

# Work-Related Issues and Physical and Psychological Burden in Canadian Patients With Axial Spondyloarthritis: Results From the International Map of Axial Spondyloarthritis

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**ABSTRACT. Objective.** To identify factors associated with work-related issues in Canadian patients with axial spondyloarthritis.

**Methods.** Data from 542 Canadian patients who participated in the International Map of Axial Spondyloarthritis online survey were analyzed. Participants who were employed, unemployed, or on short-term disability were included in this analysis. Regression analysis was used to study the association between work-related issues, disease activity (Bath Ankylosing Spondylitis Disease Activity Index [BASDAI]), and psychological distress (12-item General Health Questionnaire [GHQ-12]).

**Results.** The mean age of surveyed participants was 44.3 (SD 13.9) years, 81% were university educated, and 52.6% employed. A substantial proportion had high disease activity (BASDAI  $\geq 4$ , 72.1%) and psychological distress (GHQ-12  $\geq 3$ , 53.1%); 81% had work-related issues. This study analyzed responses from a subset of participants who were either employed, unemployed, or on short-term disability ( $n = 339$ ). Ninety percent of this subset reported at least 1 work-related issue in the year before questionnaire completion, with the most frequent being absenteeism (49.3%) and missing work for healthcare provider visits (42.5%). Factoring in disability benefits eliminated the association between work-related issues and disease activity for all variables except fatigue ( $r = 0.217$ ;  $P = 0.03$ ) and discomfort ( $r = 0.196$ ;  $P = 0.047$ ). Difficulty fulfilling working hours ( $\beta$  2.342, 95% CI 1.413–3.272) and effect on professional advancement ( $\beta$  1.426, 95% CI 0.355–2.497) were associated with psychological distress. In the presence of disability benefits, only the effect on professional advancement remained ( $\beta$  2.304, 95% CI 0.082–4.527).

**Conclusion.** Work-related issues are associated with worse patient-reported outcomes, both physical and psychological.

**Key Indexing Terms:** ankylosing spondylitis, burden of illness, employment, patient-reported outcomes, spondyloarthritis

Axial spondyloarthritis (axSpA) is a chronic inflammatory disease that affects the axial skeleton and involves the sacroiliac and spinal joints.<sup>1</sup> Inflammatory pain and spinal stiffness, with the consequent loss of mobility and disability, are the main features of axSpA.<sup>2,3</sup> Thus, axSpA has a great effect on many aspects of life, including work,<sup>4</sup> and has been shown to reduce the ability to work<sup>5</sup> and impair work productivity.<sup>6</sup>

The average age of onset of axSpA is between the second and third decade of life,<sup>1</sup> meaning that patients are predominantly affected by the disease during the completion of their studies or at a crucial and early stage of their professional career.<sup>7</sup> Nonetheless, axSpA symptoms that first present in a person's prime working life can also affect work productivity.<sup>8</sup>

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Further, as the disease progresses, so does work impairment. An increase in disease activity is related to a greater loss of work productivity, which implies greater disease burden and higher costs to society.<sup>9</sup> According to the joint recommendations developed by the Assessment of Spondyloarthritis international Society (ASAS) and the European Alliance of Associations for Rheumatology, this loss of productivity must be considered when evaluating the cost-effectiveness of treatments.<sup>10</sup>

In addition to frequent problems at work,<sup>11</sup> patients with axSpA experience difficulty progressing in their professional careers,<sup>11,12</sup> which can trigger crises and may increase the likelihood of unemployment.<sup>13,14</sup> Since problems at work tend to worsen over time,<sup>6</sup> a patient with axSpA with work-related issues will see a progressive worsening of their working and functional situation if their work issues are not appropriately managed.

The International Map of Axial Spondyloarthritis (IMAS) is a cross-sectional online survey of nonselected patients with self-reported axSpA conducted in 21 countries and endorsed by the Axial Spondyloarthritis International Federation. According to the European survey of 2846 nonselected patients, having axSpA requires patients to make workplace adaptations (43.9%), influences job choice (45.7%), and makes finding a job difficult (74.1%).<sup>15</sup>

IMAS aims to determine the patients' perspective of the psychological and physical burden of axSpA to help guide resources to reduce the burden of disease. It has been adapted for use in Canada to identify factors associated with work-related issues in Canadian patients with axSpA and to investigate the potential association between disability benefits and work-related issues. This study provides an overview of the employment status and work-related problems of participants of the IMAS Canada survey.

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## METHODS

**Study population.** Canadian participants were recruited between August 2018 and February 2019 by Ipsos SA (formerly GfK), a market research agency, through their existing database of respondents. Participants were at least 18 years of age with a self-reported diagnosis of axSpA (including ankylosing spondylitis [AS] or nonradiographic [nr-axSpA]) and an axSpA-related visit to a healthcare provider (HCP) in the 12 months prior to survey completion.

**Statement of ethics and consent.** The Canadian adaptation of the IMAS Patient Survey and its French translation were approved by the Advarra institutional review board (IRB; Columbia, Maryland). The requirement for obtaining informed consent was waived since Advarra IRB determined that the Canadian privacy requirements for a waiver of consent had been met.

**Survey.** The Canadian IMAS survey was adapted from the original Spanish Atlas of Axial Spondyloarthritis 2017.<sup>16</sup> This consisted of adapting the terminology to suit the Canadian social, geographical, and legislative context; modifying questions on diagnosis, healthcare, and treatment to align with the Canadian healthcare system; and validating existing questions and including new questions proposed by representatives of the patient organization (the Canadian Spondylitis Association) to ensure the survey gathered information on real concerns of Canadian patients with axSpA. The final Canadian survey consisted of 109 items relating to 13 different areas: sociodemographic characteristics, disability and performance, employment status, daily activities, lifestyle habits, diagnostic journey, healthcare utilization, treatment, comorbidities, mental health, axSpA-specific outcomes, income level, and patient disease-related attitudes and treatment goals (Supplementary Table S1, available from the authors upon request). Participants in the IMAS Canada survey completed the questionnaire in English or French using an online platform and were not paid, nor did they receive any type of financial compensation or gift.

**Employment status and work-related issues.** The International Labour Organization (ILO) classification of economically active and inactive persons according to working status was used to establish the employment rates of the Canadian survey population.<sup>17,18</sup> The active population or labor force is the sum of employed and unemployed persons between 15 and 64 years of age. The inactive population includes those who are neither employed (according to the ILO definition) nor unemployed: people aged < 15 years, students and people of retirement age who are not working to supplement their education or pension, homemakers, and people unable to work.

Participants were asked to select their employment status from the following options: employed, unemployed, short-term disability, long-term disability, retired, early retired, student, or homemaker. This information was used to classify whether participants were part of the economically active population (ie, employed or unemployed persons between the ages of 15 and 64 years) or part of the economically inactive population (ie, anyone not meeting the definition for economically active population).<sup>19</sup> In Canada, short-term disability is available for up to 6 months. If the disability prevents the employee from working for > 6 months, then they can access a long-term disability plan.<sup>20</sup>

A section of the IMAS questionnaire addressed work-related issues related to axSpA experienced in the 12 months preceding survey participation. The definition of these structured responses on work-related issues was based on the experience of the Spanish Federation of Spondyloarthritis Associations with associated patients. These patients expressed their main work-related issues, including key concepts such as presenteeism and absenteeism, which made it possible to establish a multiple-choice item. This study analyzed responses from participants who were either employed, unemployed, or on short-term disability. Survey respondents stated if they experienced work-related issues in the 12 months prior to completing the questionnaire. Participants who had

reported work-related issues were asked to expand on their response by selecting the applicable issues from the following list:

- I asked for some days off/leave of absence
- I took sick leave
- I reduced my working hours
- I missed work only for the time my doctor's appointment took
- It has been difficult for me to fulfill my working hours
- I have occasionally changed my work shift
- My professional life has suffered (eg, missed promotion)
- I had to give up my previous job
- Other situation

*Other patient-reported outcomes.* The survey also identified disease activity, spinal stiffness, functional limitation, and psychological distress using the following instruments:

- The Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), which was used to measure disease activity, with a possible score ranging between 0 and 10.<sup>21</sup>
- The Spinal Stiffness Index, which was used to measure the degree of stiffness experienced by patients in the spinal column, distinguishing between the cervical, dorsal, and lumbar areas.
- The Functional Limitation Index, which was developed specifically for IMAS and used to assess the degree of functional limitation in 18 daily life activities.<sup>22</sup>
- The 12-item General Health Questionnaire (GHQ-12), which was used to evaluate psychological distress using 12 items.<sup>23</sup> For the present study, these values were transformed into a dichotomous score (0-0-1-1), called the GHQ score. Scores  $\geq 3$  indicated psychological distress.<sup>24</sup>

Diagnostic delay was calculated by subtracting the age of onset of first symptoms (pain, inflammation, and stiffness) associated with spondylitis/spondyloarthritis from the age at diagnosis with spondylitis/spondyloarthritis.

*Statistical analysis.* The Kruskal-Wallis test was used to evaluate homogeneity in the distribution of work-related issues (none, 1-3, or 4-8 issues) and age, income, BASDAI, GHQ-12, and diagnostic delay. The chi-square test was used to evaluate the differences in work-related issues (none, 1-3, or 4-8 issues), sex (male, female), education (primary school, secondary school, and college/university), patient organization membership (yes/no), occupation (manual worker, nonmanual worker), receiving disability benefits (yes/no), and use of nonsteroidal antiinflammatory drugs (NSAIDs, yes/no), disease-modifying antirheumatic drugs (csDMARDs; yes/no), or biologic drugs (bDMARDs; yes/no).

Multiple linear regression was used to assess which work-related issues were associated with disease activity (BASDAI) and psychological distress (GHQ-12). In Model 1, all work-related issues were included as independent variables. Model 2 included all work-related issues, with the addition of the disability benefits variable. Model 2 was used to examine whether there is a relationship between disease activity and psychological distress in relation to work-related issues, taking into account the presence of disability benefits.

Partial correlation was used to evaluate the possible linear relationship between all items of BASDAI (level of fatigue; neck, back, or hip pain; pain and swelling in other joints; discomfort; severity of morning stiffness; duration of morning stiffness [see Supplementary Table S1 for description, available from the authors upon request]) and work-related issues, controlled by the disability benefits variable.

All comparisons were 2-sided and considered statistically significant when  $P < 0.05$ . Statistical analysis was performed using SPSS version 26.0.

## RESULTS

*Characteristics of Canadian participants.* Baseline characteristics of the 542 patients who completed the survey are shown in Table 1. Just over half of the respondents were employed (52.6%),

Table 1. Sociodemographic, diagnostic, and clinical characteristics of the analyzed Canadian population.

	Results <sup>a</sup>
<b>Sociodemographic</b>	
Age, yrs, mean (SD)	44.3 (13.9)
Sex, female	342 (63.1)
<b>Education level</b>	
No school completed	1 (0.2)
Primary school	5 (0.9)
High school	97 (17.9)
University/college	439 (81)
<b>Patient organization membership</b>	
BMI <sup>b</sup> , mean (SD)	27.8 (10.3)
<b>Work life</b>	
Job status, employed	285 (52.6)
<b>Occupation</b>	
Manual worker	66 (23.2)
Nonmanual worker	219 (76.8)
Work-related issues	439 (81)
Difficulty finding a job due to axSpA	330 (60.9)
Lost or left a job due to axSpA	25 (69.4)
Work choice determined by axSpA, n = 509 <sup>c</sup>	222 (43.6)
Formally recognized with disability and receiving benefit	162 (81)
<b>Lifestyle habits</b>	
Current smoker	110 (20.3)
<b>Diagnostic journey</b>	
Diagnostic delay, yrs, mean (SD)	9.0 (10.5)
HLA-B27 positivity	225 (69.9)
<b>Treatment</b>	
NSAID	449 (82.8)
csDMARD	197 (36.3)
bDMARD	318 (58.7)
<b>Psychological health</b>	
GHQ-12 (0-12), mean (SD)	4.0 (3.8)
Proportion with GHQ-12 $\geq 3$	288 (53.1)
<b>Disease outcomes</b>	
BASDAI (0-10), mean (SD)	5.3 (2.1)
Proportion with BASDAI $\geq 4$	391 (72.1)
Functional Limitation Index (0-54), mean (SD)	17.8 (11.5)
Spinal Stiffness Index (3-12), mean (SD)	7.4 (2.2)

Values are n (%) unless otherwise indicated. <sup>a</sup> N = 542 unless otherwise specified. <sup>b</sup> BMI is calculated as weight in kilograms divided by height in meters squared. <sup>c</sup> Work choice determined by axSpA includes "yes" or "no" responses only. axSpA: axial spondyloarthritis; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; bDMARD: biologic disease-modifying antirheumatic drug; csDMARD: conventional synthetic disease-modifying antirheumatic drug; GHQ-12: 12-item General Health Questionnaire; NSAID: nonsteroidal antiinflammatory drug.

of which most were in nonmanual jobs (76.8%). Four out of 5 respondents (80.9%) reported work-related issues and 60.9% of respondents experienced difficulty finding a job because of axSpA. Of the 36 patients who were unemployed (Table 2),<sup>25</sup> 69.4% had lost their jobs because of axSpA. In addition, 162 patients were formally recognized as having a disability and were receiving disability benefits (Table 1).

Of the 542 Canadian participants, 321 (59.2%) were considered part of the economically active labor force, whereas the remaining 221 (40.8%) were considered economically

Table 2. Employment status of the analyzed Canadian population.

Population	n/N	%	Breakdown by Employment Status	n	%
Active <sup>a</sup>	321/542	59.2	Employed	285	88.8
			Unemployed	36	11.2
Inactive <sup>b</sup>	221/542	40.8	Long-term disability	65	29.4
			Retired	53	24.0
			Early retirement	21	9.5
			Homemakers	21	9.5
			Student	19	8.6
			Short-term disability	18	8.1
			Other	24	10.9

<sup>a</sup> According to the International Labour Organization, the active population or labor force is the sum of employed and unemployed persons between 15 and 64 years of age. <sup>b</sup> The inactive population includes those who are neither employed (according to the International Labour Organization definition above) nor unemployed: people aged < 15 years, students and people of retirement age who are not working to supplement their education or pension, homemakers, and people unable to work.

inactive. Within the labor force, 285 (88.8%) were employed and 36 (11.2%) were unemployed (Table 2). To evaluate how problems at work affect people with axSpA, we analyzed a subsample of 339 patients who responded that they were part of the economically active labor force (ie, employed or unemployed), or received short-term disability (n = 18), as this best represents those who were working or had recently worked, and therefore could accurately report work-related issues. The most frequent work-related issues that affected at least 20% of respondents were absenteeism (49.3%), missing work for HCP visits (42.5%), difficulty fulfilling working hours (31.2%), reducing working hours (30.8%), taking disability leave (24.0%), and effect on professional advancement (20.5%; Supplementary Figure S1, available from the authors upon request).

Patients with a greater number of work-related issues had higher disease activity (6.1 vs 4.0;  $P < 0.001$ ), were more likely to experience moderate or severe spinal stiffness (83.3% vs 47.0%;  $P = 0.004$ ) and medium or high functional limitation (66.7% vs 23.5%;  $P = 0.002$ ), had greater psychological distress (5.8 vs 1.9;  $P < 0.001$ ), and experienced longer delays in diagnosis (10.2 vs 3.8;  $P < 0.001$ ; Table 3).

In the multiple linear regression analysis that included all work-related issues as independent variables (Model 1, n = 359), greater disease activity was associated with difficulty fulfilling working hours ( $\beta$  0.889, 95% CI 0.330-1.447), taking disability leave ( $\beta$  0.683, 95% CI 0.105-1.260), and absenteeism ( $\beta$  0.589, 95% CI 0.125-1.053). However, when granted disability benefits were factored in (Model 2, n = 136), the relationship between disease activity and these particular work-related issues was eliminated (Table 4).

All items of the BASDAI were positively correlated with work-related issues when the sample was uncontrolled for receiving disability benefits. After accounting for the receipt of disability benefit, only the level of fatigue and discomfort remained positively correlated with work-related issues (Table 5).

Using Model 1 (n = 359), work-related issues that were associated with poorer mental health were difficulty fulfilling working

hours ( $\beta$  2.342, 95% CI 1.413-3.272), resigning from a job ( $\beta$  1.538, 95% CI 0.373-2.703), effect of disease on professional advancement ( $\beta$  1.426, 95% CI 0.355-2.497), taking disability leave ( $\beta$  1.121, 95% CI 0.159-2.082), and missing work for HCP visits ( $\beta$  -0.906, 95% CI -1.689 to -0.123). Only the effect of disease on professional advancement remained as a work-related issue associated with poor mental health after performing the multiple linear regression using Model 2 (n = 136), which factored in the disability benefits variable (Table 6).

## DISCUSSION

Work-related issues were associated with worse patient-reported outcomes, both physical (BASDAI) and psychological (GHQ-12). The availability of disability benefits appears to relieve many of the work-related issues observed in Canadian patients with axSpA, with fatigue and discomfort remaining in patients receiving disability benefits. In addition, psychological distress because of lack of advancement in career persists even in those receiving disability benefits.

The results from this sample of Canadian patients with axSpA describe the associations between the disease and working life. First, the unemployment rate of the axSpA sample (11.2%), estimated according to the ILO standards,<sup>17</sup> was almost double the official unemployment rate in Canada, which was reportedly 5.7% during the period covered by the IMAS survey.<sup>25</sup> In addition, 69.4% of unemployed patients with axSpA declared they lost their job as a result of the condition. This figure contrasts markedly with that of the Spondyloarthritis Research Consortium of Canada (SPARCC) cohort, in which only 20% reportedly retired from their jobs because of AS.<sup>26</sup> This discrepancy could be related to differences in the periods covered by each study (SPARCC data were collected prior to the global economic crisis of 2007/2008) and the sampling method used (SPARCC patients had been closely monitored by rheumatologists for a year prior to data collection; thus, they were more likely than IMAS participants to have their disease controlled). Further, a high proportion of economically inactive Canadian patients with axSpA in our sample were on work disability,

Table 3. Factors associated with work-related issues in a subset of Canadian patients with axSpA who were either employed, unemployed, or on short-term disability.

	Number of Work-Related Issues in Patients Who Are Employed, Unemployed, or on Short-Term Disability <sup>a</sup>			P
	None	1-3	4-8	
<b>Sociodemographic</b>				
Age, yrs, mean (SD)	41.4 (12.7)	40.0 (10.8)	40.4 (11.3)	0.88
Sex	–	–	–	0.47
Female	18 (52.9)	159 (63.3)	35 (64.8)	–
Male	16 (47.1)	92 (36.7)	19 (35.2)	–
<b>Education level</b>				
Primary school	0 (0)	1 (0.6)	0 (0)	–
High school	7 (29.2)	39 (22)	11 (33.3)	–
University/college	17 (70.8)	137 (77.4)	22 (66.7)	–
<b>Patient organization membership</b>				
Yes	12 (35.3)	100 (39.8)	27 (50)	–
No	22 (64.7)	151 (60.2)	27 (50)	–
<b>Work life</b>				
Occupation, n = 285	–	–	–	0.56
Manual worker	8 (27.6)	46 (21.6)	12 (27.9)	–
Nonmanual worker	21 (72.4)	167 (78.4)	31 (72.1)	–
Monthly income, CAD \$, n = 298, mean (SD)	2761.9 (2154.7)	1991.8 (1327.6)	1723.6 (1082.4)	0.11
<b>Formally recognized with disability and receiving benefits, n = 104</b>				
Yes	4 (50)	57 (78.1)	16 (69.6)	–
No	4 (50)	16 (21.9)	7 (30.4)	–
<b>Diagnostic journey</b>				
Diagnostic delay, yrs, n = 328, mean (SD)	3.8 (4.9)	7.7 (8.4)	10.2 (11.9)	< 0.001
<b>Treatment</b>				
NSAID	24 (70.6)	205 (81.7)	48 (88.9)	0.10
csDMARD	13 (38.2)	77 (30.7)	21 (38.9)	0.39
bDMARD	21 (61.8)	139 (55.4)	37 (68.5)	0.19
<b>Psychological health</b>				
GHQ-12 (0-12), mean (SD)	1.9 (2.5)	3.6 (3.7)	5.8 (4.1)	< 0.001
<b>Disease outcomes</b>				
BASDAI (0-10), mean (SD)	4.0 (2.2)	5.2 (2.2)	6.1 (1.8)	< 0.001
Spinal stiffness, moderate or severe	16 (47)	177 (70.5)	45 (83.3)	0.004
Functional limitation, medium or high	8 (23.5)	110 (43.8)	36 (66.7)	0.002

Values are n (%) unless otherwise indicated. <sup>a</sup> N = 339, unless otherwise specified. Differences were considered statistically significant when *P* < 0.05. axSpA: axial spondyloarthritis; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; bDMARD: biologic disease-modifying antirheumatic drug; csDMARD: conventional synthetic disease-modifying antirheumatic drug; GHQ-12: 12-item General Health Questionnaire; NSAID: nonsteroidal anti-inflammatory drug.

with 8.1% on short-term disability (up to 6 months) and nearly 30% on long-term disability (lasting longer than 6 months).<sup>20</sup> In Europe, 29.2% of the economically inactive population of patients with axSpA were on temporary sick leave, whereas 28% were on permanent sick leave. Although it appears that a lower proportion of Canadian patients with axSpA are on short-term disability than their European counterparts, there are differences between Canada and Europe (and even among European member states) in how short-term disability and temporary sick leave are defined and when patients transition to longer-term or permanent benefits.<sup>20,22,27</sup>

Of the 200 (36.9%) Canadian patients with axSpA whose disability was formally assessed by an evaluation team, 81% reported recognition of a disability and subsequent benefits, compared with only 66% of European IMAS patients. This

result demonstrates a higher level of social coverage for people with disabilities in Canada compared with Europe.

According to Statistics Canada, 9.9% of the general population aged between 15 and 64 years has a recognized disability.<sup>28</sup> This is much lower than the finding that 29.9% (162 of 542) of Canadian patients with axSpA have a formally recognized disability, and it highlights the high burden of disability associated with axSpA.

On average, a small percentage (between 6% and 11%) of the Canadian workforce are absent from work throughout the year because of illness or disability, although rates may vary by occupation and geographic area.<sup>29</sup> In the Canadian IMAS survey, nearly half of patients with axSpA reported being absent from work during the past 12 months because of the condition, whereas nearly a third declared presenteeism issues. Prior Canadian-based

Table 4. Multiple regression analysis of work-related issues in relation to disease activity (BASDAI).

	Multiple Regression		Multiple Regression	
	Model 1 <sup>a</sup> , n = 359		Model 2 <sup>b</sup> , n = 136	
	$\beta$	95% CI	$\beta$	95% CI
Absenteeism	0.589	0.125 to 1.053	-0.170	-1.109 to 0.769
Missing work for healthcare provider visits	-0.375	-0.846 to 0.095	-0.044	-1.108 to 1.020
Difficulty fulfilling working hours	0.889	0.330 to 1.447	0.890	-0.187 to 1.968
Reducing working hours	0.527	-0.020 to 1.074	0.289	-0.795 to 1.374
Taking disability leave	0.683	0.105 to 1.260	0.123	-0.837 to 1.084
Resigning from a job	0.658	-0.042 to 1.358	0.283	-0.934 to 1.501
Changing work schedule	-0.314	-0.981 to 0.354	-0.575	-1.807 to 0.658
Effect on professional advancement	0.128	-0.515 to 0.772	0.326	-1.022 to 1.674
Receiving disability benefits	NA	NA	0.935	-0.071 to 1.941

<sup>a</sup>In Model 1, all work-related issues were included as independent variables. <sup>b</sup>Model 2 included the same variables as Model 1, with the addition of the disability benefits as a control variable. BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; NA: not applicable.

Table 5. Correlation between disease activity (BASDAI) and work-related issues.

BASDAI	Work-Related Issues			
	Uncontrolled for Disability Benefits, Correlation Coefficient, <i>r</i>		Controlled for Disability Benefits, Correlation Coefficient, <i>r</i>	
		<i>P</i>		<i>P</i>
Level of fatigue	0.255	< 0.001	0.217	0.03
Neck, back, or hip pain	0.285	< 0.001	0.179	0.07
Pain and swelling in other joints	0.186	0.001	0.031	0.76
Discomfort	0.257	< 0.001	0.196	0.047
Morning stiffness	0.229	< 0.001	0.108	0.28
Duration of morning stiffness	0.180	0.001	0.033	0.74
Total	0.282	< 0.001	0.162	0.10

BASDAI: Bath Ankylosing Spondylitis Disease Activity Index.

Table 6. Multiple regression analysis of work-related issues in relation to mental health (GHQ-12).

Work-Related Issue	Multiple Regression		Multiple Regression	
	Model 1 <sup>a</sup> , n = 359		Model 2 <sup>b</sup> , n = 136	
	$\beta$	95% CI	$\beta$	95% CI
Absenteeism	0.372	-0.400 to 1.144	-0.156	-1.705 to 1.392
Missing work for healthcare provider visits	-0.906	-1.689 to -0.123	-1.500	-3.255 to 0.255
Difficulty fulfilling working hours	2.342	1.413 to 3.272	0.885	-0.892 to 2.662
Reducing working hours	-0.081	-0.990 to 0.829	-0.366	-2.154 to 1.422
Taking disability leave	1.121	0.159 to 2.082	0.916	-0.668 to 2.500
Resigning from a job	1.538	0.373 to 2.703	1.623	-0.385 to 3.632
Changing work schedule	-0.338	-1.449 to 0.773	-1.450	-3.482 to 0.583
Effect on professional advancement	1.426	0.355 to 2.497	2.304	0.082 to 4.527
Receiving disability benefits	-	-	-0.592	-2.251 to 1.068

<sup>a</sup>In Model 1, all work-related issues were included as independent variables. <sup>b</sup>Model 2 included the same variables as Model 1, with the addition of the disability benefits as a control variable. GHQ-12: 12-item General Health Questionnaire.

research has highlighted the role of chronic conditions as predictors of both absenteeism and presenteeism.<sup>30</sup> These data should further underscore the specific contribution of axSpA to work impairment.

In the present study, an association was found between the number of work-related issues reported by patients and patient-reported outcomes related to disease severity, confirming

previous research on the subject.<sup>9</sup> As expected, the relationship was found to be progressive, with different work-related issues emerging as disease outcomes and psychological distress increased. The length of diagnostic delay was also related to work-related issues. Because of the cross-sectional nature of this study, it is not feasible to conclude whether poorer disease outcomes lead to problems at work and vice versa. However,

these data show that worse work outcomes may be related to poorer disease control and a decrease in quality of life in Canadian patients, and the need for disability benefits as a consequence.<sup>31</sup> A previous study aimed at understanding the effect of undiagnosed nr-axSpA and AS on work outcomes in a cohort of patients with long-lasting chronic low back pain found reduced work productivity to be associated with pain and physical functioning.<sup>32</sup> Therefore, it is rational to believe that optimal treatment of the disease, together with early diagnosis and timely treatment, could improve patients' work productivity.

In our study, we found no difference in work-related issues between manual and nonmanual workers. However, this may be a result of patients seeking work environments that are more suited to their health status (job choice was determined by axSpA for 43.6% of patients), as the survey questioned only patients on their current job characteristics. This is also supported by the numerically higher proportion of Canadian axSpA respondents completing university/college education (81%; Table 1) compared with the national average in 2020(60%).<sup>33</sup> A small study of 66 patients with axSpA published in 1997 found that manual and physically demanding jobs were important determinants of work withdrawal.<sup>34</sup> Together, these findings suggest that axSpA could represent a pressure that steers patients away from manual labor.

It is interesting to note that no sociodemographic characteristics were associated with work-related issues in Canada. However, in the European survey sample, sex and educational level were factors associated with problems at work.<sup>15</sup> It is unknown whether this difference between the 2 surveys is because of sampling bias. The Canadian sample is representative of the general Canadian population in terms of age.<sup>35</sup> In terms of sex, there is a higher representation of women, consistent with the increasing trend of axSpA diagnoses among female patients in Canada<sup>36</sup> and the fact that women are more likely than men to complete surveys.<sup>37</sup> However, patients with lower sociodemographic positions appear to be underrepresented by this survey, as the proportion of university/college-educated Canadian survey respondents was higher than the national average in 2020 (81% vs 60%),<sup>33</sup> and much higher than the European survey sample (48.1%).<sup>22</sup> Thus, 1 possible reason for the lack of relationship between sociodemographic factors could be the more homogenous distribution of education levels of the Canadian IMAS sample.

Although we could not extract significant gender-related results from the Canadian IMAS survey, an American registry study could. Gavigan et al<sup>38</sup> characterized employment status, work productivity, and bDMARD treatment in a predominantly female population of patients with axSpA in a real-world setting. The authors found that disease activity and overall health were more favorable in employed participants than in nonemployed participants. However, employed participants experienced a substantial deterioration in work productivity as a result of axSpA.<sup>38</sup> This emphasizes the major effect that axSpA can have on work productivity, particularly in females with axSpA, and the importance of regularly assessing a patient's disease activity and general health status.

Pharmacologic treatment is another factor that may influence work productivity in patients with axSpA. In their population-based study from southern Sweden, Wallman et al<sup>39</sup> showed that treating patients with nr-axSpA with a tumor necrosis factor inhibitor was associated with significant and sustained work improvement over 2 years. Therefore, treatment is an important factor for patients' health and work-life improvement. Further, such treatment can reduce the chronic pain suffered by patients, which is disabling and directly affects daily activities, family responsibilities, social relationships or, more specifically, work performance, as well as the appearance of feelings of helplessness, fear, or sadness.<sup>40</sup>

When examining which work-related issues were associated with an increase in disease activity, the most relevant were those related to absenteeism and presenteeism. However, this relationship disappears when controlling for disability benefits, indicating that disability benefits have an equalizing effect on patients with axSpA. That is, patients reporting poorer disease outcomes have an increased chance of receiving disability benefits, and those disability benefits seem to be effective in decreasing work-related issues. Benefits offered by Canadian programs do not correct all disease-related issues, as patients with axSpA continue to experience fatigue and discomfort. The specific ways in which disability benefits improve overall pain levels and stiffness as assessed by the BASDAI scale are unclear and may depend on the coverage of each patient's benefits and how they manage them. Nevertheless, disability benefits have a positive effect and help to improve self-reported disease outcomes and work impairment. Other factors associated with a higher number of work-related issues were moderate or severe spinal stiffness, medium or high functional limitation, and longer diagnostic delay.

The importance of disability benefits in Canadian patients' working life is limited not only to disease-related outcomes but also to mental health status. Missing work for HCP visits, difficulty fulfilling working hours, taking disability leave, resigning from a job, and effect on professional advancement were associated with poorer mental health. When these patients had disability benefits, only impairment of professional advancement was associated with poorer mental health. Despite the advantages of disability benefits and their role in improving the physical and psychological health of patients with axSpA in Canada, they are insufficient to ensure equal opportunities in the workplace.

As the results show, disability benefits have a positive effect on physical and mental health and workplace experience. However, workers may be concerned about disclosing their disease at work because of possible negative consequences, such as harassment or loss of employment. For this reason, working policies must be endorsed alongside awareness-raising initiatives on axSpA.

One of the strengths of this study is the use of validated scales for the evaluation of disease activity and mental health. A further strength is the use of statistical methods to evaluate the effect of disability benefits on patients with work-related issues.

This study has several limitations. First, using previously nonvalidated scales or indices to evaluate certain factors, such

as functional limitations in daily life and spinal stiffness, must be considered. The main reason for creating new indices was that, at the time of establishing the patient questionnaire, there was no scale that adequately measured patient-derived considerations, since the ASAS Health Index was validated at a later stage. The present study did not use a validated scale to assess associations between disease and work-related issues. The decision was made during the development of the questionnaire following discussions with patients who stated that the existing scales did not measure all aspects of their disease related to the work-related issues derived from the disease. Another limitation is not establishing a cause-and-effect relationship in a cross-sectional study. It is difficult to assess whether the presence of work-related issues is a result of increased disease activity and increased mental health issues, or if, on the contrary, the appearance of work-related issues worsens these factors. To establish causality, it would be necessary to carry out longitudinal studies that evaluate the evolution of physical and psychological variables over time and their relationship with labor productivity. The unemployment rate reported in Canadian patients with axSpA is a conservative estimate, since people with lower socio-demographic positions or physical disabilities may not have been fully represented because of the online nature of this survey.<sup>41</sup> Respondents recruited through the Canadian Spondylitis Association received no incentive for survey completion.

In conclusion, a high proportion of participants with axSpA in the IMAS survey in Canada are affected by work-related issues. These problems are associated with greater disease activity but are relieved in patients receiving disability benefits. Despite receiving disability benefits, people who are unable to advance in their professional careers report poorer mental health. Disability benefits would have positive implications on patients with axSpA in Canada and the topic deserves additional investigation to validate our findings. The value of such work obviously resides in ensuring equal opportunities in the workplace for every Canadian.

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