

Title: Work-related Issues, Physical and Psychological Burden in Canadian Axial Spondyloarthritis Patients. Results From the International Map of Axial Spondyloarthritis

Robert D. Inman MD,¹ Marco Garrido-Cumbrera PhD,^{2,3} Jonathan Chan MD, FRCPC,⁴ Martin Cohen MD, FRCPC,⁵ Artur J. de Brum-Fernandes MD, PhD, FRCPC,⁶ Wendy Gerhart BComm,⁷ Nigil Haroon MD, FRCPC,⁸ Algis V. Jovaisas MD, FRCPC,⁹ Gerald Major BA,⁷ Michael G. Mallinson MA Econ,¹⁰ Sherry Rohekar MD, FRCPC,¹¹ Patrick Leclerc PhD,¹² Proton Rahman MD¹³

¹Professor of Medicine and Immunology, Schroeder Arthritis Institute, University Health Network, University of Toronto, Toronto, Ontario, Canada.

²Professor, Health & Territory Research (HTR), Universidad de Sevilla, Seville, Spain.

³Scientific Advisor, Axial Spondyloarthritis International Federation (ASIF), London, United Kingdom.

⁴Assistant Professor, Department of Medicine, Division of Rheumatology, University of British Columbia; Arthritis Research Canada, Vancouver, British Columbia, Canada.

⁵West Island Rheumatology Research Associates, Montréal, Québec, Canada.

⁶Professor, Department of Medicine, Université de Sherbrooke, Sherbrooke, Québec, Canada.

⁷Canadian Spondylitis Association, Phelpston, Ontario, Canada.

⁸Co-director, Spondylitis Program, Schroeder Arthritis Institute, University Health Network; Associate Professor, University of Toronto, Ontario, Canada.

⁹Adjunct Professor of Medicine, Department of Medicine, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada.

¹⁰Axial spondyloarthritis patient and volunteer; past president, Canadian Spondylitis Association; past secretary, Axial Spondyloarthritis International Federation.

This article has been accepted for publication in The Journal of Rheumatology following full peer review. This version has not gone through proper copyediting, proofreading and typesetting, and therefore will not be identical to the final published version. Reprints and permissions are not available for this version. Please cite this article as doi: 10.3899/jrheum.220596. This accepted article is protected by copyright. All rights reserved.

¹¹Associate Professor, Division of Rheumatology, Western University, London, Ontario, Canada.

¹²Novartis Canada, Montréal, Canada

¹³Professor of Medicine, Department of Medicine, Memorial University, St. John's, Newfoundland, Canada.

Robert D. Inman ORCID ID 0000-0002-4750-1422

Marco Garrido-Cumbrera ORCID ID 0000-0001-9727-1189

Jonathan Chan ORCID ID 0000-0002-1837-5340

Algis V. Jovaisas ORCID ID 0000-0003-4887-0980

Nigil Haroon ORCID ID 0000-0003-3210-4771

Sherry Rohekar ORCID ID 0000-0001-8949-4198

Proton Rahman ORCID ID 0000-0002-4521-2029

Key Indexing Terms: Spondyloarthritis, ankylosing spondylitis, employment, burden of illness, patient reported outcomes

Support: This study was funded by Novartis Pharma AG.

Conflicts of interest:

Robert D. Inman received consulting fees from AbbVie, Janssen, Lilly, Novartis, Sandoz, and UCB.

Marco Garrido-Cumbrera has a research collaboration with and provides services to Novartis Pharma AG.

Jonathan Chan received honoraria and/or participated in advisory boards for AbbVie, Amgen, BMS, Celgene, Eli Lilly, Fresenius Kabi, Gilead, Janssen, Merck, Novartis, Organon, Pfizer, Roche, Sandoz, Viatrix, and UCB.

Downloaded on April 19, 2024 from www.jrheum.org

Martin Cohen received honoraria/consulting fees and/or participated in advisory board/speakers bureau events for AbbVie, Amgen, Celgene, Celltrion, Fresenius Kabi, Gilead, Janssen, Lilly, Novartis, Organon, Pfizer, Roche, Sandoz, Sanofi, and UCB.

Artur J. de Brum-Fernandes has no conflicts of interest.

Wendy Gerhart received honoraria and/or participated in advisory boards for AbbVie, Amgen, BMS, Celgene, Eli Lilly, Fresenius Kabi, Gilead, Janssen, Merck, Novartis, Pfizer, Roche, Sandoz, and UCB.

Nigil Haroon has no conflicts of interest.

Algis V. Jovaisas received honoraria and participated in advisory boards for Amgen, Eli Lilly, Novartis, Pfizer, Sandoz, and Sanofi.

Gerald Major has no conflicts of interest.

Michael G. Mallinson received honoraria and/or participated in advisory boards for AbbVie, Janssen, Novartis, and Pfizer.

Sherry Rohekar received honoraria and/or participated in advisory boards for AbbVie, Amgen, BMS, Celgene, Eli Lilly, Fresenius Kabi, Gilead, Janssen, Merck, Novartis, Pfizer, Roche, Sandoz, and UCB.

Patrick Leclerc is an employee of Novartis Canada.

Proton Rahman received consulting fees from Abbott, AbbVie, Amgen, Bristol-Myers Squibb, Celgene, Eli Lilly, Janssen, Novartis, and Pfizer, and has also received research grants from Janssen and Novartis.

Corresponding authors:

Professor Marco Garrido-Cumbrera PhD, Health & Territory Research (HTR), Universidad de Sevilla, Centro Internacional, Avenida de la Ciudad Jardín, 20-22, 41005 Seville, Spain.

E-mail: mcumbrera@us.es

Robert D. Inman MD, Schroeder Arthritis Institute, Toronto Western Hospital, 399 Bathurst Street Toronto, Ontario, M5T 2S8, Canada.

E-mail: Robert.Inman@uhn.ca

Statement of ethics and consent: The Canadian adaptation of the IMAS Patient Survey and its French translation were approved by Advarra 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.

Short running head: AxSpA work-related issues

Accepted Article

ABSTRACT

Objective: To identify factors associated with work-related issues in Canadian patients with axial spondyloarthritis (axSpA).

Methods: Data from 542 Canadian patients who participated in the International Map of Axial Spondyloarthritis (IMAS) online survey were analysed. 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: Mean \pm SD age of surveyed participants was 44.3 ± 13.9 years, 81.0% were university educated, and 52.6% employed. A substantial proportion had high disease activity (BASDAI, 72.1%) and psychological distress (GHQ-12, 53.1%); 81.1% had work-related issues. This study analysed 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 one 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 ($r=0.217$; $p=0.028$) and discomfort ($r=0.196$; $p=0.047$). Difficulty fulfilling working hours ($B=2.342$; 95% CI, 1.413 to 3.272) and impact on professional advancement ($B=1.426$; 95% CI, 0.355 to 2.497) were associated with psychological distress. In the presence of disability benefits, only the impact on professional advancement remained ($B=2.304$; 95% CI, 0.082 to 4.527).

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

INTRODUCTION

Axial spondyloarthritis (axSpA) is a chronic inflammatory disease that affects the axial skeleton and involves the sacroiliac and spinal joints.¹ Inflammatory pain and spinal stiffness, with the consequent loss of mobility and disability, are the main features of axSpA.^{2,3} Thus, axSpA has a great impact on many aspects of life, including work,⁴ and has been shown to reduce the ability to work⁵ and impair work productivity.⁶

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

Furthermore, 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.⁹ According to the joint recommendations developed by the Assessment of SpondyloArthritis international Society (ASAS) and the European Alliance of Associations for Rheumatology (EULAR), this loss of productivity must be considered when evaluating the cost-effectiveness of treatments.¹⁰

In addition to frequent problems at work,¹¹ patients with axSpA experience difficulty progressing in their professional careers^{11,12} that can trigger crises, which may increase the likelihood of unemployment.^{13,14} Since problems at work tend to worsen over time,⁶ 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 non-selected patients with self-reported axSpA conducted in 21 countries and endorsed by the Axial Spondyloarthritis International Federation. According to the European survey of 2,846 non-selected patients, having axSpA requires patients to

make workplace adaptations (43.9%), influences job choice (45.7%), and makes finding a job difficult (74.1%).¹⁵

IMAS aims to capture 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 axSpA patients 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.

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 or non-radiographic axSpA) and axSpA-related visit to a healthcare provider (HCP) in the 12 months prior to survey completion.

Survey

The Canadian IMAS survey was adapted from the original Spanish Atlas of Axial Spondyloarthritis 2017.¹⁶ 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 axSpA patients. The final Canadian survey consisted of 109 items relating to 13 different areas: sociodemographic

Accepted Article

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 1). Participants in the IMAS Canada survey completed the questionnaire in English or French via 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 classification of economically active and inactive persons according to working status was used to establish the employment rates of the Canadian survey population.^{17,18} The active population or labour 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 International Labour Organization 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 (i.e., employed or unemployed persons between the ages of 15 and 64 years) or part of the economically inactive population (i.e., anyone not meeting the definition for economically active population).¹⁹ In Canada, short-term disability is available for up to 6 months. If the disability prevents the employee from working for longer than 6 months, then they can access a long-term disability plan.²⁰

A section of the IMAS questionnaire addressed work-related issues due 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 (CEADE) 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 analysed 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 reported 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 fulfil my working hours
- I have occasionally changed my work shift
- My professional life has suffered (e.g., missed promotion)
- I had to give up my previous job
- Other situation

Other Patient-Reported Outcomes

The survey also captured disease activity, spinal stiffness, functional limitation, and psychological distress using the following instruments:

1. Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), which was used to measure disease activity, with a possible score ranging between 0 and 10²¹
2. Spinal Stiffness Index, which was used to capture the degree of stiffness experienced by patients in the spinal column, distinguishing between the cervical, dorsal, and lumbar areas

3. Functional Limitation Index, which was developed specifically for IMAS and used to assess the degree of functional limitation in 18 daily life activities²²
4. The 12-item General Health Questionnaire (GHQ-12), which was used to evaluate psychological distress using 12 items.²³ For the present study, these values were transformed into a dichotomous score (0-0-1-1), called the GHQ score. Scores of 3 or more indicated psychological distress²⁴

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. Chi-square test was used to evaluate the differences in work-related issues (none, 1–3, or 4–8 issues) and sex (male, female), education (primary school, secondary school, and college/university), patient organization membership (yes/no), occupation (manual worker, non-manual worker), receiving disability benefits (yes/no), use of nonsteroidal anti-inflammatory drug (NSAID; yes/no), disease-modifying antirheumatic drug (DMARD; yes/no), or biologic (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 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 1 for description]) and work-related issues, controlled by the disability benefits variable.

All comparisons were two-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%), of which most were in non-manual jobs (76.8%). Four out of five respondents (80.9%) reported work-related issues and 60.9% of respondents experienced difficulty finding a job due to axSpA. Of the 36 patients who were unemployed (Table 2), 25 (69.4%) had lost their jobs due to 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 labour force while the remaining 221 (40.8%) were considered economically inactive. Within the labour force, 285 (88.8%) were employed and 86 (11.2%) were unemployed (Table 2). To evaluate how problems at work affect people with axSpA, we analysed a subsample of $n=339$ patients who responded that they were part of the economically active labour force (i.e., 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 impact on professional advancement (20.5%; Supplementary Figure 1).

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 ($B=0.889$, 95% CI, 0.330 to 1.447), receiving disability benefits ($B=0.683$, 95% CI, 0.105 to 1.260), and absenteeism ($B=0.589$, 95% CI, 0.125 to 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 ($B=2.342$; 95% CI, 1.413 to 3.272), resigning from a job ($B=1.538$; 95% CI, 0.373 to 2.703), impact of disease on professional advancement ($B=1.426$; 95% CI, 0.355 to 2.497), taking disability leave ($B=1.121$; 95% CI, 0.159 to 2.082), and missing work for healthcare provider visits ($B=-0.906$; 95% CI, -1.689 to -0.123). Only impact of disease on professional advancement remained as a work-related issue associated with poor mental health after performing the multiple linear

Accepted Article

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 due to lack of advancement in career persists even in those receiving disability benefits.

The results from this sample of Canadian axSpA patients describe the associations between the disease and working life. Firstly, the unemployment rate of the axSpA sample (11.2%), estimated according to the International Labour Organization standards,¹⁷ was almost double the official unemployment rate in Canada, which was reportedly 5.7% during the period covered by the IMAS survey.²⁵ In addition, 69.4% of unemployed axSpA patients declared they lost their job due to 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 due to AS.²⁶ 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, and thus, were more likely than IMAS participants to have their disease controlled). Furthermore, a high proportion of economically inactive Canadian axSpA patients in our sample were on work disability, with 8.1% on short-term disability (up to 6 months) and nearly 30% on long-term disability (lasting longer than 6 months).²⁰ In Europe, 29.2% of the economically inactive axSpA patient population was on temporary sick leave, while 28.0% was on permanent sick leave. While it appears that a lower proportion of Canadian axSpA patients 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.^{20,22,27}

Of the 200 (36.9%) Canadian axSpA patients whose disability was formally assessed by an evaluation team, 81.0% reported receiving a recognized disability and subsequent benefits, compared with only 66.0% 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.²⁸ This is much lower than the finding that 29.9% (162/542) of Canadian axSpA patients 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 due to illness or disability; although, rates may vary by occupation and geographic area.²⁹ In the Canadian IMAS survey, nearly half of axSpA patients reported being absent from work during the past 12 months due to the condition, while nearly a third declared presenteeism issues. Prior Canadian-based research has highlighted the role of chronic conditions as predictors of both absenteeism and presenteeism.³⁰ 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.⁹ 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. Due to 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.³¹ A recent study aimed at understanding the impact of undiagnosed non-radiographic-axSpA and ankylosing spondylitis 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.³² 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 non-manual workers. However, this may be due to 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 only questioned 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 (70%).³³ A small study of 66 axSpA patients published in 1997 found that manual and physically demanding jobs were important determinants of work withdrawal.³⁴ Together, these findings suggest that axSpA disease could represent a pressure that steers patients away from manual labour.

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.¹⁵ It is unknown whether this difference between the two surveys is due to sampling bias. The Canadian sample is representative of the general Canadian population in terms of age.³⁵ In terms of sex, there is a higher representation of women, consistent with the increasing trend of axSpA diagnoses amongst female patients in Canada³⁶ and the fact that women are more likely

than men to complete surveys.³⁷ However, patients with lower sociodemographic positions appear to be under-represented by this survey, as the proportion of university/college-educated Canadian survey respondents was higher than the national average (81% vs 70%),³⁸ and much higher than the European survey sample (48.1%).²² Thus, one possible reason for the lack of relationship between sociodemographic factors could be the more homogenous distribution of education levels of the Canadian IMAS sample.

While we could not extract significant gender-related results from the Canadian IMAS survey, an American registry study could. Gavigan et al. (2022)³⁹ characterized employment status, work productivity, and bDMARD treatment in a predominantly female population of axSpA patients in a real world setting. The authors found that disease activity and overall health were more favourable in employed participants than in not employed participants. However, employed participants experienced a substantial deterioration in work productivity due to axSpA.³⁹ This emphasizes the major impact 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. (2017)⁴⁰ showed that treating non-radiographic axSpA patients with a tumour necrosis factor inhibitor was associated with significant and sustained work improvement over 2 years. Therefore, treatment is an important factor for patients' health and their work life improvement. Furthermore, 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.⁴¹

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 axSpA patients. 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 programmes do not correct all disease-related issues, as axSpA patients 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 impact 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's working life is not only limited to disease-related outcomes, but also to mental health status. Missing work for healthcare provider visits, difficulty fulfilling working hours, taking disability leave, resigning from a job, and impact 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 axSpA patients in Canada, they are insufficient to ensure equal opportunities in the workplace.

As the results show, disability benefits have a positive impact 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.

Accepted Article

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 non-validated 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 captured 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 capture 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 due to increased disease activity and increased mental health, 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 labour productivity. The unemployment rate reported in Canadian axSpA patients is a conservative estimate, since people with lower sociodemographic positions or physical disabilities may not have been fully captured due to the online nature of this survey.⁴² The rate of survey completion was comparable to surveys of a similar length conducted by Ipsos SA (personal communication) and was not considered a study limitation. Respondents recruited through the Canadian Spondylitis Association received no incentive for survey completion.

CONCLUSIONS

A high proportion of axSpA participants in the IMAS survey in Canada are impacted 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 axSpA patients 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.

ACKNOWLEDGEMENT

Editing and proofreading support was provided by Georghia Michael, PhD, MWC and funded by Novartis Canada.

REFERENCES

1. Sieper J, Poddubnyy D. Axial spondyloarthritis. *Lancet* 2017;390:73-84.
2. López-Medina C, Garrido-Castro JL, Castro-Jiménez J, et al. Evaluation of quality of life in patients with axial spondyloarthritis and its association with disease activity, functionality, mobility, and structural damage. *Clin Rheumatol* 2018;37:1581-8.
3. Gyurcsik ZN, András A, Bodnár N, Szekanez Z, Szántó S. Improvement in pain intensity, spine stiffness, and mobility during a controlled individualized physiotherapy program in ankylosing spondylitis. *Rheumatol Int* 2012;32:3931-6.
4. Packham J. Optimizing outcomes for ankylosing spondylitis and axial spondyloarthritis patients: a holistic approach to care. *Rheumatology (Oxford)* 2018;57:vi29-vi34.
5. Nadin T, Wallis D, Holroyd CR, D'Angelo S, Walker-Bone K, Edwards CJ. Amongst patients taking biologic therapies for axial spondyloarthritis, which factors are associated with work non-participation? *BMC Musculoskelet Disord* 2020;21:209.
6. Macfarlane GJ, Shim J, Jones GT, Walker-Bone K, Pathan E, Dean LE. Identifying persons with axial spondyloarthritis at risk of poor work outcome: Results from the British Society for Rheumatology Biologics Register. *J Rheumatol* 2019;46:145-52.
7. van Lunteren M, Ez-Zaitouni Z, Fongen C, et al. Disease activity decrease is associated with improvement in work productivity over 1 year in early axial spondyloarthritis (SPondyloArthritis Caught Early cohort). *Rheumatology (Oxford)* 2017;56:2222-8.
8. Cakar E, Taskaynatan MA, Dincer U, Kiralp MZ, Durmus O, Ozgül A. Work disability in ankylosing spondylitis: Differences among working and work-disabled patients. *Clin Rheumatol* 2009;28:1309-14.
9. Espahbodi S, Bassett P, Cavill C, Freeth M, Hole J, Sengupta R. Fatigue contributes to work productivity impairment in patients with axial spondyloarthritis: A cross-sectional UK study. *Clin Exp Rheumatol* 2017;35:571-8.
10. van der Heijde D, Ramiro S, Landewé R, et al. 2016 update of the ASAS-EULAR management recommendations for axial spondyloarthritis. *Ann Rheum Dis* 2017;76:978-91.
11. van Der Weijden MAC, Boonen A, Van Der Horst-Bruinsma IE. Problems in work participation and resource use should not be underestimated in patients with early spondyloarthritis. *J Rheumatol* 2014;41:2413-20.
12. Ramonda R, Marchesoni A, Carletto A, et al. Patient-reported impact of spondyloarthritis on work disability and working life: The ATLANTIS survey. *Arthritis Res Ther* 2016;18:78.
13. Haglund E, Petersson IF, Bremander A, Bergman S. Predictors of presenteeism and activity impairment outside work in patients with spondyloarthritis. *J Occup Rehabil* 2015;25:288-95.
14. de Hooge M, Ramonda R, Lorenzin M, et al. Work productivity is associated with disease activity and functional ability in Italian patients with early axial spondyloarthritis: An observational study from the SPACE cohort. *Arthritis Res Ther* 2016;18:265.

15. Garrido-Cumbrera M, Bundy C, Navarro-Compán V, et al. Patient-reported impact of axial spondyloarthritis on working life: Results from the EMAS survey. *Arthritis Care Res (Hoboken)* 2021;73:1826-33.
16. Garrido-Cumbrera M, Gálvez-Ruiz D, Chacón García J, et al. Atlas of axial spondyloarthritis in Spain 2017. Profile of the disease. Madrid, Spain: Max Weber Institute; 2017 April.
17. International Labour Organization. Labour force. [Internet. Accessed October 27, 2021.] Available from: <https://ilostat.ilo.org/topics/population-and-labour-force/>
18. Randall LE. Employment statistics: A national survey in public school physical education. *J Phys Educ Recreat Dance* 1986;57:1:23-9.
19. Pasteels JM. ILO projections of the economically active population: Revised methodology of the 2011 Edition. Geneva: International Labour Organization (ILO), Department of Statistics, 2012 April. (ISBN: 9789221262220).
20. Government of Canada. EI sickness benefits: What these benefits offer [Internet. Accessed October 6, 2021.] Available from: <https://www.canada.ca/en/services/benefits/ei/ei-sickness.html>
21. Garrett S, Jenkinson T, Kennedy LG, Whitelock H, Gaisford P, Calin A. A new approach to defining disease status in ankylosing spondylitis: the Bath Ankylosing Spondylitis Disease Activity Index. *J Rheumatol* 1994;21:2286-91.
22. Garrido-Cumbrera M, Poddubnyy D, Gossec L, et al. The European Map of Axial Spondyloarthritis: Capturing the patient perspective—an analysis of 2846 patients across 13 countries. *Curr Rheumatol Rep* 2019;21:19.
23. Goldberg D, Williams P. A user's guide to the General Health Questionnaire. London: NFER-NELSON, 1988.
24. Cano A, Sprafkin RP, Scaturo DJ, Lantinga LJ, Fiese BH, Brand F. Mental health screening in primary care: A comparison of 3 brief measures of psychological distress. *Prim Care Companion J Clin Psychiatry* 2001;3:206-10.
25. Statistics Canada. Supplementary unemployment rates, annual. 2016 [Internet. Accessed October 27, 2021.] Available from: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410007801>
26. Rohekar S, Pope J. Assessment of work disability in seronegative spondyloarthritis. *Clin Exp Rheumatol* 2010;28:35-40.
27. Spasova S, Bouget D, Vanhercke B. Sick pay and sickness benefit schemes in the European Union. Background report for the Social Protection Committee's In-depth Review on sickness benefits. Brussels: European Social Policy Network (ESPN), European Commission, 2016 December.
28. Statistics Canada. Labour force status for adults with disabilities by disability type [Internet. Accessed October 27, 2021.] Available from: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310034801>
29. Statistics Canada. Work absence rates [Internet. Accessed October 27, 2021.] Available from: <https://www150.statcan.gc.ca/n1/en/catalogue/71-211-X>

30. MacGregor JN, Cunningham JB, Caverley N. Factors in absenteeism and presenteeism: Life events and health events. *Manag Res News* 2008;31:607-15.
31. Shaikh SA. Ankylosing spondylitis: recent breakthroughs in diagnosis and treatment. *J Can Chiropr Assoc* 2007;51:249-60.
32. van Hooft, L., Boonen, A., Hazes, J., et al. Work outcome in yet undiagnosed patients with non-radiographic axial spondyloarthritis and ankylosing spondylitis; results of a cross-sectional study among patients with chronic low back pain. *Arthritis Res Ther* 2017;19:1-143.
33. Organisation for Economic Co-operation and Development (OECD). Educational attainment and labour-force status [Internet. Accessed February 2, 2022.] Available from: https://stats.oecd.org/Index.aspx?DataSetCode=EAG_NEAC
34. Boonen A, Chorus A, Miedema H, et al. Withdrawal from labour force due to work disability in patients with ankylosing spondylitis. *Ann Rheum Dis* 2001;60:1033-9.
35. Statistics Canada. Age and sex highlight tables, 2016 Census [Internet. Accessed October 27, 2021.] Available from: <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/hlt-fst/as/index-eng.cfm>
36. Haroon NN, Paterson JM, Li P, Haroon N. Increasing proportion of female patients with ankylosing spondylitis: A population-based study of trends in the incidence and prevalence of AS. *BMJ Open* 2014;4:e006634.
37. Porter SR, Whitcomb ME. Non-response in student surveys: The Role of Demographics, Engagement and Personality. *Res High Educ* 2005;46:127-52.
38. Organisation for Economic Co-operation and Development (OECD). Educational attainment and labour-force status. [Internet. Accessed October 27, 2021.] Available from: <https://stats.oecd.org/>
39. Gavigan, K., Nowell, W. B., Hunter, T et al. Employment, work productivity, and biologic treatments in self-reported axial spondyloarthritis: A cross-sectional study in a female predominant population from the ArthritisPower Registry. *Rheumatol Ther* 2022;9:663-77.
40. Wallman, J. K., Jöud, A., Olofsson, T., et al. Work disability in non-radiographic axial spondyloarthritis patients before and after start of anti-TNF therapy: A population-based regional cohort study from southern Sweden. *Rheumatology (Oxford)* 2017;56:716-24.
41. Bagcivan, G., Cinar, F. I., Cinar, et al. Living with pain in ankylosing spondylitis: A qualitative study. *Contemp Nurse* 2015;51:135-47.
42. Lallukka T, Pietiläinen O, Jäppinen S, Laaksonen M, Lahti J, Rahkonen O. Factors associated with health survey response among young employees: A register-based study using online, mailed and telephone interview data collection methods. *BMC Public Health* 2020;20:184.

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

Variables	Mean \pm SD or n (%)
Sociodemographic	
Age, years, mean \pm SD	44.3 \pm 13.9
Sex, female (%)	342 (63.1)
Education level	
No school completed	1 (0.2)
Primary school	5 (0.9)
High school	97 (17.9)
University/College	439 (81.0)
Patient organization membership	227 (41.9)
Body mass index (kg/m ²)	27.8 \pm 10.3
Work life	
Job status, employed	285 (52.6)
Occupation	
Manual worker	66 (23.2)
Non-manual worker	219 (76.8)
Work-related issues	439 (81.0)
Difficulty finding a job due to axSpA	330 (60.9)
Lost or left a job due to axSpA	25 (69.4)
Influence on work choice due to axSpA, n=509	222 (43.6)
Formally recognized with disability and receiving benefit	162 (81.0)
Lifestyle habits	
Current smoker	110 (20.3)
Diagnostic journey	
[†] Diagnostic delay, years	9.0 \pm 10.5
HLA-B27 positivity	225 (69.9)
Treatment	
NSAID	449 (82.8)
DMARD	197 (36.3)
Biologic	318 (58.7)
Psychological health	
[‡] GHQ-12 (0–12)	4.0 \pm 3.8
Proportion with GHQ-12 \geq 3	288 (53.1)
Disease outcomes	
[§] BASDAI (0–10)	5.3 \pm 2.1
Proportion with BASDAI \geq 4	391 (72.1)

¶Functional Limitation Index (0–54)	17.8 ± 11.5
Spinal Stiffness Index (3–12)	7.4 ± 2.2

N=542 unless otherwise specified.

†The diagnostic delay variable (calculated as the difference between age at diagnosis and age at first symptoms) was ≥ 0 years in 524 participants.

‡GHQ-12, which evaluates mental health, was transformed into a dichotomous score (0-0-1-1) to eliminate bias resulting from the tendency of respondents choosing answers 1 and 4 or 2 and 3 in the 4-point Likert scale. Scores ≥ 3 indicated psychological distress.²³

§BASDAI is a validated self-administered questionnaire assessing disease activity between 0 (no activity) and 10 (maximum activity).²¹

¶The Functional Limitation Index, explicitly developed for IMAS, assessed the degree of functional limitation in 18 daily life activities. Scores ranged between 0 and 54, indicating low (0–17), medium (18–36), and high limitation (37–54).²²

BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; DMARD: disease-modifying antirheumatic drug; GHQ-12: 12-item General Health Questionnaire; HLA-B27: human leukocyte antigen B27; IMAS: International Map of Axial Spondyloarthritis; NSAID: nonsteroidal anti-inflammatory drug.

Table 2. Employment status of the analysed Canadian population.

Population	n/N	%	Breakdown by employment status	n	%
Active*	321/542	59.2	Employed	285	88.8
			Unemployed	36	11.2
Inactive†	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

*According to the International Labour Organization, the active population or labour 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 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.

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

Variable	Number of work-related issues in patients who are employed, unemployed, or on short-term disability			p
	None	1–3	4–8	
Sociodemographic				
Age, years	41.4 ± 12.7	40.0 ± 10.8	40.4 ± 11.3	0.878
Sex				0.466
Female	18 (52.9)	159 (63.3)	35 (64.8)	
Male	16 (47.1)	92 (36.7)	19 (35.2)	
Education level				0.640
Primary school	0 (0.0)	1 (0.6)	0 (0.0)	
High school	7 (29.2)	39 (22.0)	11 (33.3)	
University/College	17 (70.8)	137 (77.4)	22 (66.7)	
Patient organization membership				0.300
Yes	12 (35.3)	100 (39.8)	27 (50.0)	
No	22 (64.7)	151 (60.2)	27 (50.0)	
Work life				
Occupation, n=285				0.561
Manual worker	8 (27.6)	46 (21.6)	12 (27.9)	
Non-manual worker	21 (72.4)	167 (78.4)	31 (72.1)	
Monthly income, CAD, n=298	2,761.9 ± 2,154.7	1,991.8 ± 1,327.6	1,723.6 ± 1,082.4	0.112
Formally recognized with disability and receiving benefits, n=104				0.195
Yes	4 (50.0)	57 (78.1)	16 (69.6)	
No	4 (50.0)	16 (21.9)	7 (30.4)	
Diagnostic journey				
Diagnostic delay, years, n=328	3.8 ± 4.9	7.7 ± 8.4	10.2 ± 11.9	<0.001
Treatment				
NSAID	24 (70.6)	205 (81.7)	48 (88.9)	0.096
DMARD	13 (38.2)	77 (30.7)	21 (38.9)	0.391
Biologic	21 (61.8)	139 (55.4)	37 (68.5)	0.186
Psychological health				
GHQ-12 (0–12)	1.9 ± 2.5	3.6 ± 3.7	5.8 ± 4.1	<0.001
Disease outcomes				
BASDAI (0–10)	4.0 ± 2.2	5.2 ± 2.2	6.1 ± 1.8	<0.001
Spinal stiffness, moderate or severe	16 (47.0)	177 (70.5)	45 (83.3)	0.004
Functional limitation, medium or high	8 (23.5)	110 (43.8)	36 (66.7)	0.002

Results are expressed as mean \pm SD or n (%). n=339, unless otherwise specified.

Differences were considered statistically significant when $p < 0.05$. BASDAI: Bath

Ankylosing Spondylitis Disease Activity Index; CAD: Canadian dollars; DMARD:

disease-modifying antirheumatic drug; GHQ-12: 12-item General Health Questionnaire;

HLA-B27: human leukocyte antigen B27; NSAID: nonsteroidal anti-inflammatory drug.

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

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

*In Model 1, all work-related issues were included as independent variables.

†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.

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

BASDAI	Work-related issues			
	Uncontrolled for disability benefits, correlation coefficient, r	p	Controlled for disability benefits, correlation coefficient, r	p
Level of fatigue	0.255	<0.001	0.217	0.028
Neck, back, or hip pain	0.285	<0.001	0.179	0.070
Pain and swelling in other joints	0.186	0.001	0.031	0.760
Discomfort	0.257	<0.001	0.196	0.047
Morning stiffness	0.229	<0.001	0.108	0.278
Duration of morning stiffness	0.180	0.001	0.033	0.741
Total	0.282	<0.001	0.162	0.103

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

*In Model 1, all work-related issues were included as independent variables.

†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.