

# The Contribution of Arthritis and Arthritis Disability to Nonparticipation in the Labor Force: A Canadian Example

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**ABSTRACT. Objective.** To examine the factors affecting labor force participation and understand how arthritis affects labor force participation in a Canadian working population.

**Methods.** Data from the 1990 Ontario Health Survey population ( $n = 35,221$ ) were used. Labor force participation was dichotomized as in the labor force and not in the labor force. Stratified logistic regression analyses by sex were carried out to identify factors associated with not being in the labor force, including arthritis, chronic disorders, and sociodemographic and family composition variables.

**Results.** Overall, 6.7% of men and 23.0% of women were not in the labor force compared with 18.6% and 36.0%, respectively, of men and women with arthritis. After controlling for other covariates, disability caused by arthritis was significantly associated with increased risk of being out of the labor force, with odds ratios of 2.70 for men and 1.91 for women. Low education, pain, and nonarthritis disability were also significantly associated with being out of the labor force. The effects of age and family structure on employment were sex dependent. Women were at higher risk at all age groups. Men with dependent children were more likely to work, as were women who lived alone. For women, having dependent children increased the likelihood of not being in the labor force.

**Conclusion.** People with arthritis disability were more likely to be out of the labor force. It was not arthritis *per se* that limited people in labor force participation, but rather the arthritis disabilities. (J Rheumatol 2001;28:1077–82)

*Key Indexing Terms:*

ARTHRITIS DISABILITY  
EMPLOYMENT

EPIDEMIOLOGY  
FAMILY COMPOSITION

Arthritis is one of the most prevalent chronic conditions in developed countries<sup>1,4</sup> and affects almost 20% of adults in Canada<sup>4,5</sup>. Arthritis is the most frequently reported cause of physical disability in the population<sup>6,8</sup>. Previous research on work disability has found that arthritis is an important cause of days lost from work<sup>9,10</sup> and is the second leading cause of work disability payments in the United States<sup>1,11,12</sup>. The

economic burden of arthritis and other musculoskeletal (MSK) disorders is significant and is expected to grow in Canada and the US<sup>13</sup>. Recent research in the US has reported that the economic cost of arthritis and rheumatism in 1992 amounted to \$64.8 billion or 1.1% of the gross domestic product (GDP)<sup>14,15</sup>. In Canada, for arthritis alone, a recent estimate of societal costs was \$5.8 billion or 0.9% of the GDP and the majority of the costs were associated with reduced productivity<sup>16</sup>. Canadian data show that half of those of working age who have arthritis disability are not in the labor force because of disability<sup>6</sup>. People with MSK conditions in general have been found to have higher rates of work disability compared to those with other chronic conditions<sup>17-19</sup>. The proportion of people with work disability related to arthritis and other MSK disorders in the population has been rising, especially among middle aged and older men<sup>1,19</sup>.

Population projections have suggested that the number of people with arthritis aged 45–64 years will almost double between 1996 and 2031<sup>4</sup>. The increases in number of people with arthritis in the older working age population are likely to have major economic implications for the individual and for society as a whole.

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Although there is a substantial body of literature related to arthritis related work disability, there is less information on the determinants of continued labor force participation of people with arthritis in the population as a whole. Yelin has found that labor force participation in the US among men with arthritis was about 20% lower than among those without arthritis and about 25% lower among women with arthritis than among those without<sup>1</sup>. In the US, the overall labor force participation rates among persons with MSK conditions were found to have declined from 71% to 56% between 1976–81 and 1982–87<sup>20</sup>. We investigated the factors that affect participation in the labor force in a Canadian population using data from the 1990 Ontario Health Survey<sup>21</sup>. Specifically, we wished to determine the relative contribution of arthritis to labor force participation controlling for a variety of sociodemographic and some disease related factors.

## MATERIALS AND METHODS

**Data sources.** The target population for the 1990 Ontario Health Survey was all residents of private dwellings in Ontario during the survey period. Respondents were selected using a multistage stratified cluster sampling frame designed to obtain a representative provincial sample. Residents of Indian reserves, inmates of institutions, foreign service personnel, and residents of remote areas were excluded from the sampling frame. The survey consisted of a face-to-face interview with one responsible individual within the selected households concerning the health of all household members, and a subsequent self-completed questionnaire to all household members 12 years of age and older. The survey methodology is described in detail<sup>7</sup>. The response rate was 87% for the household interview and 77% for the self-completed questionnaire, with 45,650 participants completing both sections of the survey. Sample weights are provided with the data set to permit the generation of provincial estimates adjusted for the sampling strategy and for differential nonresponse. As the purpose of these analyses was to look at determinants of being out of the labor force, these analyses were restricted to the population aged 20 to 64, a sample size of 35,221 (16,543 men and 18,678 women, representing population estimates of roughly 2.92 million men and 2.98 million women in Ontario).

**Outcome variable.** To ascertain employment status, the participants were asked to indicate their main activity during the past 12 months from a list of 6 categories: working at a job, looking for work, going to school, keeping house, retired, or other. People were defined as not in labor force if they reported that they were retired, stayed at home, were not looking for a job, or had never worked. Those who were in school, looking for jobs, and currently working were considered to be in the labor force.

**Predictive variables.** The sociodemographic variables used were age, level of education, place of residence, occupational status, and family composition. Disease related variables were arthritis status, other chronic conditions, and self-reported pain.

A categorical age variable was formed with 5 categories; 20–24 (baseline), 25–34, 35–44, 45–54, and 55–64. Education was defined as a dichotomous variable of low vs not low education (baseline). Low education referred to having some secondary education or less. Place of residence was dichotomized into urban (baseline) and rural location.

Occupational status was a trichotomized variable derived from the Pineo-Porter-McRoberts (Pineo) job classification<sup>21</sup> that categorizes occupations into 16 homogeneous groups based on skill level and special attributes such as prolonged formal training. The 3 categories of occupation were professional (Pineo scores 1–6), skilled (Pineo scores 7–11), and semi-skilled or lower (Pineo 12–16).

A family composition variable, which comprised 5 categories, was also

used in the analysis: (1) couple without children (baseline), (2) couple with dependent child(ren), (3) couple with independent child(ren) in household, (4) live alone, and (5) other types of living arrangement. Level of income was not considered in these analyses as it was more likely to be a consequence rather than a predictor of employment.

Survey respondents were asked about the presence of longterm health conditions and coded as having arthritis if they responded in the affirmative to a question about “arthritis and rheumatism” as a longterm health condition. Participants were considered to have other chronic conditions if they reported one or more of the following longterm health conditions: back or neck pain, MSK disorders due to trauma, hypertension/heart disease, stroke and vascular disorders, respiratory disease, neoplasms, digestive disorders, injuries and trauma, metabolic disorders, sensory disorders, and other ill defined chronic conditions excluding skin and allergy disorders. Respondents were also asked about whether they had disability that limited activities at work, home, or school, and if so, which chronic health conditions were mainly responsible. An arthritis variable was created with 3 mutually exclusive categories: no arthritis, chronic arthritis (but no disability), and arthritis causing disability. An analogous variable was created for the other chronic conditions: no (other) chronic conditions, one or more chronic conditions (but no disability), chronic conditions as a cause of disability. Respondents could report both arthritis and other chronic conditions. Pain was a derived dichotomous variable: “no pain or pain that does not prevent any activities” and “pain prevents few, some, or most activities.” The former was used as the baseline.

**Analyses.** Frequency distributions and bivariate analyses were followed by multiple logistic regressions to determine the factors associated with not being in the labor force. Although the occupational status variable was analyzed in the bivariate analyses, it was excluded in the logistic regression due to the high proportion of missing data for those not in the labor force and its collinearity with level of education. All multilevel predictor variables were introduced as nominal scales (dummy variables). Preliminary analysis found interactions between sex and other covariates, especially for age. Consequently, sex was used as a stratifying variable.

To ensure the results were representative of the target population, all statistical analyses, including 95% confidence interval estimates, were weighted to take into account the unequal probabilities of a person being included in the survey. The aggregate of all weights represents an estimate of the noninstitutionalized population aged 20 to 64 years of Ontario in 1990. For the statistical testing, the original expansion weights were rescaled by dividing the expansion weights by the mean weight. As we were unable to calculate the design effect factor for each individual variable, the rescaled weights were further divided by the average design effect factor provided by Statistics Canada to accommodate the stratified-cluster sampling scheme.

## RESULTS

**Descriptive analyses.** The total prevalence of arthritis as a longterm health condition (regardless of disability) in the study population was 12.4%. Table 1 presents the results of the bivariate analysis looking at the relationship between employment status and a variety of sociodemographic characteristics. Overall, 6.7% of men and 23.0% of women were not in the labor force, compared with 18.6% of men and 36.0% of women with arthritis. Those with disabling arthritis were much more likely to be not in the labor force than those reporting chronic arthritis. Age exhibited differential effects on employment between men and women. A greater proportion of women than men were not in the labor force in all age groups. Increasing age was associated with increasing proportions of women being not in the labor

Table 1. Proportion of not being in labor force by major characteristics related to labor force status (age 20–64) from the 1990 Ontario Health Survey.

	Men, %	N = 2,920,000 95% CI	Women, %	N = 2,976,000 95% CI	Total, %	N = 5,896,000 95% CI
Age, yrs						
20–24	5.8	4.3, 7.3	10.5	8.5, 12.5	8.1	6.9, 9.3
25–34	2.0	1.4, 2.6	16.7	15.2, 18.2	9.5	8.6, 10.4
35–44	2.6	1.9, 3.3	17.8	16.2, 19.4	10.2	9.3, 11.1
45–54	5.2	4.1, 6.3	21.9	19.8, 24.0	13.6	12.4, 14.8
55–64	26.0	23.5, 28.5	55.6	52.8, 58.4	41.0	39.0, 43.0
Total	6.7	6.2, 7.3	23.0	22.1, 23.9	14.9	14.4, 15.4
Education						
Low (some secondary or less)	13.0	11.6, 14.4	37.7	36.5, 38.9	11.0	10.3, 11.7
Not low (secondary or higher)	4.2	3.7, 4.7	17.6	16.0, 19.2	25.1	24.1, 26.1
Occupation						
Professional	3.6	2.9, 4.3	11.5	10.2, 17.8	7.4	6.7, 8.1
Skilled	6.0	5.0, 7.0	15.9	14.1, 17.7	10.0	9.1, 10.9
Semiskilled or lower	6.7	5.8, 7.6	22.1	20.7, 23.5	15.2	14.3, 16.1
Residence						
Urban	6.5	5.9, 7.1	22.4	21.4, 23.4	14.5	13.9, 15.1
Rural	8.4	6.7, 10.1	27.7	24.9, 30.5	18.0	16.3, 19.7
Family composition						
Couple without child(ren)	12.7	11.1, 14.3	28.9	26.7, 31.1	20.9	19.5, 22.3
Live alone	8.6	6.4, 10.8	16.1	13.1, 19.1	12.2	10.3, 14.1
Couple with dependent child(ren)	3.0	2.4, 3.6	22.4	21.0, 23.8	12.6	11.8, 13.4
Couple with independent child(ren)	8.8	7.3, 10.3	25.4	23.0, 27.8	16.8	15.4, 18.2
Other	6.1	4.5, 7.7	17.2	15.1, 19.3	15.5	14.0, 17.0
Pain						
No pain or pain that does not prevent activities	4.5	4.0, 5.0	20.3	19.3, 21.3	12.3	11.7, 12.8
Pain that prevents activities	14.1	12.5, 15.7	30.5	28.6, 32.4	22.9	21.6, 24.2
Arthritis						
No	5.3	4.8, 5.8	20.8	19.8, 21.8	13.0	12.4, 13.1
Chronic	16.0	13.2, 18.7	33.2	30.3, 36.1	26.1	24.0, 18.2
Disability	32.5	24.5, 40.5	51.9	44.6, 59.2	43.7	38.2, 49.2
Other chronic health condition						
No	4.3	3.7, 4.9	21.2	19.8, 22.6	12.3	11.5, 13.1
Yes	8.9	8.0, 9.7	24.3	23.0, 25.5	17.1	16.3, 17.9

force, but the effect of increasing age was only seen for men in the 55–64 year age group.

Low education was also associated with not being in the labor force. There did not seem to be a strong relationship between place of residence and labor force status. There was a gradient in the proportions not in the labor force across occupation status from professional to semiskilled or lower. A higher proportion of individuals with arthritis, other chronic conditions, disability, or pain that prevents activity were not in the labor force compared with those without these characteristics.

The results of the logistic regression analysis are shown in Table 2 for men and women separately. Compared to those aged 20–24 years, the risk of not being in the labor force for men was much lower for age groups 25–34, 35–44, and 45–54, but was almost 3 times greater than baseline for the age group 55–64. For women, the odds ratio (OR) for not being in the labor force increased in every successive age group, from 1.3 in age group 25–34 to 9.6 in age group 55–64. The OR for being out of the labor force at age 55–64 was much higher in women than men (9.7 vs 3.0).

Low education was similarly associated with an increased likelihood of not being in the labor force for both men and women. The effect of family composition on labor force participation in men was not very strong, although there was a significantly reduced OR for men with dependent children. However, for women, living alone was related to a reduced likelihood (OR 0.50) and living with dependent children was related to an increased likelihood (OR 1.78) of not being in the labor force.

When no arthritis was used as the comparison group, the risk of being out of the labor force was slightly increased for men with chronic arthritis, but not for women. The OR for not being in the labor force were significantly increased for both men and women with disabling arthritis, with OR of 2.70 and 1.91, respectively. In this analysis, all other chronic conditions were treated as one condition (nonarthritis conditions). Similar to the findings for arthritis, only disability was associated with an increased risk of being not in the labor force, with adjusted OR of 8.33 and 2.23 for men and women, respectively.

Even after controlling for chronic condition and

Table 2. Sex stratified multiple logistic regression: factors associated with not being in the labor force (1990 Ontario Health Survey).

Variables	Men		Women	
	OR	95% CI	OR	95% CI
Age, yrs				
20–24	1.00		1.00	
25–34	0.28	0.18, 0.42	1.44	1.13, 1.84
35–44	0.32	0.21, 0.49	1.31	1.02, 1.67
45–54	0.50	0.34, 0.75	1.90	1.47, 2.44
55–64	3.00	2.11, 4.28	9.74	7.53, 12.60
Education				
Not low (secondary or higher)	1.00		1.00	
Low (some secondary or less)	1.81	1.47, 2.23	1.98	1.76, 2.24
Residence				
Urban	1.00		1.00	
Rural	1.10	0.82, 1.46	1.18	1.00, 1.39
Family composition				
Couple without child(ren)	1.00		1.00	
Live alone	1.30	0.89, 1.88	0.50	0.38, 0.67
Couple with dependent child(ren)	0.58	0.43, 0.79	1.78	1.50, 2.11
Couple with independent child(ren)	0.72	0.55, 0.95	1.02	0.85, 1.24
Others	0.89	0.61, 1.28	0.87	0.71, 1.10
Arthritis				
None	1.00		1.00	
Chronic	1.36	1.04, 1.79	1.12	0.95, 1.33
Disability	2.70	1.68, 4.36	1.91	1.34, 2.73
Other nonarthritis conditions				
No	1.00		1.00	
Chronic	1.19	0.94, 1.51	1.01	0.88, 1.15
Disability	8.33	6.14, 11.28	2.23	1.77, 2.82
Pain				
No pain or pain that does not prevent activities	1.00		1.00	
Pain that prevents activities	1.36	1.08, 1.72	1.26	1.10, 1.44

disability variables, pain preventing activity was significantly associated with increased risk of not being in the labor force.

## DISCUSSION

We examined the predictors of not being in the labor force for the working age population, including a measure of arthritis and arthritis disability, using a large population based survey in Ontario, the largest province in Canada. The findings provide further evidence that people with arthritis were more likely to be out of the labor force, which was consistent with other studies<sup>1,19,20,22–24</sup>. However, our study differs from several previous studies as we included the whole spectrum of arthritis, and looked at disability attributed to arthritis. One in 6 people with arthritis reported associated disability. We found that it was not arthritis *per se* that limited people in labor force participation, but rather the disabilities associated with arthritis. Therefore, the principal contribution of this study lies not so much in establishing the relationship between labor force participation and arthritis, but in focusing attention on the disabling consequences of this condition. As the risk factors of arthritis are largely unknown or nonmodifiable, this finding underscores

the importance of early interventions to forestall or reduce arthritis associated disability and pain in order to prevent people from leaving the labor force. The question asked about limitations in activity at home, school, or work. It is thus possible that respondents' labor force status might have influenced responses to this question such that people who were not in the labor force might have been more likely to report disability. Unfortunately, separate questions about problems with activities of daily living are not available in this data set. However, analyses of data from the Canadian Health and Activity Limitation Survey, which used a similar overall screening questionnaire for disability, showed that a very high proportion of respondents with arthritis associated disability had difficulties with activities of daily living. Over 90% of these respondents reported some problems with mobility such as walking or standing, and 75% were dependent on the help of others for at least some tasks<sup>25,26</sup>. Based on these parallel findings we think it likely that the measure of disability used in our study reflects activity limitations in general.

Arthritis, like all other health conditions in this study, is self-reported. Studies of the agreement between self-reported and physician-evaluated arthritis have been incon-



sistent<sup>27-32</sup>. Although self-reported chronic health conditions, such as arthritis, may not always be equated with a clinical diagnosis, a recent study showed that self-reported chronic non-serious illnesses had predictive validity for disability<sup>33</sup>. In this study we feel that any misclassification of arthritis is likely to be non-systematic, and if anything, lead to an attenuation of the relationship between arthritis disability and labor force participation.

In this study, which relates to the working age population as a whole, having other non-arthritis chronic conditions was also associated with not being in the labor force, and similar to the findings for arthritis, the association was strongest for the reporting of associated disability. The odds ratio for disability caused by non-arthritis was 8.33 in males, which was much higher than that for arthritis disability. This may be an indication of the presence of multiple disabilities in the non-arthritis disability population. The presence of pain that limits activity also had an independent effect on labor force status, and the inclusion of pain in the model diminished the contribution of arthritis disability. This finding suggests the effect of arthritis on employment may be mediated by both pain and disability.

In addition to arthritis disability, a constellation of other factors were associated with an increased risk of not being in the labor force, including female sex, older age, low education, and certain sex-family composition combinations. Although the associations between labor force participation and age, sex, and education are well established<sup>1,9,19,20,34-36</sup>, in the health field much of the literature on family composition and employment has been devoted to psychological well being<sup>37-40</sup>. In this study we were able to examine the interrelationships among arthritis disability, family composition, and labor force status. Family composition had a greater effect on labor force participation in women than men: women living alone were more likely to be in the labor force and the reverse was true for women living with dependent children. The divergent patterns may suggest the influence of different social roles such as parenthood or marital status on employment between the 2 sexes<sup>41,42</sup>. The influence of family composition may itself contribute to the labor force status of women with arthritis.

We were not able to include occupation in the logistic regression models due to the high proportion of nonworking respondents who did not provide this information. However, bivariate analyses suggested that education and occupation were strongly correlated. It is reasonable to speculate that occupation could be an intermediate variable lying between education and employment.

The Ontario Health Survey was conducted in 1990, at the beginning of the last economic recession, which worsened by 1993, with the unemployment rate at 11.4%<sup>43</sup>. In the last few years of the 1990s, employment growth in Canada accelerated substantially and by 1999, the unemployment

rate stood at 6.8%, its lowest level since early 1976. The boom in the economic climate had several major characteristics: growth in self-employment, more older workers in the labor force, more part-time jobs, and a reduced earning gap between the 2 sexes<sup>44</sup>. In theory these changes could have benefitted people with arthritis. Previous studies suggest that cyclical changes in the economy affect the labor force participation of persons with disabilities to a greater extent than persons without disabilities<sup>45,46</sup>, with particular effect on those with low skills<sup>45</sup>. As the present study uses data from one cross sectional study, we are unable to examine whether and how macroeconomic changes affect labor force participation in people with arthritis disabilities. However, it is likely that the greater differential effect on not being in the labor force associated with pain and arthritis disability would be maintained.

Employment opportunities for persons with significant disabilities are an important focus for public policies related to social service, income maintenance, and health insurance. Their participation in the labor force contributes to their independence and integration into society, provides tax revenues, and reduces outlays from income support<sup>45</sup>. We identified that arthritis disability was a predictor of labor force participation. As the number of people with arthritis disability in the working age population is expected to increase<sup>4</sup>, this finding has major implications. Preventing or slowing the disability process in people with arthritis is of great importance for labor force retainment. For future studies, it is also important to learn about specific incentives and barriers to labor force participation in people with disabling arthritis. People with significant disabilities often need support of some sort to engage in work, including access to health care, vocational rehabilitation, personal assistance services, assistive devices, and employers' accommodation. Research on the best way to provide these supports is needed.

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