Acceptance of Disability and the Risk of Frailty*

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ABSTRACT

Background

The objectives are to determine if: 1) accepting disability as a part of aging is associated with frailty; and 2) accepting disability is associated with becoming frail over a five-year period.

Methods

Secondary analysis of a prospective cohort study of 1,751 community-dwelling adults aged 65+. Participants were asked to rate their agreement with the statement: "When you reach my age, you have to accept a fair degree of discomfort and physical disability" on a five-point scale. Frailty was categorized as not frail or frail. The sample was re-interviewed five years later.

Results

The mean age was 75.5 years, 62.3% were women, and the mean education was 10.2 years. Accepting disability as a part of aging was strongly associated with frailty at time 1; the unadjusted Odds Ratio (OR) and 95% confidence interval (CI) was 1.47 (1.25, 1.72) and this association persisted after adjusting for confounding factors. Accepting disability was also associated with becoming frail; the unadjusted OR and 95% CI was 1.51 (1.20, 1.90), and this association also persisted after adjusting for potential confounding factors.

Conclusions

Accepting disability as a part of aging is associated with being frail and becoming frail.

Key words: health beliefs, disability, frailty

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INTRODUCTION

Frailty is a common issue facing older adults, their families, and society in general. Frailty predicts adverse outcomes such as death,[1] worsening functional status,[2] and institutionalization.[3] While there are numerous definitions and theoretical models of frailty,[4] all agree that frailty is associated with increasing vulnerability and a reduced reserve to deal with stressors. To date, a large body of literature has accumulated on the adverse outcomes of frailty, the theoretical framework and definitions of frailty, and the physical and medical predictors of frailty. There has been research into psychological and social predictors of frailty, but further inquiry into social and psychological predictors of frailty is needed.

The attitude to aging and disability has also received attention. Health beliefs, such as locus of control, predict a wide variety of adverse health outcomes: death,[5] health service utilization,[6,7] and heart disease.[8] Specific beliefs may predict disability and frailty. Williamson and Fried[9] have shown that the belief that disability is due to aging is strongly associated with walking speed, disability, and medical conditions. The authors conclude that "identifying and reducing the impact of these conditions may prove to be a useful approach to preventing or minimizing functional loss". In the work done by the Study of Osteoporosis Fractures Group, this association was also present.[10] The authors went on to find that those who attributed poor mood to aging were less likely to seek medical care.[11] The Study of Osteoporosis Fractures consisted entirely of women, and the study by Williamson and Fried was also predominantly female. In addition, the temporal nature of the association is not clear; those with disability may feel that their disability is due to aging. Conversely, the sense that disability is due to aging may change their behaviours, and engage in less healthy behaviours, or be less likely to engage in activities which maintain their health.

Believing disability is due to aging may be associated with frailty for several reasons. This may be a marker of someone who is in the early phases of frailty, and may be a "warning sign" of impending frailty. Conversely, this may be a risk factor for becoming frail. This belief may result in behaviours which predispose to frailty, such a lower levels

of physical activity or lower levels of social engagement. Seeing poor outcomes as inevitable may cause older adults to simply accept frailty rather than attempting measures to prevent it. Modifying this belief could be part of a strategy to prevent frailty.

We have, therefore, conducted a secondary analysis of an existing cohort study, the Manitoba Study of Health and Aging (MSHA), in order to determine if the belief that discomfort and disability are due to aging. Specifically, the objectives of these analyses are:

1. To determine if accepting disability as a part of aging is associated with frailty in older adults living in the community; and
2. To determine if accepting disability as a part of aging is associated with becoming frail over a five-year period in older adults who are not frail.

METHODS

Population

We conducted a secondary analysis of the Manitoba Study of Health and Aging (MSHA), a population-based study conducted in the Canadian province of Manitoba, done in conjunction with the Canadian Study of Health and Aging (CSHA).[12] The original aims of this study were to determine the prevalence and risk factors for dementia in Manitoba, and to examine social correlates of aging. In 1991/1992, community-dwelling adults above the age of 65 were interviewed. The original sampling frame was from a list provided by Manitoba Health, the provincial Ministry of Health. Since health-care coverage is universal in Manitoba, this represents a comprehensive representative sampling frame. Older age groups (over 85) were over-sampled, and sampling was stratified by region, with representation from the entire province. Persons residing in institutions (nursing homes and chronic care hospitals) did not undergo the screening interview and were not included in these analyses. Initially, 2,890 persons were selected. Of these, 443 refused to participate, 480 were not eligible (had died, had entered a nursing home, or were too ill), 162 could not be located, and 54 did not complete the screening questionnaire. The final sample at time 1 was 1,751. At time 1, 1,735 had no missing variables for health beliefs.

These participants were followed five years later. The follow-up sample included those who had survived to 1996/7, who underwent the screening questionnaire with complete data at time 2, who were living in the community, and who agreed to participate in the study (N = 1,028). Those who were living in institutions at time 2 were excluded since they did not undergo the screening questionnaire. In Manitoba, nursing homes are not used for convalescence, and those in institutions are very frail. For the prospective analyses, we excluded those who were frail at time 1, leaving a final sample

of 851. Informed consent was obtained from the participants or from an appropriate proxy. There were too few participants with mild/moderate frailty who survived and were living in the community to determine if attitudes to disability and aging predicted becoming more frail. The research was approved by the Research Ethics Committee of the Faculty of Medicine of the University of Manitoba, and adhered to the Declaration of Helskinki.

Measures

Participants were interviewed in their homes by trained interviewers. Data gathered were: age, gender, educational level (years of education), and marital status. Income security was measured with the item: "How do you think your income and assets satisfy your needs?" and was scored as: "Very well/Adequately/With some difficulty/Not very well/Totally inadequately." We considered this as a continuous measure. Since it was not normally distributed and some cells contained few observations, we also considered it as a dichotomous variable in sensitivity analyses. These results were similar, and we present the models with this variable included as a continuous factor.

The Modified Mini-Mental State Examination (3MS)[13] was used as the screening test for cognitive impairment and dementia. Those who scored less than 78 on the 3MS were invited to participate in a clinical examination to determine the presence of cognitive impairment or dementia. DSM-III criteria were used as the diagnostic criteria for dementia. Those with cognitive impairment not meeting these criteria were diagnosed with Cognitive Impairment No Dementia (CIND). This is a heterogeneous group of people with different conditions and circumstances interfering with cognition. Functional status was measured using the Older Americans Resource Survey (OARS).[14] Participants were asked about their ability to perform basic activities of daily living (ADL; eating, dressing, grooming, getting in and out of bed, taking a bath or shower, and ability to use the bathroom), instrumental activities of daily living (IADL; using the telephone, getting to places out of walking distance, going shopping, preparing meals, doing housework, taking medication[s], managing money), and ambulation.

The item: "When you reach my age, you have to accept a fair degree of discomfort and physical disability" was asked and scored on a five-point scale. We considered this as a continuous factor. Since there were few people who answered "mixed" and the data were not normally distributed, we also dichotomized this response into agree (Strongly agree, agree) vs. disagree (mixed, disagree, and strongly disagree) for sensitivity analyses. These results were similar to the primary analyses, and we present the results of models with this item entered as a continuous variable.

Frailty was defined according to the CSHA criteria using the brief frailty measure.[15] This is a measure of frailty based upon the "accumulation of deficits" model of frailty,

which has good construct validity and predicts a variety of adverse outcomes. It categorizes individuals as:

i) Not Frail—Walk without help, perform basic activities of daily living, continent of bowel and bladder, and are not cognitively impaired.
ii) Incontinence—Bladder incontinence only.
iii) Mild—One (two if incontinent) or more of needing assistance with mobility; or activities of daily living, or has CIND, or has bowel or bladder incontinence.
iv) Moderate/Severe—Two (three if incontinent) or more of totally dependent for transfers or one or more activities of daily life, incontinent of bowel and bladder, or diagnosis of dementia.

As a sensitivity analysis, we also considered the Frailty Index.[16,17] This is a simple tally of deficits derived from items in the CSHA. Forty deficits in multiple domains were considered, and each was considered as present or absent. The number of deficits was summed and divided by the number of possible deficits to yield a score from 0 to 1. We considered this score as a continuous variable and as a dichotomous variable, using a cut-point of 0.25. The Frailty Index and the brief frailty measure were correlated (Spearman's correlation coefficient 0.42, $p < .001$).

We also conducted a sensitivity analysis using disability as our outcome. Here, we considered the OARS[14] at time 1 and time 2 as our outcome. For these analyses, we summed the OARS items from 0 to 28 at both times. We considered the statement "When you reach my age, you have to accept a fair degree of discomfort and physical disability" as the predictor variable of interest.

Analyses

Categorical variables were compared using chi-square tests and continuous variables were compared using t-tests (assuming unequal variance) or one-way analysis of variance (ANOVA). Logistic regression models were constructed, with the outcome of mild/moderate to severe frailty vs. no frailty/incontinence at time 1. As well, logistic regression models were constructed for the outcome of mild/moderate to severe frailty vs. no frailty/incontinence at time 2. Continuous variables were entered directly into the model, and categorical variables entered as categories. Standard regression diagnostics (e.g., multicollinearity, influential outliers) were conducted. Bivariate analyses and graphs were conducted in SPSS version 10, and statistical models were constructed using Stata version 10 (College Station Texas).

RESULTS

The baseline characteristics of the cross-sectional sample and the prospective sample are shown in Table 1. Those who agreed with the statement (80.4% of the time 1 sample),

"When you reach my age, you have to accept a fair degree of discomfort and physical disability", were older, more likely to be women, and had lower levels of education. These characteristics were similar for the prospective sample. There was no difference in mortality or institutionalization over the five-year period between those who agreed or disagreed with the statement (Table 1).

There was a strong and graded association between accepting disability and frailty in the cross-sectional analyses (Figure 1). The proportion of those who were frail was: 4.8% (strongly disagree); 12.2% (disagree); 22.4% (undecided); 23.4% (agree); 30.9% (strongly agree) ($p < .001$, chi-square test). This association persisted after adjustment for potential confounding factors (Table 2). Older age, lower education, less adequate income, and never having married were also associated with frailty. We sought potential interactions in these associations by entering interaction terms between predictor variables and did not detect any interactions. However, the numbers for some factors (e.g., marital status) may have been insufficient to detect interactions. Analyses considering the Frailty Index were similar.

The prospective analysis included those who were not frail at time 1, and who were alive and available for follow-up at time 2 (N = 851). Accepting disability as part of aging also predicted becoming frail in those who were not frail at time 1 (Figure 2). The proportion of those who were frail at time 2 was 8.3% (strongly disagree); 9.8% (disagree); 18.8% (undecided); 19.8% (agree); 30.2% (strongly agree) ($p = .007$, chi-square test). Again, this association was fairly strong and graded. This association was also seen in logistic regression models adjusting for potential confounding factors (Table 3). Older age and lower education also predicted becoming frail. Analyses using the Frailty Index were similar.

The analyses considering disability as an outcome were very similar. Attributing disability as a result of growing old was associated with more disability on the OARS at both time 1 and five years later (Figure 3). This association, between accepting disability as part of aging and disability at both time 1 and time 2, persisted in multivariable models adjusting for age, gender, and education (data available upon request).

We also sought interactions in the effects. We did not find any interactions in these associations, and the effect was seen in men and women, and in all educational and age groups.

DISCUSSION

We have found that the belief that disability is due to aging is associated with frailty and, indeed, predicts frailty over a long time interval. Our findings are similar to previous findings. Williamson and Fried[9] have found that believing disability is a part of aging is strongly associated with disability. Sarkisian et al.[10] have also found that those who were disabled were more likely to report that their disability is due to aging. We go on to show this association in men and women in a general, representative population. We have used a simple, general

TABLE 1.
Baseline characteristics

	Time 1 (N = 1,735)		Time 1 – 2 Sample (N = 835)	
	Disagree[a]	Agree[b]	Disagree[a]	Agree[b]
Age (mean yrs)	75.5	78.1[c]	74.6	76.8[c]
Gender (% women)	62.3%	57.4%[c]	62.6%	56.9%[c]
Education (mean yrs)	10.2	9.1[c]	10.8	9.7[c]
Income Adequacy (% inadequate)	19.3%	19.4%	13.9%	11.7%
Marital Status				
Never Married	6.6%	5.9%	6.4%	4.8%
Married	51.8%	50.9%	53.1%	55.0%
Separated/Divorced	2.1%	3.2%	2.6%	3.2%
Widowed	39.5%	40.4%	37.7%	31.1%
Dead at Time 2 (%)	19.5%	21.3%		
Institutionalized at Time 2 (%)	12.9%	11.7%		

[a]Disagree is disagreeing with the statement that disability is due to aging.
[b]Agree is agreeing with the statement that disability is due to aging.
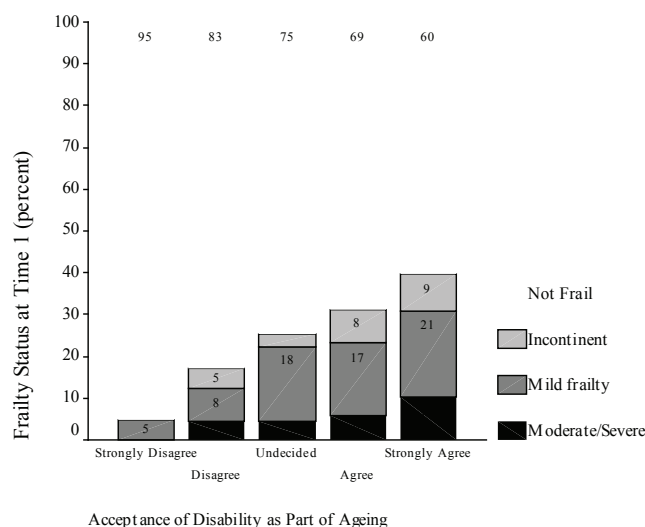[c]Denotes $p < .05$.

FIGURE 1. Association between accepting disability as a part of aging and frailty in cross-sectional analysis of participants at time 1

measure. Previous studies have used a question specific to the person (i.e., "what caused your disability?", rather than "what causes disability?") The question asked in our study would be easier to generalize to a wide population in other settings, as well as being easier to interpret. As well, our study included a large number of older men, and we found that the association between attitudes to disability and frailty was present in both men and women. We also used a different measure of frailty than previous studies.

Most of the participants agreed with the statement that disability was due to aging. The reasons for this are not clear. The participants in the MSHA were less well-educated than some other study populations, and the data are somewhat older. There may be cohort effects in these beliefs with younger birth cohorts having a different sense of control or different attitudes to aging. We did not note any association between attitudes to disability and mortality or institutionalization. The reason for this lack of association is not clear. The measure we used may simply be very specific to the risk of frailty and/or disability. Another explanation is that other factors may play a larger role in predicting death and nursing home admission.

There are some limitations to our study. First, the original study was conducted in the 1990s and health beliefs may have changed in the intervening time. It is less likely that the association between health beliefs and frailty has changed in these years, however. A second limitation is the simplicity of the measure. Only a single item was considered in these analyses. Longer questionnaires may have altered our findings. Third, we have used a measure of frailty which is consistent with the "Frailty as an accumulation of deficits model" used in the CSHA. The definition we used also weights disability very highly. Indeed, we may simply be measuring the association between attitudes to disability and disability itself. Other alternative models, such as the "Frailty as a phenotype" model, may have yielded different results. We do not have all the items to replicate this measure in the MSHA. Another limitation is that we have data from only two time points. Attitudes to disability and frailty may evolve and vary over time. The causal nature of the association is thus less clear,

TABLE 2.

Results of logistic regression models for time 1 associations; the Odds Ratio (OR) and 95% confidence interval (CI) are shown for various models adjusting for potential confounding factors

	Model 1	Model 2	Model 3
Accepting Disability (per point 0-5)[a]	1.47 (1.25, 1.72)	1.33 (1.27, 1.57)	1.28 (1.08, 1.51)
Age (years)		1.10 (1.08, 1.12)	1.09 (1.07, 1.11)
Gender (ref = men)		0.87 (0.68, 1.12)	0.84 (0.68, 1.14)
Education			0.87 (0.84, 0.91)
Income Adequacy (per point 0-5)			1.28 (1.05, 1.56)
Marital Status (ref = Never married)			
Married			0.48 (0.29, 0.81)
Divorced/Separated			0.63 (0.26, 1.52)
Widowed			0.51 (0.31, 0.86)

[a]Accepting disability is agreeing with the statement that disability is due to aging, scored on a five point scale.
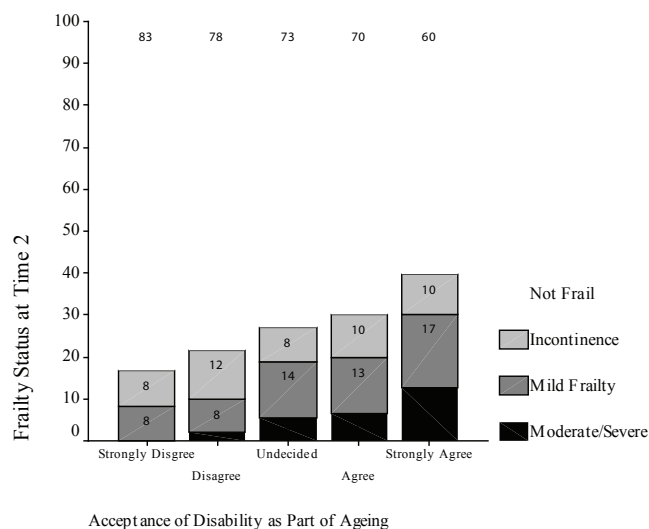

FIGURE 2. Accepting disability as a part of aging predicted frailty at time 2 in those who were not frail at time 1
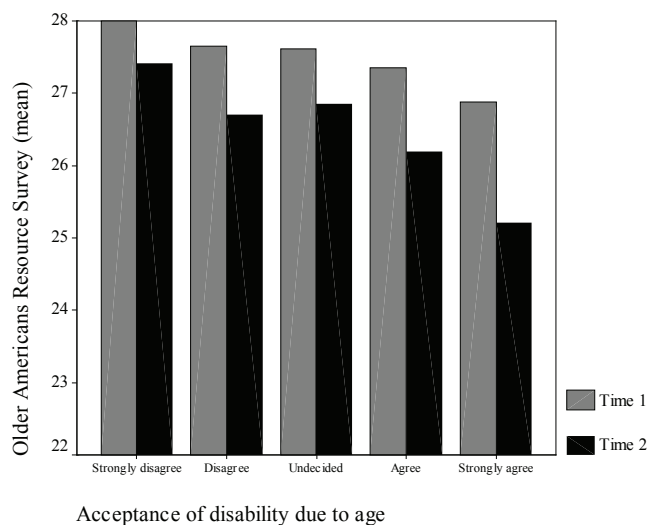

FIGURE 3. Accepting disability as a part of aging is associated with higher levels of disability at time 1 and time 2

TABLE 3.

Results of logistic regression for the risk of being frail at Time 2; analyses include those who were not frail at time 1 and had data available at both times (followed over five years), and the odds ratio (OR) and 95% confidence interval (CI) are shown for various models adjusting for potential confounding factors

	Model 1	Model 2	Model 3
Accepting Disability (per point 0-5)[a]	1.51 (1.20, 1.90)	1.38 (1.08, 1.75)	1.32 (1.03, 1.69)
Age (years)		1.16 (1.12, 1.20)	1.16 (1.12, 1.21)
Gender (ref = men)		0.74 (0.50, 1.09)	0.70 (0.45, 1.10)
Education			0.87 (0.82, 0.93)
Income Adequacy (per point 0-5)			1.23 (0.89, 1.70)
Marital Status (ref = Never married)			
Married			0.73 (0.20, 1.79)
Divorced/Separated			0.59 (0.13, 2.71)
Widowed			0.66 (0.27, 1.63)

[a]Accepting disability is agreeing with the statement that disability is due to aging, scored on a five point scale.

and longitudinal associations over long periods of time are needed. A final limitation is that there may be factors which we have not considered, which may confound or interact with attitudes to health and disability.

There are also some strengths to our analysis. First, our study was representative of a general population. Men and women from rural and urban areas were included in our analyses. Previous studies in this area have been conducted primarily in women. While there were gender differences in the belief that disability was due to aging, there were no gender differences in the association between this belief and becoming frail. Somewhat surprisingly, we did not observe an association between gender and frailty. This lack of an association may be due to the definition of frailty we used, which weighted cognition heavily. The association between gender and incident dementia is not strong in this dataset. As well, there may be differential attrition, with higher mortality in men. A final explanation may be that the effect of gender is mediated through health beliefs and attitudes. Another strength is that reliable, valid measures of disability were used, and were gathered by trained interviewers in person.

CONCLUSION

Our findings are relevant for several reasons. First, clinicians should be aware that older adults who view disability as a part of aging may be at higher risk for frailty. Second, it is possible that interventions to increase the sense of control over health may be useful in reducing the risk of frailty. Addressing depressive symptoms, social isolation, and other factors may increase a sense of control. Since the belief that disability is due to aging is widespread, the potential intervention could benefit a large number of people. Further research into the causal relationship between this association is of course needed prior to any intervention study. Future research would need to focus on the stability of these beliefs over time, and how they change with changing disability and frailty.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that no conflicts of interest exist.

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