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Physical Disability and Social Interaction: Factors Associated With Low Social Contact and Home Confinement in Disabled Older Women (The Women's Health and Aging Study)

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Objectives. This study examines the association of disability and social interaction, measured as in-person contact with non-household members and home confinement, and identifies sociodemographic, socioeconomic, and health-related factors that modify this relationship.

Methods. Participants were 1,002 moderately to severely disabled community-dwelling women aged 65 and older from the Women's Health and Aging Study, identified by screening an age-stratified random sample of Medicare beneficiaries in Baltimore, Maryland. Logistic regression models were used to estimate the odds of low social interaction associated with disability and each independent modifier.

Results. In a typical week, 23% did not visit with anyone residing outside their households and 17% did not leave their homes. In addition to and independent of disability level, older age, not completing high school, having a driver in the home, hearing difficulties and incontinence were associated with low social contact; older age and African American race were related to home confinement. African American women living alone are especially vulnerable to home confinement.

Discussion. Physical disability is not necessarily socially disabling, as many of the most severely disabled in our study had at least daily social interaction. Improvements in social interaction appear possible through more effective management of certain health conditions and attention to potential sociocultural barriers.

SOCIAL contact and interaction have been identified as important predictors of morbidity and mortality in older populations (Blazer, 1982; House, Landis, & Umberson, 1988; Larson, 1978; Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987). Older adults, older women in particular, may be especially vulnerable to low social contact, due to spousal death, loss of other companions through death or institutionalization, and the departure of adult children (Atchley, 1980; George, 1989). Restricted finances (Atchley, 1980; Field, Minkler, Falk, & Leino, 1993) and poor health and disability may further limit opportunities for social participation (Field et al., 1993; Lawton, Moss, & Fulcomer, 1986–87).

Functional limitation and disability are prevalent in older women and increase dramatically with age (Prohaska, Mermelstein, Miller, & Jack, 1993). Over 25% of women age 65 years and older report difficulty performing activities of daily living (ADL), including walking and getting outside; nearly 50% of women age 85 years and older have such difficulty. When instrumental ADL, such as shopping and using the telephone are included, 40% and 64%, respectively, have difficulty.

Disability has been associated with lower levels of social interaction (Blazer, 1982; Kovar, 1988; Simonsick, 1993; Thompson & Heller, 1990). Yet, a sizable proportion of severely disabled women have substantial social participation (Simonsick, Phillips, Skinner, Davis, & Kasper, 1995), suggesting that other factors, in addition to disability, condition social contact. Few empirical investigations have directly examined the relationship between physical and social function in older adults or considered factors that may modify such a relationship. Thus, within a population of disabled older women, this study aims to investigate the relationship between severity of disability and social interaction and identify sociodemographic and socioeconomic characteristics associated with increased vulnerability for low social contact and home confinement. In addition, because disability has multiple etiologies, we examine the association of specific health conditions, underlying or concurrent with disability, with social participation. Identifying factors that modify social interaction may be key for more effective targeting of interventions aimed at improving the life quality of disabled older adults.

Social interaction has been conceptualized in various

ways (Chappell & Badger, 1989; Kaufman & Adams, 1987; Oxman & Berkman, 1990). We focus on two indicators, contact with persons outside the immediate household and home confinement, as important dimensions of social interaction. Although persons living with others are not typically considered isolated, if they have limited contact with a broader social world, they may have insufficient social interaction. Relations with cohabitating family members have been characterized as more obligatory than those with friends, neighbors and more distant relatives (Arling, 1976). This may be particularly true for disabled older women who live with others, often out of necessity, and are to some degree dependent on household members for assistance with routine tasks (Avery, Speare, & Lawton, 1989). Friendships are, by definition, voluntary in nature and have been found to have a more positive impact on well-being and satisfaction than family relationships (Arling, 1976; Crohan & Antonucci, 1989; Larson, Mannell, & Zuzanek, 1986). The majority of older adults living with someone other than a spouse share residency with an adult child and, less frequently, other relatives. Rarely do they reside with friends (Bachrach, 1980; Himes, Hogan, & Eggebeen, 1996). Living with adult children or other relatives and their families does not guarantee adequate social interaction, however. For instance, older adults who live with others commonly eat alone (Torres, McIntosh, & Kubena, 1992).

Spousal relations are also important, but less than half of women age 65 years and older and only 11% of women age 85 years and older are married (U.S. Bureau of the Census, 1991). Even among married women, living with a spouse does not ensure sufficient social and emotional support (Essex & Nam, 1987), as the majority do not consider their spouse a confidant (Connidis & Davies, 1992). Moreover, if the husband is in poor health, the impact on the marital relationship, as well as caregiving-related tasks, can be socially confining and contribute to poor mental health (Simonsick, 1993). Because we are primarily interested in personal contact for purposes other than provision of instrumental support, we distinguish contact with persons outside of the immediate household from contact with household members.

Another measure of social interaction is the frequency of getting outside the home. Home confinement among community-dwelling disabled older persons is common (Ganguli, Fox, Gilby, & Belle, 1996; Kovar, 1988) and has been associated with nutritional deficiencies (Posner, Smigelski, & Krachenfels, 1987; Roe, 1990), reduced access to medical care (Brickner et al., 1975), and depressive symptomatology (Bruce & Hoff, 1994; Bruce & McNamara, 1992). Despite associated health risks, few population-based studies have examined characteristics of home confinement (Ganguli et al., 1996).

Extreme social isolation, represented by near or complete absence of contact with other people, is rare (House et al., 1988; Kaufman & Adams, 1987). It is especially unlikely for disabled older women living in the community, for whom continued community residence depends largely on the availability of help from others. Nevertheless, relative social isolation may exist in the form of limited interaction with friends and other valued members of one's social network.

Methods

Sample

The study population consists of 1,002 moderately to severely disabled community-dwelling women age 65 years and older participating in the Women's Health and Aging Study (WHAS). The WHAS is a prospective cohort study of the causes and course of physical disability in older women. Participants were identified through an in-home screening interview of physical function and represent approximately the one-third most disabled women living in the community. Women who reported difficulty performing one or more tasks in two or more domains of functioning and who were not severely cognitively impaired were eligible. The sampling frame consisted of all female Medicare beneficiaries residing in 12 contiguous zip code areas covering the eastern half of Baltimore City and small parts of Baltimore County, Maryland. An age-stratified random sample of 5,316 women was selected for screening. Of those women, 4,137 (78%) completed the screener and 1,409 (34%) were study eligible. Of the eligible women, 1,002 (71%) completed an in-depth home interview, physical assessment, and comprehensive home-based nurse-administered physical examination. Descriptive data (Tables 1–3) are weighted to adjust for sample stratification and nonresponse. For further detail about the study design, eligibility criteria, and population characteristics see Guralnik, Fried, Simonsick, Kasper, and Lafferty (1995).

Study Variables

Independent variables.—Data are drawn from the screening questionnaire and baseline interview. Three types of independent variables were examined: sociodemographics, socioeconomic resources, and disability and health conditions. The sociodemographic measures consist of age, race, and living arrangement. Indicators of socioeconomic resources include completing high school, perceived adequacy of monthly income (some money left over or just enough to make ends meet vs not enough to make ends meet), and access to a driver and car (residing in the home or not). Studies of recent retirees (Havinghurst, 1973) and the elderly (Thompson & Heller, 1990) have found these and other indicators of socioeconomic resources to be significant predictors of social contact and activity.

The major health conditions examined are incontinence, cognitive function, and vision and hearing difficulties. Each condition has been previously associated with social function (Carabellese et al., 1993; Evans, Werkhoven, & Fox, 1982; Wyman, Harkins, & Fantl, 1990). Women reporting they could not see well enough (with glasses, if used) to watch television, read a newspaper, or recognize someone across a room were considered to have vision problems (Rubin & Salive, 1995). Hearing problems were deemed present if the participant reported she was unable to hear well enough to carry on a conversation in a crowded room (Rubin & Salive, 1995). Women losing more than a teaspoon of urine, at least weekly in the past month, and those ever losing control of normal bowel movements were regarded as having urinary and bowel incontinence, respec-

tively (Simonsick et al., 1995). Cognitive function was evaluated with the Mini-Mental State Examination (MMSE) (Folstein, Folstein, & McHugh, 1975). Women scoring below 18 on the MMSE were excluded from the WHAS. Scores between 18 and 23, inclusive, are considered indicative of moderate cognitive impairment (Folstein et al., 1975). Women scoring in this range were classified as having poor cognitive function and those scoring above 23 were classified as having good cognition.

Disability, within this disabled cohort, was categorized into three levels, in order of decreasing severity: (a) has a lot of difficulty or is unable to perform one or more ADL: bathing, dressing, eating, using the toilet, and getting in and out of bed or chairs; (b) has a little to some difficulty with one or more ADL; and (c) has difficulty performing at least two tasks (e.g., walking 1/4 mile, climbing stairs, doing housework, grasping and handling), but no difficulty with ADL. Several studies demonstrate that older persons with difficulty in ADL have more severe functional limitations than those with difficulty in mobility-related tasks and instrumental ADL, only (Guralnik, et al., 1994; Langlois et al., 1996).

Measures of social interaction.—We defined infrequent in-person social contact as no face-to-face contact, in a typical week, with friends, neighbors or relatives living outside of the household. Participants are considered homebound if they responded "no" to "During a typical week, weather permitting, do you leave your home?" or if they responded "yes," but reported the frequency of leaving their home in a typical week as "less than once a week."

Results

Complete social isolation, signified by living alone, having less than weekly in-person contact with non-household members, and not leaving the home in a typical week, is extremely rare in community-dwelling disabled older women, describing only 3%. Only 8% are both homebound and have less than weekly in-person social contact. Nevertheless, relative social isolation is common, as 23% did not visit with friends or relatives in a typical week and 17% did not leave their homes. These observations are consistent with other studies of community-dwelling older persons (Chappell & Badger, 1989; Ganguli et al., 1996; Kaufman & Adams, 1987).

Table 1 presents the distribution of living arrangements and measures of social interaction for the total population and disability subgroups. Overall, just under half live alone, one-fourth are married and live with their spouse, and nearly one-third live with nonspouse others. Living arrangement does not vary systematically with disability level, as similar percentages of moderately disabled women and those with a lot of difficulty with ADL live alone.

In a typical week, while nearly one quarter do not visit with a friend, relative, or neighbor who resides outside the home, 18% have daily contact. The most severely disabled tend toward these extremes, with 32% having less than weekly contact and 22% having at least daily visits with non-household members. Regarding home confinement, about half of these moderately to severely disabled older women leave their home daily; yet, 17% do not venture out at all in a typical week. The proportion of women who leave their home declines with increasing disability level; nearly one third of the most severely limited are homebound.

Tables 2 and 3 show the prevalence of low in-person social contact and home confinement, respectively, by selected characteristics for the total population and disability subgroups. These data are presented to show how social interaction varies as a function of sociodemographic, socioeconomic, and health status classification, as well as disability level. This also aids identification of atypical associations between the independent variables and disability level related to social interaction. Percentages are not adjusted for possible confounders such as age and race, thus no statistical tests were done and findings should be interpreted with caution.

For each subgroup, with few exceptions, the prevalence of low in-person social contact (Table 2) is higher among women with a lot of difficulty with ADL versus the moderately disabled. In addition, three general patterns of association emerge. First, low in-person social contact is more prevalent for women with certain characteristics—older age, living with nonspouse others, hearing problems, and urinary incontinence—regardless of severity of disability and tends to increase with disability. In the second pattern, women with vision problems and poor cognitive function show a uniformly high prevalence of low contact across disability levels, in contrast to women without these conditions, for whom the prevalence of infrequent social contact is lower overall and increases more steeply with disability. Thirdly, regardless of the characteristic of interest, the most severely disabled have the highest prevalence of low in-person social contact. The exceptions are inadequate personal

Table 1. Living Arrangement and Indicators of Social Interaction in a Typical Week Among Disabled Older Women by Disability Level[a]

		Disability Level		
			ADL Difficulty	
	Total	Moderate	A Little/ Some	A Lot/ Unable
N	1002	343	343	316
Living Arrangement (%)				
Alone	46.1	44.6	50.0	43.5
With spouse	23.8	25.1	25.1	20.9
With nonspouse others	30.1	30.2	25.0	35.6
In-Person Social Contact With Non-household Members (%)				
< 1 time/week	23.4	17.9	21.1	32.4
1–3 times/week	46.0	49.3	50.2	37.5
4–6 times/week	12.8	15.0	15.0	8.0
≥ 7 times/week	17.7	17.8	13.7	22.0
Frequency Leaves Home (%)				
< 1 time/week	16.6	9.3	10.4	32.0
1–3 times/week	17.1	19.6	13.4	18.1
4–6 times/week	18.0	17.2	19.4	17.3
≥ 7 times/week	48.3	53.9	56.8	32.6

[a]Percentages are based on weighted data.

Table 2. Percentage of Disabled Older Women with Low In-Person Social Contact by Disability Level and Selected Individual Characteristics[a]

			Disability Level		
				ADL Difficulty	
	N	Total	Moderate	A Little/ Some	A Lot/ Unable
Total	1002	23.4	17.9	21.1	32.4
Age Group					
65–74	388	18.5	17.2	15.0	25.4
75–84	311	25.1	17.1	24.2	34.4
85+	303	33.2	24.2	30.7	41.5
Race					
African American	284	24.1	21.8	19.6	31.7
White	718	23.2	16.0	21.6	32.7
Living Arrangement					
Alone	486	21.2	18.3	19.7	26.6
With spouse	206	18.9	11.2	17.5	31.6
With nonspouse others	310	30.4	22.9	27.5	40.0
Years of School					
Less than 12	645	26.4	21.6	22.0	35.8
12 or more	353	17.8	11.1	19.8	23.6
Personal Finances					
Inadequate	108	27.4	33.5	21.4	25.9
Adequate or better	893	22.9	16.0	21.1	33.6
Car Access					
Driver in home	255	27.2	18.8	18.9	43.2
No driver in home	747	22.0	17.6	21.8	27.8
Vision Problems					
Yes	169	34.3	32.7	28.9	38.7
No	828	21.4	15.8	20.0	30.6
Hearing Problems					
Yes	197	33.2	18.1	30.0	47.9
No	795	21.2	17.9	18.9	28.0
Urinary Incontinence					
Yes	140	31.3	19.4	37.4	35.0
No	862	22.1	17.7	18.2	31.9
Bowel Incontinence					
Yes	190	33.8	28.2	22.8	45.2
No	812	20.9	16.4	20.7	27.6
Poor Cognition					
Yes	180	28.2	25.2	28.4	31.1
No	822	22.6	16.5	20.0	32.7

[a]Percentages are based on weighted data.

Table 3. Percentage of Disabled Older Women Who Are Homebound by Disability Level and Selected Individual Characteristics[a]

			Disability Level		
				ADL Difficulty	
	N	Total	Moderate	A Little/ Some	A Lot/ Unable
Total	1002	16.6	9.3	10.4	32.0
Age Group					
65–74	388	13.2	8.3	7.6	28.0
75–84	311	15.8	6.8	9.5	31.5
85+	303	28.9	23.4	20.3	40.8
Race					
African American	284	23.1	13.9	18.0	40.7
White	718	14.1	7.1	7.9	28.7
Living Arrangement					
Alone	486	16.1	10.2	12.3	27.9
With spouse	206	10.7	1.2	5.0	31.2
With nonspouse others	310	22.2	14.7	11.9	37.4
Years of School					
Less than 12	645	18.6	9.8	9.0	37.1
12 or more	353	13.5	8.6	12.2	21.5
Personal Finances					
Inadequate	108	22.9	5.8	16.0	41.0
Adequate or better	893	15.8	9.8	9.8	30.3
Car Access					
Driver in home	255	15.9	6.4	7.4	33.0
No driver in home	747	16.9	10.3	11.3	31.5
Vision Problems					
Yes	169	26.6	10.9	13.5	44.9
No	828	14.8	9.1	9.9	28.2
Hearing Problems					
Yes	197	19.3	9.3	13.3	32.8
No	795	16.0	9.3	9.6	31.7
Urinary Incontinence					
Yes	140	21.1	15.0	12.6	34.6
No	862	15.9	8.5	10.0	31.4
Bowel Incontinence					
Yes	190	24.1	15.3	16.7	34.2
No	812	14.8	8.5	8.9	31.1
Poor Cognition					
Yes	180	26.2	15.9	15.1	46.1
No	822	14.9	8.1	9.7	29.0

[a]Percentages are based on weighted data.

finances and urinary incontinence. For urinary incontinence, prevalence of infrequent social contact is still higher in the presence of greater disability, but similar between women at both levels of ADL difficulty. Women with inadequate income, however, represent the only instance in which those with moderate disability have the highest prevalence of low in-person contact. Among women with adequate or better than adequate income, the general pattern of increasing prevalence of low contact with increasing disability holds. This suggests a possible interaction between income adequacy and disability as they relate to in-person social contact.

Prevalence of home confinement is uniformly high among women reporting a lot of difficulty or inability to perform at least one ADL across all attributes (Table 3). Factors associated with the highest prevalence of home confinement at each level of disability relative to their counterparts include older age, African American race, living with nonspouse others, less than high school education, vision problems, and poor cognition.

Tables 4 and 5 present results of a series of logistic regression analyses of factors associated with low in-person social contact and home confinement, respectively. Model I includes disability only; Model II adds age, race, and living

Table 4. Relative Odds of Low In-Person Social Contact Associated with Sociodemographic, Socioeconomic, and Health Conditions in Disabled Older Women

Model	Odds Ratio 95% CI I	Odds Ratio 95% CI II	Odds Ratio 95% CI III	Odds Ratio 95% CI IV	Odds Ratio 95% CI V
Disability					
ADL difficulty, a lot/unable	2.03	1.81	1.79	1.59	1.85
	1.42, 2.90	1.26, 2.61	1.23, 2.59	1.08, 2.32	1.23, 2.80
ADL difficulty, a little/some	1.14	1.11	1.15	1.05	1.19
	.78, 1.65	.76, 1.62	.78, 1.68	.72, 1.55	.79, 1.80
Sociodemographic Indicators					
Age in years		1.03	1.03	1.03	1.03
		1.01, 1.05	1.01, 1.05	1.01, 1.05	1.01, 1.05
African American		1.00	.97	1.04	1.06
		.71, 1.41	.68, 1.38	.72, 1.49	.73, 1.52
Lives with nonspouse others		1.56	1.53	1.42	1.40
		1.00, 2.43	.96, 2.44	.89, 2.27	.87, 2.24
Lives alone		.85	1.04	.99	1.01
		.55, 1.31	.63. 1.71	.60, 1.65	.61, 1.68
Socioeconomic Resources					
Completed high school			.67	.70	.69
			.48, .94	.50, .99	.48, .97
Inadequate income			.99	.97	2.10
			.60, 1.63	.58, 1.60	.94, 4.69
Driver in home			1.44	1.49	1.52
			.98, 2.14	1.00, 2.22	1.02, 2.27
Health Conditions					
Vision problems				1.30	1.31
				.89, 1.91	.89, 1.92
Hearing problems				1.59	1.60
				1.11, 2.28	1.11, 2.29
Urinary incontinence				1.50	1.52
				.99, 2.26	1.00, 2.29
Bowel incontinence				1.36	1.34
				.94, 1.96	.93, 1.94
Poor cognition				.92	.91
				.61, 1.37	.61, 1.37
Interactions					
Inadequate income and					.31
ADL difficulty, a lot/unable					.10, .91
Inadequate income and					.33
ADL difficulty, a little/some					.09, 1.22

arrangement; Model III incorporates socioeconomic resources; and Model IV adds the health conditions. For in-person social contact, a fifth model was run, including two terms representing the cross-products of income adequacy and two levels of disability, to test for the potential interaction identified in Table 2. Using progressively more complex models permits examination of interrelationships among the sociodemographic, socioeconomic, and health-related factors and disability severity and their direct and indirect association with social interaction.

The odds ratios presented in Table 4 indicate that severe disability, having a lot of difficulty or being unable to perform at least one ADL, is independently associated with infrequent in-person contact and that several factors either modify this association or have direct independent associations themselves. In Model I, which includes only disability, women who have a lot of difficulty with ADL have twice the odds of low in-person contact relative to the moderately disabled. In Model IV, which includes all covariates exclusive of interactions, the odds associated with severe disability alone decline to 1.6. Age shows a stable relationship with an increased likelihood of infrequent contact and accounts for some of the apparent association of disability.

Socioeconomic resources also contribute to infrequent social contact. Having a driver in the home (participant or someone else) is independently associated with a higher likelihood of infrequent in-person contact with non-household members and completing high school is protective against low contact. Income adequacy shows no association with in-person contact; however, Model V indicates that inadequate income in the presence of ADL difficulty protects against low in-person contact, with odds ratios of .31 and .33. Even though the number of women represented by each term is small, they have at least borderline statistical

Table 5. Relative Odds of Home Confinement Associated with Sociodemographic, Socioeconomic, and Health Conditions in Disabled Older Women

Model	Odds Ratio 95% CI I	Odds Ratio 95% CI II	Odds Ratio 95% CI III	Odds Ratio 95% CI IV	Odds Ratio 95% CI V
Disability					
ADL difficulty, a lot/unable	4.16	4.08	4.06	3.73	3.68
	2.75, 6.29	2.65, 6.28	2.64, 6.26	2.40, 5.79	2.36, 5.72
ADL difficulty, a little/some	1.15	1.14	1.14	1.08	1.06
	.72, 1.84	.70, 1.85	.70, 1.85	.66, 1.76	.65, 1.74
Sociodemographic Indicators					
Age in years		1.06	1.06	1.05	1.05
		1.03, 1.08	1.03, 1.08	1.03, 1.08	1.03, 1.08
African American		2.29	2.22	2.26	1.44
		1.58, 3.32	1.50, 3.28	1.52, 3.36	.84, 2.45
Lives with nonspouse others		1.69	1.64	1.55	1.63
		.97, 2.94	.93, 2.90	.87, 2.76	.92, 2.90
Lives alone		1.24	1.25	1.25	.89
		.72, 2.14	.68, 2.28	.68, 2.29	.46, 1.72
Socioeconomic Resources					
Completed high school			.90	.97	.98
			.61, 1.32	.65, 1.44	.66, 1.46
Inadequate income			1.17	1.10	1.12
			.68, 2.00	.63, 1.89	.65, 1.94
Driver in home			1.01	1.02	.94
			.64, 1.61	.64, 1.64	.59, 1.51
Health Conditions					
Vision problems				1.42	1.46
				.94, 2.15	.96, 2.21
Hearing problems				1.16	1.12
				.77, 1.75	.74, 1.71
Urinary incontinence				1.26	1.26
				.79, 2.01	.79, 2.02
Bowel incontinence				1.38	1.35
				.92, 2.08	.90, 2.03
Poor cognition				1.27	1.27
				.83, 1.95	.83, 1.94
Interactions					
African American and lives alone					2.55
					1.23, 5.30

significance at the $p = .03$ and $p = .10$ levels, respectively. More importantly, accounting for the more frequent social contact among women who have both inadequate income and severe disability revealed a potential risk associated with inadequate financial means ($p = .07$) and increased the magnitude of the odds associated with disability.

Of the health conditions examined, hearing problems and urinary incontinence are associated with significant increased odds of infrequent social contact. Including these conditions in the model reduces the odds associated with severe disability, indicating some shared variance.

Examining Table 5, it is clear that severe disability, having a lot of difficulty with or being unable to perform ADL, strongly relates to home confinement. Few other factors are associated with home confinement and accounting for them has little impact on the relative odds associated with disability. Age and race are the sole exceptions. Each additional year of age is associated with a 5% increase in the odds of being homebound. African Americans are over twice as likely not to leave their homes in a typical week relative to Whites, independent of functional status, age, and the socioeconomic resources and health conditions examined.

Discussion

Within a disabled population, severe disability, having a lot of difficulty with or being unable to perform one or more ADL, is independently associated with a higher likelihood of both infrequent in-person contact with non-household members and home confinement. The association with home confinement is substantially stronger, however. Less severe disability, having a little or some difficulty with ADL in the presence of other functional limitations, confers no additional risk of low social interaction relative to moderately disabled women with no difficulty performing ADL.

The factors that modify the relationship of disability to social interaction differ for the two measures. Characteristics independently associated with infrequent face-to-face contact are largely sociocultural, such as age, living arrangement, ed-

ucational attainment, and presence of a driver in the home, although some potentially manageable health conditions, hearing difficulties and incontinence, also are important. Age and living arrangement may reflect reduced opportunities for contact with non-household members—the very old having outlived their spouse and most older friends and relatives, and those living with others having reduced availability of family outside the immediate household.

It appears, from a separate logistic regression analysis (data not shown), that women living with nonspouse others relative to women living alone or with a spouse have a modestly elevated vulnerability for low in-person social contact (OR = 1.43, CI = 1.02–2.00, from Model IV, with living arrangement categorized as living with nonspouse others vs living alone or with a spouse). While this contrasts with Field et al. (1993) who found marriage predicted less family contact, their married sample was primarily male. Whether contact with household members alone provides sufficient social interaction remains an important question. Essex and Nam (1987) suggest it does not, because among never-married older women, those who had close contact with family out of need for help reported the highest prevalence of loneliness. Although family contact contributes to feelings of security among older adults, friendships and group membership are important for self-esteem, and family is not necessarily an adequate substitute (Larson et al., 1986; Simons, 1983–84). Thus, programs designed to facilitate social contact should target all older women regardless of living arrangement.

Higher educational attainment was associated with lower odds of infrequent social contact, a finding consistent with other studies (Field et al., 1993; Kaufman & Adams, 1987). Years of school completed may be indicative not only of economic, but also social resources, that is, a broader network and higher degree of social integration. Although years of school completed is associated with income adequacy, the observed relationship with social contact is independent of income, suggesting that educational attainment represents something more than economic opportunity.

Several studies of middle-age and older adults have found income and other measures of financial health positively associated with social activity (Havinghurst, 1973; Thompson & Heller, 1990). We identified a similar relationship, except among women with severe disability. Among the most severely disabled, those reporting inadequate income had lower odds of infrequent contact with non-household members. Some of the contact may be related to the provision of help and higher usage of informal care from outside the home among the economically disadvantaged (Stoller & Cutler, 1993). In exploring this further, we found this small group of women with inadequate income and a lot of difficulty with ADL were much more likely to be African American (53% vs 27%), to live with nonspouse others (58% vs 30%), to not have completed high school (87% vs 64%), and to be homebound (42% vs 17%). This appears to describe inner-city poor elderly women, whose inability to leave the house may be compensated by receiving visitors in their home.

The higher likelihood of low in-person social contact associated with having a driver in the home also was unexpected, as others have found lack of transportation to inhibit contact (Thompson & Heller, 1990). One interpretation is that some contact with non-household members among those with no resident driver is for transportation purposes and is regarded by these women as social contact. Only one quarter of these moderately to severely disabled women drive and less than 20% consider themselves the usual driver. Nearly half rely on non-household members to travel by car. Thus, being able to drive or having a driver in the home may eliminate a common reason for, and thereby reduce the frequency of, contact with family and friends residing outside the home.

Hearing difficulty and urinary incontinence are two potentially treatable health conditions associated with infrequent social contact in disabled older women. Of the 20% who could not hear well enough to carry on a conversation in a crowded room, 75% did not use a hearing aid. Use of sensory aids to correct sensory impairments, including hearing, has been associated with better social relationships (Appollonio, Carabellese, Frattola, & Trabucchi, 1996). Urinary incontinence was also common, affecting nearly 15%. As this condition is often underreported and frequently goes unrecognized by the medical community (National Institutes of Health Consensus Development Conference, 1990), there is potential for improved social functioning through increased diagnosis and treatment of urinary incontinence. Alternatively, incontinence may reflect severe mobility difficulty, since over 90% of women with urinary incontinence reported, "not get[ting] to the toilet quickly enough" as a reason for losing bladder control.

Turning to home confinement, independent of age and severe disability, only African American race emerged as important. The degree to which this reflects cultural preference or adaptation to aspects of the housing or neighborhood environment of older African American women in Baltimore City cannot be determined from these data. The association is independent of living arrangement, economic resources and health status, which suggests a sociocultural preference. This interpretation is consistent with the differential utilization of nursing homes by race (Salive, Collins, Foley, & George, 1993). On the other hand, housing in low income city neighborhoods may present physical barriers to entry and exit by persons with significant disabilities. The immediate environment outside the home also may be perceived as dangerous.

Given the strong association between race and home confinement, we ran race-stratified models to explore whether factors associated with home confinement differ for African Americans and Whites (data not shown). Age and disability remained significantly related to home confinement for both groups and odds ratios were similar for the other factors, with the exception of living arrangement. For African Americans, there appears to be some increased vulnerability associated with living alone that is not present for Whites. We subsequently added an interaction term, the cross-product of race and living alone, to the full model (see Table 5, Model V). The interaction was significant and, once accounted for, eliminated the main association between African American race and home confinement. To aid interpretation, we examined home confinement by race

and living arrangement and found that among women living alone, African Americans had over twice the percentage homebound as Whites (30% vs 14%, respectively). Among those living with nonspouse others, the proportions were similar by race (23% and 26%, respectively). Although older African American women are less likely to live alone (Miles, George, & Wallsten, 1990), those that do appear especially vulnerable to home confinement.

Few population-based studies have examined risk factors for home confinement among older adults. Ganguli and colleagues (1996) investigated characteristics of the homebound in a primarily White, rural sample that was 41% male. In addition to poor functional status, only female gender, weight loss, and depression were independently associated with home confinement. As in this study, poor cognitive function was related to being homebound in the univariate, but not multivariate, analyses that included age and functional status. Bruce and McNamara (1992) had a similar finding. We elected not to examine depressive symptomatology and weight loss in the cross-sectional analyses presented here, as these are potential consequences of home confinement (Bruce and Hoff, 1994). While depression and low weight may contribute to social isolation, the strong possibility of reciprocal relationships requires longitudinal data to investigate properly.

Nearly two thirds of study participants had difficulty in ADL, which must be considered in interpreting the findings. Other studies have found associations between disability and social participation (Blazer, 1982; Field et al., 1993; Kovar, 1988; Thompson & Heller, 1990); this study permitted examination of severity of disability and social interaction. The disability reference group in the logistic models (Tables 4 and 5) consists of women with some degree of functional limitation. All report difficulty with at least two tasks and 73% have difficulty with three or more tasks; 66% have difficulty walking a quarter mile and 37% have difficulty climbing stairs. Given this, the lack of association between having a little or some difficulty in ADL and social interaction should be interpreted as indicating that relative to other functional deficits, having minor difficulty with ADL presents no additional disadvantage. Most importantly, this study demonstrates that even in the presence of severe disability, sociocultural and other health-related factors condition social interaction.

Although stronger and more consistent associations have been found between health and subjective assessments of social relationships (e.g., satisfaction with amount of contact), than for objective measures (e.g., frequency of contact) (Antonucci, 1985; Duff & Hong, 1982), we were interested in examining how disability, among other factors, might inhibit social interaction. Strong associations between subjective and objective measures have been found in several studies (Essex & Nam, 1987; Seeman & Berkman, 1988; Thompson & Heller, 1990); this is true of the WHAS, as well. Of women who are both homebound and have infrequent in-person social contact, 16% are dissatisfied with how often they see and talk to family and friends, 19% are dissatisfied with the amount of help they receive, and 44% report they could use more emotional support. For women with neither indicator of poor social interaction, the respective percentages are 2, 5, and 27. These subjective measures of social and emotional support did not vary by living arrangement, that is, women living with nonspouse others had no advantage, in terms of satisfaction with social interaction, over women living alone. This lends support to the decision to distinguish contact with non-household members from contact with cohabitants.

The inability to differentiate between family and friend contact is a major shortcoming. Because no distinction was made between family outside the immediate household and friends, it remains unknown whether these types of contacts are affected differentially by disability. Conceivably, because of instrumental need, disability could facilitate family interaction (Kaufman & Adams, 1987) and inhibit contact with friends (Kovar, 1988). Given the continued importance of friendships in old age, this begs further investigation.

Future research should be directed toward understanding the health-related significance of low contact with non-household members and home confinement. This type of relative social isolation is common in disabled older women and may have serious consequences for continued residence in the community. Longitudinal outcomes of low social interaction, including depressive symptomatology, decline in physical and cognitive function, and nursing home entry deserve attention and will be explored in future studies of this population. Lastly, as substantial percentages of women with severe disability maintain good social interaction, it is clear that physical disability is not necessarily socially disabling. Nevertheless, improvements appear possible through the more effective management of certain health conditions and attention to potential sociocultural barriers.

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