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Low Back Pain and Disability in Older Women: Independent Association With Difficulty But Not Inability to Perform Daily Activities

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Background. Low back pain is a highly prevalent chronic condition, yet little is known about the disabling effects of this common problem in older adults. This study examines the relationship between the presence and severity of low back pain and disability in older women.

Methods. The study population was 1,002 disabled older women participating in a population-based prospective study of disablement. Key outcome measures of disability included level of difficulty and inability to perform the following daily activities: light housework, shopping, walking one-quarter mile, climbing stairs, lifting, and activities of daily living (ADLs).

Results. Forty-two percent of participants reported they had low back pain for at least one month in the year before baseline. The prevalence of severe back pain decreased markedly with age (10% of those ≥ 85 yr versus 23% in each of the two younger 10 yr age groups). After multivariate adjustments, women with severe back pain were 3 to 4 times more likely than other women to have a lot of difficulty with light housework or shopping. There was also an increased likelihood of difficulty with mobility tasks and basic ADLs among those with severe back pain. No associations were found between back pain and being unable to perform any of the daily activities studied, indicating possible differences in disablement processes leading to functional difficulties versus functional incapacity.

Conclusions. There was a strong association between back pain and functional difficulties in older women, pointing to the need for further research using longitudinal methods.

THE role of low back pain in the process of age-associated disablement is poorly understood. Back pain research has largely targeted young and middle-aged populations, although the problem is common in older adults as well. Prevalence estimates of back pain in older adults vary widely, from 24% of older women and 18% of older men in a study in rural Iowa (1), up to 68% in a multisite study of fractures in older women (2). Although the causes of back pain are infrequently ascertained (3), conditions known to contribute to back pain in older adults include osteoarthritis of the facet joints, degenerative disc disease, spinal stenosis, vertebral fractures, postural abnormalities, and other musculoskeletal disorders. To better understand the long-term consequences of back pain, researchers have focused on predictors of disability due to back pain in primarily working-aged adults (4,5). However, these findings cannot be generalized to older populations. Not only are the causes of back pain markedly different in older adults (6), the disablement process in aging is generally more complex and involves multiple chronic conditions and age-related impairments.

The few longitudinal studies of disability in older adults that have included back pain in their lists of potential risk factors have found back pain to be an independent predictor of disability (7,8). Cross-sectional findings from the Study of Osteoporotic Fractures (SOF) showed that back pain was among the factors most strongly associated with impaired function in this population of nonblack older women, even after adjusting for multiple measures of physical performance (2). In the Iowa 65+ Rural Health Study, persons with low back pain reported limitations in physical functioning, specifically walking, bending, and doing household chores (1). Although these studies have begun to describe the relationship between back pain and disability, the role of pain severity in disablement has not been explored. In the present study, we used baseline data from the Women's Health and Aging Study (WHAS) to examine the relationship between the presence and severity of low back pain and functional status using performance measures and self-reported disability.

Methods

The WHAS study is a prospective, population-based, 5-year follow-up study of moderately to severely disabled older women in the East Baltimore area of Maryland. Representing the one-third most disabled women aged 65 years and older, participants were eligible for the study if they reported difficulty in one or more functional tasks within two or more domains of functioning (basic self-care, upper extremity ability, mobility, and higher functioning tasks). Women with severe

cognitive impairment, measured by scores below 18 on the Mini-Mental State Examination [MMSE; (9)], were excluded. Previous studies have found that the lower cutpoint of 18 on the MMSE improved the specificity of the test among those with less education and in African American populations (10,11). Of the 4,137 women who completed the in-home screening, 1,409 were eligible and 1,002 agreed to participate in the study. Selection and characteristics of the study participants have been described previously (12,13). Briefly, 30% were aged 85 years or older, 28% were black, 44% had incomes of less than $10,000/ year, and 51% rated their health as fair or poor.

Procedures

Data for the present analysis were from the comprehensive baseline assessment that included an interviewer-administered battery of questions on health, functioning and demographics, physical performance testing, nurse's physical exam, and physician's questionnaire (12,13). The presence and severity of low back pain were assessed by the following two questions: "During the past year, have you had pain in your lower back on most days for at least one month?" and, "Please rate the average pain in your back during the past month." For the latter question, the participant was shown a card, with 0 indicating no pain and 10 indicating severe or excruciating pain. Persons were classified as having back pain if they answered "yes" to the first question; the severity of their pain was based on response to the second question, a measure of recent or current pain. Low back pain was categorized as none or mild (no pain or pain rating 0–3), moderate pain (rated 4–6), and severe pain (rated 7–10). There were only 49 women with mild pain, and they were combined with the 597 women who reported no back pain.

Study outcomes included self-reported difficulty with daily activities and performance measures of physical functioning. Daily activities that we hypothesized would be affected by low back pain included housework, shopping, walking, climbing stairs, lifting, and activities of daily living (ADLs). Women were asked to report the level of difficulty they experienced with each of these tasks from among the following: none, little, some, or a lot of difficulty, or unable to perform the task. The ADL variable was based on difficulties with any of the following: bathing, dressing, eating, transferring from bed to chair, and using the toilet. The amount of ADL difficulty was classified as the greatest amount of difficulty reported for any one ADL. For example, a person would be classified as having a lot of difficulty in ADLs if they had a lot of difficulty with bathing even though they performed all other ADLs with no difficulty. Difficulty with bathing or transferring were the most common ADL impairments among the study participants (45% and 35%, respectively).

The tests of physical functioning included in this study targeted functional mobility (13). Usual and fast-paced gait speed were measured by timed 4-meter walks. Chair stand time was measured as the time required to stand five times as quickly as possible from a straight-backed chair with arms folded across the chest. To determine functional reach, subjects were asked to stand next to a wall with one arm extended at the level of the shoulder with a closed fist, then reach as far forward as possible, keeping the arm at shoulder level without losing their balance (14). The measure was the difference between the starting position and the furthest reach, the best of three trials. Maximal knee extension and hip flexion strength were tested using a hand-held dynamometer (Nichols Manual Muscle Tester, Fred Sammons, Inc., Burr Ridge, IL), with two trials for each test of each leg. The strength measurement was the average of the highest strength for each leg. Overhead lifting ability was tested using a 10-pound water-filled plastic jug. Subjects were asked to raise the jug above their heads while in a seated position. The test was scored hierarchically from 0 to 3 as follows: 0 = unable to lift > 1 inch; 1 = unable to lift to eye level; 2 = lifted to eye level; 3 = lifted over head.

Three tests of standing balance included: standing with feet touching side-by-side; semi-tandem stand, with the side of the heel of one foot touching the side of the big toe of the other foot; and full tandem stand, with the heel of one foot touching the toes of the other foot. Each stand was conducted for up to 10 seconds. Balance was scored hierarchically from 0 to 7, with 0 for not able to stand unassisted, 1 for standing unassisted but unable to hold the side-by-side position, and subsequent scores of 2 to 7 for times of 1–9 seconds or 10 seconds for each progressively more difficult stand. A score of 7 was given for those who performed each stand for 10 seconds. This summary balance scale was found to be strongly associated with age and disability level in the WHAS participants (15).

Demographic and health behavior information were obtained during the in-home screening and baseline interviews. Body mass index (BMI) was calculated as measured weight (kg) divided by height in squared meters, each measured during the home-based physical assessment. For a surrogate measure of change in height, we computed the difference between measured and imputed height, or expected height based on measured knee height. Imputed height was calculated using the formula developed by Chumlea and colleagues (16): 84.88 + 1.83 (knee height) – 0.24 (age). Depressive symptomatology was measured using the Geriatric Depression Scale (17), with a cutpoint of 10 or greater for mild to high levels of depressive symptoms. Ascertainment of 17 major chronic conditions was conducted with complex algorithms using information from a variety of sources, including self-report information, nurse exam, physician questionnaire, and medical records (12). For example, symptomatic knee osteoarthritis (OA) was confirmed using a decision tree based on the following: self-reported knee pain, report of knee surgery, physician report of knee OA, morning joint stiffness, presence of osteophytes on radiograph, and crepitus or bony enlargement on exam. The number of confirmed medical conditions was tallied to create a summary disease score.

Statistical Analysis

Subjects were described by demographic and health characteristics according to levels of back pain. Chi-square tests for between-group differences were used to compare proportions across pain groups. The associations between several risk factors and back pain severity were determined using tests for linear trend (1 degree of freedom; *df*). Physical performance test scores were presented as least-squares means and standard errors, adjusted for age, weight, and height, according to pain severity level. Student's *t* tests were used to compare the physical performance means of those with moderate or severe back pain to those with none or mild pain. Tests for linear trend (1*df*) were used to determine if there was a linear relationship in the performance test means across back pain levels.

Polychotomous logistic regression modeling (CATMOD Procedure, SAS version 6.11) was used to determine odds ra-

tios (ORs) and 95% confidence intervals (CIs) for severe back pain as a predictor of the four-category functional difficulty variable (no difficulty, little or some difficulty, a lot of difficulty, unable to perform task). Because there was no significant association between moderate back pain and functional difficulty outcomes, it was not included as a separate predictor in the modeling. Education was not found to be associated with disability in the multivariate models and did not alter the odds ratios for severe pain; therefore it was removed from the models. An indicator variable for missing data was added to the models for any variable with missing information for at least 5% of participants (BMI, knee strength, gait speed, lifting test).

To understand the additional disabling effects of low back pain in women with symptomatic knee OA (37% of our population) versus those without symptomatic knee OA, we conducted a stratified analysis using the polychotomous modeling approaches described above to determine the relationship of back pain and functional difficulty according to the presence of knee OA. In the nonstratified model, tests for interaction were also performed for back pain and knee OA in relationship to functional difficulties.

Results

Among the disabled women in this study, 42% reported having had low back pain lasting at least one month in the year before their baseline interview. Severe low back pain was reported by 19% of the women. There were markedly fewer women with severe back pain in the oldest age group (those aged 85 and older), compared to the younger groups (10% of the oldest women vs 23% in each of the two younger age groups). Prevalent medical conditions of the back assessed at baseline included disc disease (8% of all participants), spinal stenosis (2.8%), and self-reported vertebral fractures (5%).

Well-established risk factors for disability were examined across levels of back pain severity (Table 1). In addition to age differences described above, women with more severe pain had fewer years of formal education, were more likely to be obese, had poorer self-rated health, and more depressive symptoms. There was no evidence that more severe pain was associated with shorter stature than would be expected based on knee height. There were significant trends for higher prevalence of musculoskeletal conditions with increasing pain severity, specifically for osteoarthritis of the knee and hip, disc disease, and spinal stenosis.

Severity of back pain was associated with poorer performance in several physical performance measures. Adjusted for age, weight, and height, usual-paced gait speed and chair stand times were slower in women with severe pain compared to their counterparts with none or mild back pain (Table 2). Similarly, knee extension and hip flexion strength and ability to lift 10 pounds were lower in women with severe back pain compared to those with none or mild pain. Although functional reach and fast-paced gait speed were somewhat less in women with severe back pain, the differences across severity levels were not significant. Balance test performance was not associated with level of back pain.

Sixteen percent ($n = 157$) of the women identified back pain as the major condition, from a list of 21 health problems, contributing to difficulties in at least one ADL or mobility task. There was a strong relationship between the presence of severe back pain and difficulty performing a number of functional tasks. Women with severe back pain had a three- to nearly four-fold increased likelihood of having a lot of difficulty with light housework or shopping than other women after adjusting for age, BMI, race, self-rated health, knee and hip OA, and number of chronic conditions (Table 3). Women with severe back pain were about twice as likely as other women to report a lot of difficulty with stair climbing, walking two to three blocks, lifting 10 pounds, and activities of daily living. Additional adjustment for knee extension strength, gait speed, and test score for lifting 10 pounds did not materially change the findings (Table 3, Model 2). Similarly, controlling for pain in the hips, knees, hands, or feet also did not alter the results (data not shown). There was no consistent evidence of an association between severe back pain and being unable to perform functional activities or having little or some difficulty with these tasks.

Twice as many women with symptomatic knee osteoarthritis reported having severe back pain compared to other women (28% vs 14%). Among women with symptomatic knee OA, those who reported severe back pain had approximately five

Table 1. Characteristics and Musculoskeletal Conditions of Participants According to Level of Back Pain (Percentage)

Characteristic	None or Mild Pain ($n = 646$)	Moderate Pain ($n = 162$)	Severe Pain ($n = 193$)
Age			
65–74	34.5%	46.9%	46.1%
75–84	30.8	25.9	36.3
≥ 85	34.7	27.2	17.6***
High school graduate	38.6	35.2	24.9**
Black race	28.5	22.2	33.2
BMI (kg/m²)†			
<21.44	14.4	13.3	7.7
21.44–31.58	63.6	60.2	52.2
>31.58	22.0	26.5	40.1***
Height change (cm, mean)‡	–0.95	–1.68	–1.19
Fair/poor self-rated health	44.3	57.5	70.5***
Blocks walked in past week: > 7	29.2	27.6	23.6
Current smoker	11.2	13.0	11.4
Depressive symptoms§	27.6	39.1	38.9***
Osteoarthritis of knee	31.6	36.4	53.4***
Osteoarthritis of hip	5.0	12.4	13.5***
Disc disease or spinal stenosis	5.9	16.1	18.1***
Vertebral fracture‖	4.2	7.6	4.2
Rheumatoid arthritis	2.8	4.3	3.1
Heart disease¶	28.0	33.3	35.2

†Cutpoints for BMI, based on lowest 15th and highest 85th percentiles, derived from representative similarly aged national population samples (35).

‡Height change computed as difference between current height and imputed adult based on knee height in 898 women with complete height data (16).

§Score ≥ 10 on the Geriatric Depression Scale (17).

‖Self-report of past spine x-ray and diagnosis of compression fracture by doctor.

¶Confirmed history of angina, myocardial infarction, or congestive heart failure.

**$p < .01$; ***$p < .001$; chi-square test for linear trend (1 df).

Table 2. Adjusted Means and Standard Errors† of Physical Performance Tests According to Level of Back Pain

Performance Test‡	None or Mild Pain Mean ± *SE*	Moderate Pain Mean ± *SE*	Severe Pain Mean ± *SE*	Trend (*p* value)
Fast pace gait speed (m/sec) (*n* = 977)	0.85 ± 0.02	0.85 ± 0.03	0.79 ± 0.03	.10
Usual pace gait speed (m/sec) (*n* = 950)	0.59 ± 0.01	0.57 ± 0.02	0.55 ± 0.02*	.02
Balance test score (*n* = 1001)	4.57 ± 0.07	4.77 ± 0.14	4.57 ± 0.13	.75
Chair stand time (sec) (*n* = 710)	15.0 ± 0.21	15.7 ± 0.42	16.0 ± 0.39*	.02
Knee extension strength (kg) (*n* = 844)§	12.3 ± 0.19	11.4 ± 0.38*	11.3 ± 0.35*	.006
Hip flexion strength (kg) (*n* = 819)§	10.8 ± 0.20	10.1 ± 0.40	9.6 ± 0.36***	.004
Lifting 10 lb. weight (score) (*n* = 976)‖	2.17 ± 0.04	2.02 ± 0.07	1.97 ± 0.07*	.006
Functional reach (cm) (*n* = 639)	21.3 ± 0.40	20.0 ± 0.79	20.4 ± 0.76	.16

†Means adjusted for age, weight, and height.
‡There were no significant differences in the proportions who were or were not able to complete the performance measures across pain levels.
§Knee strength and hip strength are calculated as the average of the maximal strength of both legs.
‖Lifting a 10 lb. jug, scored as follows: 0 = unable to lift > 1 inch; 1 = unable to life to eye level; 2 = lifted to eye level; 3 = lifted over head.
*$p < .05$; **$p < .01$; *t* test for differences between means of moderate or severe pain groups compared to none or mild pain groups.

Table 3. Adjusted Odds Ratios for Little or Some Difficulty, a Lot of Difficulty, and Inability To Perform Functional Activities for Those With Severe Back Pain Versus Those Without Severe Back Pain

Functional Outcomes	Model 1* Odds Ratio (95% CI)	Model 2† Odds Ratio (95% CI)
Light housework (vs no difficulty)		
Little or some difficulty	1.25 (0.78 – 2.00)	1.16 (0.72 – 1.88)
A lot of difficulty	3.13 (1.54 – 6.37)	3.07 (1.50 – 6.27)
Unable to perform	0.94 (0.54 – 1.66)	0.81 (0.44 – 1.50)
Shopping (vs no difficulty)		
Little or some difficulty	0.93 (0.52 – 1.66)	0.92 (0.51 – 1.65)
A lot of difficulty	3.84 (1.95 – 7.58)	4.42 (2.18 – 8.97)
Unable to perform	1.22 (0.81 – 1.84)	1.18 (0.75 – 1.87)
Walk 1/4 mile (vs no difficulty)		
Little or some difficulty	0.95 (0.58 – 1.56)	0.94 (0.56 – 1.57)
A lot of difficulty	1.82 (1.10 – 3.00)	1.81 (1.08 – 3.04)
Unable to perform	1.11 (0.67 – 1.86)	1.04 (0.59 – 1.83)
Climb 10 steps (no difficulty)		
Little or some difficulty	0.99 (0.64 –1.53)	0.97 (0.63 – 1.51)
A lot of difficulty	1.71 (1.07 – 2.72)	1.76 (1.08 – 2.86)
Unable to perform	1.33 (0.77 – 2.28)	1.34 (0.74 – 2.42)
Lift < 10 lbs. (vs no difficulty)		
Little or some difficulty	1.45 (0.94 – 2.24)	1.44 (0.93 – 2.24)
A lot of difficulty	2.29 (1.34 – 3.91)	2.24 (1.31 – 3.86)
Unable to perform	1.47 (0.90 – 2.40)	1.38 (0.83 – 2.30)
Activities of daily living (vs no difficulty)		
Little or some difficulty	1.44 (0.93 – 2.24)	1.44 (0.92 – 2.24)
A lot of difficulty	2.72 (1.61 – 4.58)	2.72 (1.60 – 4.61)
Unable to perform	1.53 (0.94 – 2.49)	1.44 (0.85 – 2.45)

*Odds ratios and 95% confidence intervals (CI) from polychotomous logistic regression models in which each of the levels of difficulty with functional activity was compared to the no-difficulty group. Model 1 was adjusted for age, race, body mass index, self-rated health, confirmed knee or hip osteoarthritis, and number of confirmed chronic diseases.
†Model 2: Odds ratios adjusted for all variables in Model 1 and the following performance measures: knee extension strength, usual pace gait speed, and ability to lift 10 pounds above head.

Table 4. Adjusted Odds Ratios for a Lot of Difficulty With Functional Activities Among Those With Severe Back Pain Versus Those Without Severe Pain According to the Presence of Symptomatic Knee Osteoarthritis

Functional Difficulty	Severe Back Pain % difficulty†	No–Moderate Back Pain % difficulty†	Adjusted Odds Ratio (95% CI)‡
Knee Osteoarthritis (*n* = 366)			
Light housework	10.9	2.2	4.61 (1.37 – 15.47)
Shopping	17.9	3.3	5.36 (1.79 – 16.11)
Walking 1/4 mile	58.0	29.0	3.26 (1.43 – 7.41)*
Climbing stairs	38.1	21.5	2.54 (1.30 – 4.96)
Activities of daily living	42.0	17.0	3.34 (1.59 – 7.00)
No Knee Osteoarthritis (*n* = 636)			
Light housework	8.6	3.6	2.58 (0.99 – 6.73)
Shopping	14.5	4.6	3.03 (1.23 – 7.46)
Walking 1/4 mile	27.5	19.2	1.23 (0.62 – 2.46)
Climbing stairs	21.1	12.0	1.39 (0.70 – 2.77)
Activities of daily living	14.9	10.3	1.91 (0.83 – 4.38)

†Percent with a lot of difficulty among those with none to any difficulty, excluding those unable to perform task.
‡Adjusted odds ratios from polychotomous logistic regression model adjusted for age, race, body mass index, self-rated health, and number of confirmed chronic diseases.
*$p < .05$; test for back pain–knee osteoarthritis interaction.

times the likelihood for having a lot of difficulty with shopping and light housework, compared to women without severe pain (Table 4). The disabling effects of low back pain on shopping and housework were also evident in women without knee OA but to a lesser extent (adjusted OR = 2.58 and 3.03, respectively). In the mobility functions (walking and stair climbing), low back pain was associated with a lot of difficulty only when knee OA was present (adjusted OR = 3.26 and 2.54, respectively). The interactive effects of severe back pain and arthritis were statistically significant only for walking difficulty. Women with knee OA were more than three times as likely to have ADL difficulty if they reported severe back pain compared to those without severe back pain. A weaker association (adjusted OR = 1.91) was observed in women without knee OA, but the confidence limits included 1. Moderate back pain was not found to be associated with functional difficulties (data not shown). The stratified analysis was rerun with stratification based on the presence of knee or hip OA, and the results were very similar to the above findings (data not shown).

Discussion

Our findings demonstrate a strong independent relationship between severe low back pain and functional difficulty in older women. The association was independent of multiple factors that are known to be related to disability, including other disabling chronic arthritic conditions, performance measures of strength and function, as well as other musculoskeletal pain. Our results also demonstrate the importance of distinguishing between *having difficulty* with daily tasks versus being *unable to perform* functional tasks. We did not find severe back pain to be associated with the latter. Considering that nearly one fifth of the women in our study reported having severe low back pain lasting at least one month in the previous year, these findings reveal the serious impact of low back pain on the daily functioning of older women.

The prevalence of back pain in the previous year in the disabled population we studied (42%) was higher than some previous reports on groups of older women including the Hawaii Osteoporosis Study (33%) and the Iowa study (1,18) mentioned earlier (24%). However, the SOF study found that 68% of 9,700 women they studied in four regions of the United States reported having back pain in the previous year (2). Using data from NHANES I (1971–1975), investigators reported that 48% of women aged 65 to 74 reported having neck or back pain lasting at least one month (19). Differences in the age distributions of these over-65 study groups or in the phrasing of the back pain questions may contribute to variations in prevalence. Although our study included only disabled women, the high prevalence of this chronic condition was not inconsistent with other studies in showing that back pain is a very common problem for older women.

It is clear from the findings that the relationship between back pain and functional difficulty was independent of decrements in physical performance such as strength and gait speed. This independent association between back pain and disability in women aged 65 and older has been reported previously in a study of disability risk factors (2). In their population of generally healthier and younger women, Ensrud and colleagues (2) found that report of any back pain in the previous 12 months was associated with a 66% increased likelihood of any difficulty in performing three or more mobility tasks or instrumental ADLs after adjusting for multiple risk factors including measures of strength and gait. Pain severity and specific disability outcomes were not explored in that study. In a cohort of Japanese American women aged 55 to 93 living in Hawaii, severity of back pain in the previous year was associated with ADL difficulties (18). However, in contrast to our own findings, walking and stair-climbing difficulties were not associated with back pain in these women, who were also generally healthier than women in the WHAS. Low back pain in persons over age 65 in Finland was associated with modest increases in risk for any ADL and IADL difficulties, including being unable to perform, after adjusting for multiple health and demographic factors (20). Similar to our own findings, when these investigators looked separately at risk for being unable to perform daily activities, no back pain association was found after adjusting for comorbid conditions. There were no adjustments for functional performance in either the Hawaii or Finnish studies. The preponderance of the evidence demonstrating a strong association between back pain and functional difficulties from these cross-sectional studies points to the need for longitudinal research to determine the causal impact of chronic low back pain on disability in older adults.

The notable differences in the relationship between severe pain and difficulty versus pain and the inability to perform daily tasks are important to consider. One explanation for these seemingly contradictory findings is that the pathologies leading to functional difficulties may differ from those leading to incapacity. In an analysis not presented in this article, women in the WHAS who were unable to perform daily living or mobility tasks were more likely to be older and have heart failure, stroke, or diabetes compared to women who reported difficulty with the same tasks (unpublished data, WHAS baseline). Alternatively, women who reported having a lot of difficulty were more likely to have knee OA. Although these findings were cross-sectional, they support the hypothesis that the causes of even substantial functional difficulty may be distinct from causes of inability to perform daily tasks. Indeed, back pain may lead to substantial difficulty in doing usual activities, but it is probably uncommon for back pain to completely prevent the performance of these basic activities. Another factor that may contribute to our disparate findings is that once an individual has become totally disabled, regardless of whether it is related entirely or in part to back pain, the pain may subside due to lack of movement (21).

Our study also showed detrimental effects of low back pain on lower extremity strength and gait speed. In older adults, back muscle strength is reduced in chronic low back pain (22), and lower spine impairment (tenderness, deformity, or limited motion) has been found to be associated with slower gait speed (23). However, there is very little previous research examining the association between back pain and other measures of functional performance in older adults. In considering the pathway from pathology and impairment to disability described by Nagi (24), the results suggest a complex process through which chronic low back pain contributes to functional impairments (loss of strength and difficulty lifting a 10-pound weight) and functional limitations (slowed gait speed and repeated chair stands), and, independent of these impairments, also contributes to disability (mobility, daily activities, and basic self-care). A hypothetical model describing this trajectory is shown in Figure 1. Although we lacked information on trunk muscle strength, the physical performance measure most proximal to back pain in the disability pathway, we had other strength measures that showed intermediate effects on the pathway to disability. Moderate back pain was not associated with substantial functional difficulty in our participants; however, there was evidence that moderate pain did limit physical performance, suggesting another intermediate factor in the disability pathway. Further research using longitudinal data can examine the relationships in the proposed model and lead to an understanding of the complex influences of pain in the development of disability.

Another critical consideration in disentangling causes of disability is the role of comorbid conditions. Because knee OA was much more common in women with severe back pain and because knee OA is the most prevalent disabling disease in older women (25,26), it was important to examine the combined impact of these two conditions on disablement. In our study, the association between severe back pain and difficulty with each of five functional activities was notably stronger (1.5 to 2 times higher) in women with symptomatic knee OA. Fifty-

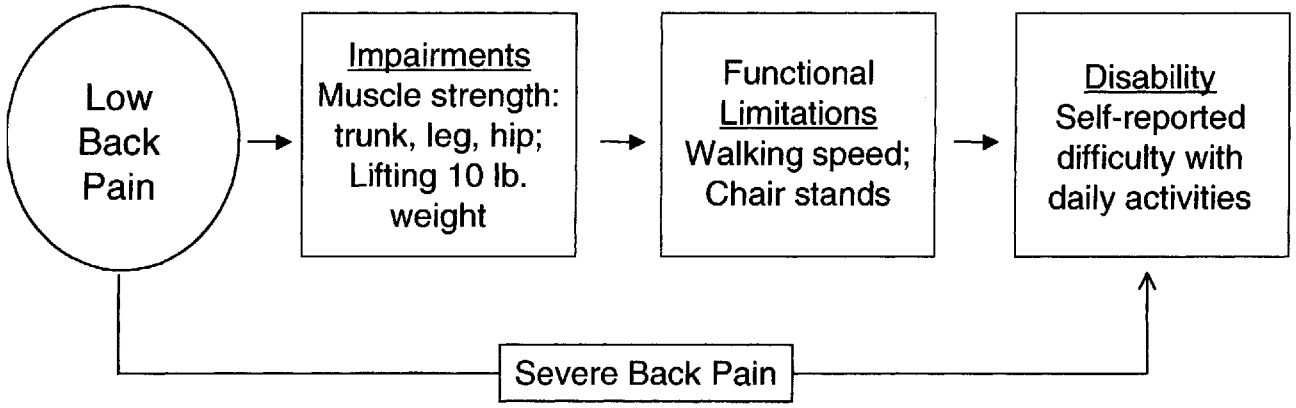

Figure 1. A hypothetical model showing the influence of low back pain on the development of disability in older adults.

eight percent of the women with both symptomatic knee OA and severe back pain reported having a lot of difficulty walking one-quarter mile compared with fewer than 30% of women with either condition alone, and 19% of those with neither problem. Similar to our own findings, a previous study of rheumatology clinic patients reported that disability was much more common in persons with both back pain and knee OA compared to those with knee OA alone (27). In that study, 55% of the patients with knee OA reported current back pain, compared to 44% in our study. Among those with both back pain and knee OA, 83% reported severe disability measured by the Health Assessment Questionnaire (HAQ score ≥ 2), compared to only 17% of those with knee OA without back pain. Although these study findings were derived from cross-sectional data and would need to be confirmed longitudinally, the combined impact of these very common conditions on the prevalence of disability in older women may be far greater than previously considered. The importance of preventing and effectively treating these conditions cannot be understated. Use of available treatments such as simple analgesics, physical therapy, weight control, patient education, and exercise (28) for both conditions could potentially lead to substantial reductions in functional losses and their sequelae, including further disability, institutionalization, and death (29–32).

As mentioned above, an important limitation of this study was that it is cross-sectional and thus limited to detecting associations rather than identifying predictors. It is possible that women with more mobility difficulties had more back pain because of their disability. However, as we hypothesize, previous research on pain in disabled adults suggests that the reverse is the more common scenario (33). Ultimately, longitudinal data will better address questions on the causal relationship between back pain and disability. Another limitation was that the study subjects were from a sample of disabled women and, as a result, our findings can only be generalized to this population. However, this population afforded us a view across the spectrum of moderate to severe disablement, thus giving us greater statistical power to evaluate the pain severity and disability relationship. We lacked information on recency of vertebral fractures, which have been shown to be associated with back pain (18). In addition, vertebral fractures were assessed by self-report rather than radiographs, which would have been necessary to detect undiagnosed vertebral deformities. Better ascertainment of vertebral fractures might have provided additional insights about the pathway leading to back pain and then to disability in older women.

Back pain may be one more in a complex network of factors, including other chronic conditions, health behaviors, and personal, social, and environmental characteristics, that contribute to the development of disability in older people. Although medical management of chronic back pain is an ongoing challenge for clinicians and patients, successful treatment could have a substantial impact on reducing disability. Research into the development of disability has shown that, with advancing age, the onset of severe disablement is more and more the culmination of a progressive process rather than the sudden occurrence of a catastrophic disablement (34). Greater attention to the disabling features of low back pain in older adults is warranted.

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