physical function and elder mistreatment in a community-dwelling Chinese population in NanJing China, 2005

	Odds ratio (95% CI)		
Specific ADL impairment	*Model A*[a]	*Model B*[b]	*Model C*[c]
Eating	0.80 (0.24, 2.67)	0.64 (0.17, 2.47)	0.26 (0.05, 1.26)
Dressing	1.39 (0.54, 3.55)	1.36 (0.46, 3.47)	0.62 (0.19, 1.94)
Bathing	1.64 (0.79, 3.45)	1.36 (0.61, 3.04)	0.64 (0.24, 1.68)
Walking	1.07 (0.40, 2.87)	0.97 (0.34, 2.78)	0.42 (0.12, 1.49)
Transferring	1.76 (0.96, 3.22)	1.46 (0.76, 2.82)	0.65 (0.29, 1.44)
Grooming	1.13 (0.43, 2.96)	0.91 (0.32, 2.56)	0.55 (0.17, 1.75)
Incontinence	1.01 (0.29, 3.47)	0.95 (0.25, 3.62)	0.46 (0.10, 2.07)
Toileting	1.06 (0.59, 1.89)	0.99 (0.53, 1.85)	0.69 (0.34, 1.39)
Specific IADL impairment	*Model A*[a]	*Model B*[b]	*Model C*[c]
Managing money	1.95 (1.01, 3.76)	1.24 (0.58, 2.63)	0.62 (0.26, 1.49)
Using telephone	1.61 (0.66, 3.93)	0.94 (0.35, 2.48)	0.61 (0.21, 1.79)
Preparing meals	2.22 (1.29, 3.81)[d]	2.02 (1.11, 3.67)[d]	1.49 (0.75, 2.94)
Doing laundry	1.39 (0.82, 2.38)	1.20 (0.67, 2.17)	0.69 (0.35, 1.36)
Taking medicine	0.69 (0.34, 1.39)	0.64 (0.29, 1.35)	0.56 (0.24, 1.29)
Housework	1.02 (0.59, 1.74)	0.89 (0.49, 1.58)	0.51 (0.26, 1.01)
Routine health	1.68 (0.81, 3.49)	1.27 (0.57, 2.80)	0.89 (0.35, 2.29)
Shopping	1.85 (1.01, 3.41)[d]	1.83 (0.94, 3.55)	1.02 (0.47, 2.24)

[a]Model A = age and sex

[b]Model B = age, sex, education, income, marital status, and number of children

[c]Model C = age, sex, education, income, marital status, number of children, medical conditions, depression, loneliness, and social support

[d]$p<0.05$

CI = confidence interval

ADL = activities of daily living

IADL = instrumental activities of daily living

remained not statistically significant. The findings for IADL impairment (considered as a continuous variable) and EM are shown in Table 3.

In addition, the study examined the association of the specific ADL and IADL indicators with EM (Table 4). The analyses showed significant associations only among IADL indicators. Specifically, in the core model (Model A), impairment in ability to prepare meals (OR=2.22, 95% CI 1.29, 3.81) and impairment in shopping (OR=1.85, 95% CI 1.01, 3.41) were associated with an increased risk of EM. After considering education, income, marital status, and number of children (Model B), only impairment in ability to prepare meals remained significantly associated with EM (OR=2.02, 95% CI 1.11, 3.67). However, after adding medical conditions and psychosocial measures (Model C), this association was no longer statistically significant (OR=1.49, 95% CI 0.75, 2.94).

Among the lower age group (60–69 years of age), the mean ADL impairment for those with EM was 0.3 (SD=0.6) and for those without EM was 0.3 (SD=0.9). The mean IADL impairment for the lower age group with EM was 0.6 (SD=1.2) and for those without EM was 0.5 (SD=1.3). Among the higher age group (≥70 years of age), the mean ADL impairment for those with EM was 1.2 (SD=1.9) and for those without EM was 0.8 (SD=1.8). For the higher age group, the mean IADL impairment for those with EM was 2.3 (SD=2.5) and for those without EM was 1.6 (SD=2.3). In the fully adjusted model, impairment in ADL or IADL was not associated with increased risk of EM in either age group (Table 5, Model C).

Among men, the mean ADL impairment for those with EM was 0.4 (SD=1.0) and for those without EM was 0.6 (SD=1.5). Among men, the mean IADL impairment for those with EM was 1.0 (SD=1.8) and for those without EM was 1.2 (SD=1.9). Among women, the mean ADL impairment for those with EM was 0.9 (SD=1.8) and for those without EM was 0.6 (SD=1.5). Among women, the mean IADL impairment for those with EM was 1.6 (SD=2.4) and for those without EM was 0.7 (SD=1.7). In the fully adjusted model, impairment in ADL or IADL was not associated with an increased risk of EM across gender (Table 5, Model C).

Table 5. Association of physical function and elder mistreatment across age and gender groups in a community-dwelling Chinese population in NanJing China, 2005

	Odds ratio (95% CI)		
Variable	*Model A*[a]	*Model B*[b]	*Model C*[c]
Younger age group (60–69 years)			
ADL impairment: any	1.45 (0.71, 2.96)	1.30 (0.61, 2.77)	0.79 (0.33, 1.91)
IADL impairment: any	1.16 (0.60, 2.25)	1.06 (0.52, 2.14)	0.79 (0.36, 1.77)
Older age group (≥70 years)			
ADL impairment: any	1.85 (0.98, 3.51)	1.59 (0.78, 3.28)	0.97 (0.42, 2.27)
IADL impairment: any	1.99 (1.04, 3.81)[d]	1.56 (0.74, 3.29)	0.95 (0.39, 2.29)
Men			
ADL impairment: any	1.30 (0.69, 2.43)	1.23 (0.61, 2.49)	0.77 (0.35, 1.68)
IADL impairment: any	1.17 (0.67, 2.06)	1.08 (0.57, 2.07)	0.72 (0.35, 1.49)
Women			
ADL impairment: any	2.22 (1.06, 4.62)[d]	2.11 (0.95, 4.69)	1.26 (0.49, 3.24)
IADL impairment: any	2.40 (1.11, 5.21)	2.00 (0.87, 4.62)	1.65 (0.61, 4.45)

[a]Model A = age and sex

[b]Model B = age, sex, education, income, marital status, and number of children

[c]Model C = age, sex, education, income, marital status, number of children, medical conditions, depression, loneliness, and social support

[d]$p<0.05$

CI = confidence interval

ADL = activities of daily living

IADL = instrumental activities of daily living

DISCUSSION

In this Chinese population, the study found that impairment in physical function was not independently associated with increased risk of EM, after considering potential confounders. In addition, the study found that impairment in specific indicators of ADL and IADL were also not independently associated with increased risk of EM. Moreover, the results of these findings were similar across age and gender.

Our findings expand prior studies of physical function and EM. This is the first study of a Chinese aging population to systematically examine the independent association of physical function with EM. This information contributes to the global understanding of risk factors associated with EM. In addition, the study considered an extensive number of potential confounders in examining the relationship between physical function and EM, which further permits a more comprehensive understanding of these relationships. Moreover, our findings suggest that the lack of independent association between physical function and EM was in part explained by group differences in socioeconomic, family structure, medical condition, and psychosocial factors. This finding sets the cornerstone for future longitudinal study to elucidate potential mediators and causal mechanisms between impairment in physical function and EM. Lastly, this study was the first to examine the age and gender differences in physical function impairment and risk of EM, which further suggest the nonsignificant association between the two and contribute to the validity of our results.

Previous literature on EM

Research suggests that there is incomplete and often controversial evidence linking impairment in physical function to EM. Fulmer et al. performed a cross-sectional study of 165 older adults who presented to the emergency room and found in the bivariate analyses that lower levels of functional status were associated with increased risk of EM.[28] In 1994, Lachs et al. examined the Established Populations for the Epidemiologic Study of the Elderly cohort (n=2,812) and found that 68 participants with EM reported to social services agencies.[26] This study found a significant bivariate association between impairment in eating, grooming, and walking and EM. However, after adjusting for potential confounders, only impairment in eating was associated with increased risk of EM (OR=3.5, 95% CI 1.2, 11.7). In a follow-up study of the same cohort, the authors found that in the multivariate analyses, greater impairment in ADL (OR=1.3, 95% CI 1.1, 1.8) was associated with increased risk of EM.[27] However, impairment in physical activities and mobility measures

was not associated with increased risk of EM. Comijs et al.[32] found that physical dependence was not associated with increased risk of EM in a Dutch population. Pillemer and Finkelhor found that it was not the physical dependence that increased the risk of EM, but, rather, the personality disorders of the caregiver that predisposed the elderly to the increased risk of EM.[30]

Compared with these prior studies, our findings in a Chinese population did not show a significant association between physical function impairment and EM. More specifically, compared with Lachs' study, we did not find eating impairment to be associated with an increased risk of EM. However, in our core model, adjusting for age and sex, we did find a significant association between impairment in any ADL and increased risk of EM. However, after considering additional socioeconomic and health-related variables, the association became statistically insignificant. Similar associations were also found for impairment in ability to prepare meals and to shop with the risk of EM. Unfortunately, our study did not have personality measures, caregiver characteristics, or objective testing of physical performance measures to make a meaningful comparison with Pillemer and Finkelhor's study findings.

The causal pathway between impairment in physical function and EM remains unclear. Our study findings did not support the NRC Socio-Cultural Context framework, which suggests that impairment in physical function is an independent vulnerability factor for this Chinese population. In our core models, we found a significant association between impairment in physical function and EM. However, our findings suggest the possibility that the relationship between impairment in physical function and EM may be mediated through socioeconomic, family structure, medical condition, and psychosocial factors. Rigorous consideration of these factors further contrasts the bivariate findings from prior studies, and emphasizes the importance of potential confounding and mediating factors. Future longitudinal study of physical function and EM is needed to provide more precise understanding of the causal mechanisms in the aging Chinese population.

Furthermore, insights into Chinese culture may yield additional interpretation of our study findings. In the recent decade, urbanization and industrialization have fundamentally altered the family dynamic and household composition. Many children are leaving home to seek jobs and wealth, which are often thought of as courageous acts to support the family and honor their parents. These acts of leaving parents are often accepted as a temporary deviation from the traditional cultural norms of filial piety and customary responsibilities. However, if the older parents become more physically frail, the cultural and community expectations of the children are drastically different. Because there are virtually no nursing homes to care for the elderly in China, family members are expected to provide necessary psychological, social, and financial support for their frail, aging parents. These factors and expectations of support could, in turn, modify other risk factors for EM in Chinese populations.[45,46] The intersection of impairment in physical function, psychosocial factors, and EM deserves further exploration, and in-depth investigations are needed to elucidate the causal mechanism.

Limitations

Our study had several limitations. First, this was a population presenting to a medical center and is not representative of the general population. This clinical population is also likely to be frailer than the general population, which could bias the self-reported physical function in relation to the general population. Thus, the results of our findings may not be generalizable to other Chinese rural populations, including Chinese minority groups and rural immigrant Chinese residents in other countries, as they may be subjected to varying degrees of social, economic, and Western influence.

Second, this was a self-administered survey that excluded older people with cognitive impairment, because the study team was concerned that people with cognitive impairment would not be able to appropriately complete the survey. This further limits the generalizability of the study findings. Third, our study was based on self-report of older participants, who may have been subjected to recall bias. Fourth, this study did not have any qualitative data regarding the social context of EM.

Fifth, the study collected self-reported medical conditions and could not objectively assess the severity of medical conditions (e.g., coronary artery disease, stroke, and diabetes). Sixth, we did not have directly observed physical performance testing to objectively assess the association between comprehensive measures of physical function and EM. Lastly, this was a cross-sectional study that examined the association between physical function and EM. Prospective study would be needed to quantify these relationships. Nevertheless, this study provides a unique window into a seldom studied issue of EM in a Chinese population and lays the groundwork for future studies on these issues.

CONCLUSIONS

Overall, our study found that impairment in physical function was not independently associated with

increased risk of EM. Due to the vast geographical area of China and its diverse culture, there is a need for a multisite study of EM in China. Further in-depth studies across different geographic areas are needed to (*1*) explore the cultural, familial, physical function, and psychosocial well-being of both victims and perpetrators; (*2*) quantify the temporal relationships of physical function and EM; and (*3*) better understand the adverse health outcomes of EM across different Chinese populations. Social services agencies, family members, communities, local governments, public health officials, and health-care professionals could play crucial roles in providing support to those with EM and improving health and aging. Together, they could set the cornerstone for more targeted screening, intervention, and prevention strategies to reduce EM and improve public health and human rights for the elderly.

The authors thank the NanJing Medical Center, which provided tremendous support for this study; the research assistants for their diligent and hard work in administering and collecting the survey; and the senior citizens of NanJing for participating in this study and sharing the stories of their lives.

Dr. Dong is supported by the National Institute on Aging Paul B. Beeson Career Development Award in Aging (K23 AG030944), The Starr Foundation, John A. Hartford Foundation, and The Atlantic Philanthropies.

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REFERENCES

1. World Health Organization. World report on violence and health: summary. Geneva: WHO; 2002. Also available from: URL: http://www.who.int/violence_injury_prevention/violence/world_report/en/summary_en.pdf [cited 2008 Jun 1].
2. Dong X. Medical implications of elder abuse and neglect. Clin Geriatr Med 2005;21:293-313.
3. Dong X, Simon M, Mendes de Leon C, Fulmer T, Beck T, Hebert L, et al. Elder self-neglect and abuse and mortality risk in a community-dwelling population. JAMA 2009;302:517-26.
4. Bonnie RJ, Wallace RB, editors. Elder mistreatment: abuse, neglect, and exploitation in an aging America. Washington: National Academies Press; 2003.
5. Giordano NH, Giordano JA. Elder abuse: a review of the literature. Soc Work 1984;29:232-6.
6. Thomas C. The first national study of elder abuse and neglect: contrast with results from other studies. J Elder Abuse Neglect 2002;12:1-14.
7. Lachs MS, Pillemer K. Elder abuse. Lancet 2004;364:1263-72.
8. Wolf RS. Elder abuse: ten years later. J Am Geriatr Soc 1988;36:758-62.
9. Tatara T. Elder abuse. In: Edwards RL, Hopps JG, editors. Encyclopedia of social work. 19th ed. Washington: NASW Press; 1995. p. 834-42.
10. House of Representatives (US), Select Committee on Aging. Elder abuse: decades of shame and inaction. Washington: Government Printing Office (US); 1990.
11. Brownell P, Welty A, Brennan M. Elder abuse and neglect. Albany (NY): New York State Office for the Aging; 2004. Also available from: URL: http://www.aging.state.ny.us/explore/project2015/artabuse.htm 6-4-2004 [cited 2008 Jun 1].
12. Cooper C, Manela M, Katona C, Livingston G. Screening for elder abuse in dementia in the LASER-AD study: prevalence, correlates and validation of instruments. Int J Geriatr Psychiatry 2008;23:283-8.
13. Acierno R, Hernandez MA, Amstadter AB, Resnick HS, Steve K, Muzzy W, et al. Prevalence and correlates of emotional, physical, sexual, and financial abuse and potential neglect in the United States: the National Elder Mistreatment Study. Am J Public Health 2010;100:292-7.
14. Beach SR, Schulz R, Williamson GM, Miller LS, Weiner MF, Lance CE. Risk factors for potentially harmful informal caregiver behavior. J Am Geriatr Soc 2005;53:255-61.
15. Page C, Conner T, Prokhorov A, Fang Y, Post L. The effect of care setting on elder abuse: results from a Michigan survey. J Elder Abuse Negl 2009;21:239-52.
16. Garre-Olmo J, Planas-Pujol X, Lopez-Pousa S, Juvinya D, Vila A, Vilalta-Franch J, et al. Prevalence and risk factors of suspected elder abuse subtypes in people aged 75 and older. J Am Geriatr Soc 2009;57:815-22.
17. Leisey M, Kupstas PK, Cooper A. Domestic violence in the second half of life. J Elder Abuse Negl 2009;21:141-55.
18. Dong X, Simon MA, Gorbien M. Elder abuse and neglect in an urban Chinese population. J Elder Abuse Negl 2007;19:79-96.
19. Yan E, Tang CS-K. Prevalence and psychological impact of Chinese elder abuse. J Interpers Violence 2001;16:1158-74.
20. Banister J. Implications of the aging of China's population. In: Changing family structure and population aging in China: a comparative approach. Beijing (China): Peking University Press; 1990. p. 263-308.
21. Gabrenya WK Jr, Hwang KK. Chinese social interaction: harmony and hierarchy on the good earth. In: Bond MH, editor. The handbook of Chinese psychology. New York: Oxford University Press; 1996. p. 309-21.
22. Tam S, Neysmith S. Disrespect and isolation: elder abuse in Chinese communities. Can J Aging 2006;25:141-51.
23. Olsen J, Jeune B. The mortality experience of early old-age and disability pensioners from unskilled- and semiskilled labour groups in Fredericia. Scand J Soc Med Suppl 1980;16:50-2.
24. Johnson NE. The racial crossover in comorbidity, disability, and mortality. Demography 2000;37:267-83.
25. Wallman T, Wedel H, Johansson S, Rosengren A, Eriksson H, Welin L, et al. The prognosis for individuals on disability retirement. An 18-year mortality follow-up study of 6,887 men and women sampled from the general population. BMC Public Health 2006;6:103.
26. Lachs MS, Berkman L, Fulmer T, Horwitz RI. A prospective community-based pilot study of risk factors for the investigation of elder mistreatment. J Am Geriatr Soc 1994;42:169-73.
27. Lachs MS, Williams C, O'Brien S, Hurst L, Horwitz R. Risk factors for reported elder abuse and neglect: a nine-year observational cohort study. Gerontologist 1997;37:469-74.
28. Fulmer T, Paveza G, VandeWeerd C, Fairchild S, Guadagno L, Bolton-Blatt M, et al. Dyadic vulnerability and risk profiling for elder neglect. Gerontologist 2005;45:525-34.
29. Paveza GJ, Cohen D, Eisdorfer C, Freels S, Semla T, Ashford JW, et al. Severe family violence and Alzheimer's disease: prevalence and risk factors. Gerontologist 1992;32:493-7.
30. Pillemer K, Finkelhor D. Causes of elder abuse: caregiver stress versus problem relatives. Am J Orthopsychiatry 1989;59:179-87.
31. Compton SA, Flanagan P, Gregg W. Elder abuse in people with dementia in Northern Ireland: prevalence and predictors in cases referred to a psychiatry of old age service. Int J Geriatr Psychiatry 1997;12:632-5.
32. Comijs HC, Smit JH, Pot AM, Bouter LM, Jonker C. Risk indicators of elder mistreatment in the community. J Elder Abuse Negl 1999;9:67-76.

33. Schofield MJ, Mishra GD. Validity of self-report screening scale for elder abuse: Women's Health Australia Study. Gerontologist 2003;43:110-20.
34. Hwalek MA, Sengstock MC. Assessing the probability of abuse of the elderly: toward development of a clinical screening instrument. J Appl Gerontol 1986;5:153-73.
35. Dong X, Simon MA, Gorbien M, Percak J, Golden R. Loneliness in older Chinese adults: a risk factor for elder mistreatment. J Am Geriatr Soc 2007;55:1831-5.
36. Dong X, Simon MA. Is greater social support a protective factor against elder mistreatment? Gerontology 2008;54:381-8.
37. Dong X, Simon MA, Odwazny R, Gorbien M. Depression and elder abuse and neglect among community-dwelling Chinese elderly population. J Elder Abuse Negl 2008;20:25-41.
38. Katz S, Akpom CA. A measure of primary sociobiological functions. Int J Health Serv 1976;6:493-508.
39. Fillenbaum GG. Multidimensional functional assessment of older adults: the Duke Older Americans Resources and Services Procedures. Hillsdale (NJ): Lawrence Erlbaum Associates; 1988.
40. Tang WK, Wong E, Chiu HF, Lum CM, Ungvari GS. The Geriatric Depression Scale should be shortened: results of Rasch analysis. Int J Geriatr Psychiatry 2005;20:783-9.
41. Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A short scale for measuring loneliness in large surveys: results from two population-based studies. Res Aging 2004;26:655-72.
42. Berkman LF, Leo-Summers L, Horwitz RI. Emotional support and survival after myocardial infarction. A prospective, population-based study of the elderly. Ann Intern Med 1992;117:1003-9.
43. Gorkin L, Schron EB, Brooks MM, Wiklund I, Kellen J, Verter J, et al. Psychosocial predictors of mortality in the Cardiac Arrhythmia Suppression Trial-1 (CAST-1). Am J Cardiol 1993;71:263-7.
44. SAS Institute, Inc. SAS®: Version 9.1.3 for Windows. Cary (NC): SAS Institute, Inc; 2004.
45. Dong X, Beck TT, Simon MA. Loneliness and mistreatment of older Chinese women: does social support matter? J Women Aging 2009;21:293-302.
46. Dong X, Beck TT, Simon MA. The associations of gender, depression and elder mistreatment in a community-dwelling Chinese population: the modifying effect of social support. Arch Gerontol Geriatr 2010;50:202-8.