Rheumatology, 2024, **00**, 1–9
https://doi.org/10.1093/rheumatology/keae346
Advance access publication 27 June 2024
Original Article

British Society for Rheumatology RHEUMATOLOGY OXFORD

Clinical science

Do quality of life and work productivity change in early axial spondyloarthritis and non-axial spondyloarthritis patients after 2 years?

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Abstract

Objective: The objective of this study was to compare health-related quality of life (HRQoL) and work productivity in axial SpA (axSpA) and non-axSpA patients with chronic back pain of <2 years.

Methods: Baseline and 2-year data for patients included in the SPondyloArthritis Caught Early cohort were analysed. HRQoL was assessed by the physical (PCS) and mental component summary (MCS) scores of the 36-Item Short-Form Health Survey, and presenteeism, absenteeism, work productivity loss (WPL) and activity impairment (AI) by the Work Productivity and Activity Impairment questionnaire. Linear or zero-inflated negative binomial regression was conducted to compare 2-year outcomes between groups (axSpA and non-axSpA), adjusting for the baseline value, sex, age and use of NSAIDs.

Results: There were 265 axSpA and 108 non-axSpA patients: males 52% *vs* 26%, mean age 29 *vs* 31 years, respectively. At baseline, non-axSpA patients showed worse PCS (mean 28.6 axSpA *vs* 26.6 non-axSpA), presenteeism (31.1% *vs* 37.3%), absenteeism (8.2% *vs* 10.3%), WPL (34.7% *vs* 44.1%) and AI (39.6% *vs* 48.5%). MCS was not impaired in either group. After 2 years, PCS, presenteeism, WPL and AI significantly improved in both groups; absenteeism only improved in axSpA. In multivariable analysis, axSpA (*vs* non-axSpA) was associated with 22% less WPL [incidence rate ratio (95% CI): 0.78 (0.62; 0.98)] and 18% less AI [0.82 (0.69; 0.97)].

Conclusion: HRQoL and work productivity are more impaired in non-axSpA (*vs* axSpA) at baseline and also after 2 years. Although most outcomes improve in both groups, axSpA is associated with larger reductions in WPL and AI.

Keywords: axial spondyloarthritis, chronic back pain, quality of life, work productivity.

Rheumatology key messages

- Quality of life and work productivity are more impaired in non-axial SpA patients (*vs* axSpA).
- After 2 years, quality of life and work productivity significantly improved in both axSpA and non-axSpA.
- AxSpA (*vs* non-axSpA) is associated with larger improvements in work productivity and activity impairment.

Received: 4 April 2024. **Accepted:** 31 May 2024

Introduction

Axial SpA (axSpA) is a chronic inflammatory rheumatic musculoskeletal disease that predominantly affects the axial skeleton, with chronic back pain (CBP) being its main feature. It usually starts in early adulthood, in most patients before the age of 45 years, a period in life characterized by graduation and the start of a career and a family [1, 2].

AxSpA often leads to physical impairment and disability [3], affecting health-related quality of life (HRQoL) and work productivity. Compared with the general population, patients with axSpA have demonstrated worse HRQoL and more work productivity loss (WPL), reflecting absence from work due to the disease (absenteeism) and loss of efficiency while at work (presenteeism), which is also a predictor of future sick leave [4–10]. Additionally, labor force withdrawal was reported to be three times more common in axSpA, being found to reach >30% after 20 years of disease in one study [11]. However, most information relates to patients with longstanding axSpA, frequently with extensive structural spinal damage. Data regarding early axSpA are limited, and given the heterogeneous nature of the disease, results cannot be extrapolated from patients with disease of long duration.

Not only patients with axSpA but also those with non-specific CBP experience substantial impairments in HRQoL and work productivity [12–15]. However, it is still unclear in which of these groups the impact on these outcomes is larger, as comparisons are frequently hampered by the methodology of the studies. Ideally, to allow for more reliable comparisons between groups, patients are included in the same study with similar inclusion criteria, such as symptom duration. Also, a common longitudinal follow-up would be informative, especially as there is effective treatment available for axSpA. Previous studies have demonstrated an association between higher disease activity and worse HRQoL and WPL in early axSpA [16–19]. Consequently, with better disease management, improvements in these outcomes could be expected in axSpA patients. However, little is known about the change in these outcomes in the first years of the disease, especially in comparison with patients with non-specific CBP, where lack of specific treatment is still a concern.

The Spondyloarthritis Caught Early (SPACE) cohort was established with the purpose of identifying early axSpA in patients presenting with CBP starting at <45 years of age and lasting ≥3 months and ≤2 years. All included patients were followed-up for 2 years, regardless of the diagnosis, providing a unique opportunity to compare outcomes between patients with and without a diagnosis of axSpA over time. Thus, we aimed to evaluate the differences in HRQoL and work productivity at baseline and after 2 years, as well as their change over the 2-year period, between patients with early axSpA and non-axSpA CBP enrolled in the SPACE cohort.

Methods

The present study was conducted in the SPACE cohort, already previously described in detail [20]. Briefly, adult patients (≥16 years) with CBP starting at <45 years of age and lasting ≥3 months and ≤2 years were included. From 2009 to 2016, patients were recruited from rheumatology outpatient clinics in the Netherlands, Italy, Norway and Sweden and followed up for 2 years. At baseline, patients underwent a full diagnostic workup consisting of medical history, physical examination, laboratory tests (CRP and HLA-B27) and imaging (radiographs and MRI of SI joints and spine). For eligible patients [21], four study visits were conducted over 2 years: at baseline, 3 months, 1 year and 2 years. At each visit, patients completed a questionnaire form to assess several patient-reported outcomes, including HRQoL and work productivity. A diagnosis of axSpA or non-axSpA CBP with an accompanying level of confidence (LoC) on a numeric rating scale (NRS) ranging from 0 ('not confident at all') to 10 ('very confident') was established by the treating rheumatologist at each evaluation, based on regular clinical practice. The final diagnosis was established based on the 2-year diagnosis, respective LoC and the consistency of the diagnosis over time (Supplementary Data S1, available at *Rheumatology* online) [21]. Those classified as possible axSpA or possible non-axSpA were considered to have an uncertain diagnosis. Because our aim was to compare axSpA and non-axSpA patients, and as only few patients were included in this uncertain category ($n = 16$), it was decided to exclude these patients from the analysis (Supplementary Fig. S1, available at *Rheumatology* online). For classification, all images were scored by three central readers per imaging modality. Findings were considered positive for sacroiliitis in the case of agreement between ≥2 readers according to the modified New York criteria for radiographs and Assessment of SpondyloArthritis international Society (ASAS) definition for MRI. For the present study, the SPACE database was locked on 4 January 2024. Patients were included if both baseline and 2-year data on ≥1 of the assessed outcomes (described below) were available. This study was approved by the *Medisch-Ethische Toetsingscommissie Leiden Den Haag Delft* (METC LDD), the Medical Ethical Committee of the Leiden University Medical Center. The SPACE study protocol was also approved by the appropriate local ethical committees of the participation centres. Before inclusion in the study, all patients provided their written informed consent, in accordance with the Declaration of Helsinki.

Outcomes

HRQoL was assessed by the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) version 1. Age-, sex- and country-weighted scale scores were created for each of the eight subscales of the SF-36, ranging from 0 ('worst health') to 100 ('best health'). In the absence of Italian age- and sex-matched scores, Dutch age- and sex-matched scores were used for the Italian patients. The physical (PCS) and mental component summary (MCS) scores were calculated from the adjusted scores on each of the respective subscales and transformed to enable comparison with the general population mean of 50 points (higher scores indicate better HRQoL) [22]. Cases with negative PCS or MCS were set to 'zero'. PCS and MCS adjusted for country of inclusion but not for age and sex were also calculated. Furthermore, the proportion of patients with an improvement or worsening of the PCS and MCS above the minimal clinically important difference (MCID ≥3 points [23]) was evaluated.

Work productivity in the previous week was assessed using the Work Productivity and Activity Impairment (WPAI) general health questionnaire version 1.0, consisting of 6 questions (Q): current employment status (Q1), missed working

hours due to the disease (Q2), missed working hours due to other reasons (Q3), number of worked hours (Q4), the impact of the disease on work productivity on an 11-point NRS (Q5), and the impact of the disease in non-work-related activities on an 11-point NRS (Q6). Four summary measures were calculated, ranging from 0% to 100%: Presenteeism reflects the reduction in performance while at work due to disease (Q5/10 × 100); absenteeism is the absence from work due to disease [Q2/(Q2+Q4) × 100]; WPL is a combined measure of presenteeism and absenteeism, reflecting the total loss of work productivity due to disease [(presenteeism + (1 – presenteeism) × absenteeism] × 100); and activity impairment (AI) reflects the impact of the disease in non-work-related activities (Q6/10 × 100). Higher scores imply more impairment. For presenteeism, absenteeism and WPL, the analysis was restricted to the population employed at both baseline and 2 years. For presenteeism, patients who were completely absent from work in the previous week, for any reason, were not considered in the analysis.

Statistical analysis

Categorical variables were reported as frequencies (proportions) and continuous variables as means and S.D. Baseline patient and disease characteristics and treatment, at both baseline and 2 years, were compared between groups (axSpA *vs* non-axSpA) using the χ^2 test for dichotomous variables and the unpaired *t* test for continuous variables. The paired *t* test (or Wilcoxon signed rank test for non-normally distributed data) was used to compare baseline and 2-year outcomes within each group (axSpA and non-axSpA). To compare 2-year HRQoL between groups, linear regression models were built, with the 2-year outcome as the dependent variable and the diagnosis as the independent variable. The models were adjusted for the baseline value of the respective outcome (equivalent to modelling a change in a variable between baseline and 2 years, thus allowing interpretation of the change between the two time points), sex, age at baseline and use of NSAIDs ('never use' *vs* 'ever use' during the entire 2-year follow-up). For presenteeism, absenteeism, WPL and AI, the distribution of the variables was highly skewed, with an excess of zeros. Therefore, to compare 2-year outcomes between axSpA and non-axSpA, zero-inflated negative binomial (ZINB) models were built, also with the 2-year outcome as the dependent variable, the diagnosis as the independent variable, and adjustment for the same potential confounders. ZINB generates two different models: a logit model and a negative binomial model. The logit model reflects the odds of being a 'certain zero', and the negative binomial model predicts the score of those not in the 'certain zero' group [24, 25]. Regression coefficients are provided for both models: a positive coefficient in the logit model reflects a higher likelihood of being a 'certain zero', and the more positive the coefficient in the negative binomial model the smaller the chance of scoring zero (that is, positive coefficients reflect higher impairments in this case). After exponentiating the coefficients, the results are presented in the form of an odds ratio (OR) for the logit model and in incidence rate ratio (IRR) for the negative binomial model. *P*-values of <0.05 were considered statistically significant. Data were analysed using *STATA* software version V.16 (*Statacorp*®).

Results

Study population

In 373 (265 axSpA, 108 non-axSpA) out of 434 SPACE patients with baseline and 2-year visits, and without an uncertain axSpA or non-axSpA diagnosis, data on ≥1 of the assessed outcomes (PCS, MCS, presenteeism, absenteeism, WPL or AI) were available and used for this analysis (Supplementary Fig. S1, available at *Rheumatology* online). AxSpA patients (*vs* non-axSpA) were more frequently male (52% *vs* 26%) and had more SpA features [mean (S.D.): 5 (2) *vs* 3 (1)], including HLA-B27 positivity and imaging features (Table 1). Age [mean (S.D.) years: 29 (8) axSpA *vs* 31 (8) non-axSpA] and symptom duration [mean (S.D.) months: 13 (7) *vs* 13 (7)] were similar between groups. Seventy-two percent of axSpA patients fulfilled ASAS classification criteria. In the cohort, 175 (66%) axSpA and 73 (68%) non-axSpA patients were employed at both baseline and 2 years.

Health-related quality of life

The mean (S.D.) PCS (not adjusted for age and sex) was 38.7 (9.6) for axSpA and 36.7 (8.9) points for non-axSpA patients at baseline, with significant improvements noted in both groups after 2 years (Supplementary Fig. S2, available at *Rheumatology* online). Two-year results were compared between groups, adjusting for the baseline PCS value, sex, age and use of NSAIDs (Supplementary Table S1; Supplementary Fig. S3, available at *Rheumatology* online). In the linear regression analysis, no significant differences between groups were detected [β (95% CI): 1.86 (−0.37; 4.09)].

Overall, after adjusting for age and sex, worse PCS scores were observed. At baseline, the mean (S.D.) PCS was 28.7 (14.6) for axSpA and 26.8 (13.6) for non-axSpA patients (Fig. 1), reflecting a significant impact compared with the general population mean of 50 points. At 2 years, the mean (S.D.) PCS increased to 39.4 (12.6) in axSpA and 35.6 (15.3) in non-axSpA. An MCID improvement was achieved in a similar proportion of axSpA and non-axSpA patients (71% *vs* 67%, respectively). In multivariable analysis (Table 2; Supplementary Fig. S4, available at *Rheumatology* online), axSpA (*vs* non-axSpA) was associated with a 3.04 (95% CI: −0.05; 6.13) points higher PCS, just missing the level of statistical significance. Moreover, in the model, females (*vs* males) and 'ever use' of NSAIDs (*vs* 'never use') were associated with a decrease of 2.98 (−5.52; −0.44) and 4.59 (−8.29; −0.89) points in PCS at 2 years, respectively.

Contrary to what was found for PCS, MCS (adjusted for age and sex) remained constant between baseline and 2 years, with mean scores in both groups very close to the normal reference of 50 points (mean range: 46.4–47.7 axSpA; 47.6–49.2 non-axSpA). No significant differences were observed between groups after 2 years [β (95% CI): −0.75 (−2.99; 1.49)].

Work productivity and activity impairment

At baseline (Fig. 2), the mean (S.D.) presenteeism was 31.1% (27.1) in axSpA and 37.3% (26.9) in non-axSpA and the mean absenteeism was 8.2% (19.9) and 10.1% (23.1), respectively. At 2 years, the mean presenteeism decreased to 19.0% (22.9) in axSpA and 28.3% (27.4) in non-axSpA, and the mean absenteeism to 3.8% (13.8) in axSpA and 6.7% (21.4) in non-axSpA. Together, presenteeism and

Table 1. Baseline patient and disease characteristics of axSpA and non-axSpA patients[a]

	axSpA ($N = 265$) mean (S.D.) or *n* (%)	Non-axSpA ($N = 108$) mean (S.D.) or *n* (%)
Males	138 (52%)[d]	28 (26%)[d]
Age at inclusion, in years	29 (8)	31 (8)
Duration of back pain, in months	13 (7)	13 (7)
SpA features		
Inflammatory back pain	188 (71%)	71 (66%)
Peripheral arthritis	62 (23%)[d]	10 (9.3%)[d]
Dactylitis	28 (11%)[d]	1 (0.9%)[d]
Heel enthesitis	88 (33%)[d]	15 (14%)[d]
Uveitis	32 (12%)	6 (5.6%)
IBD	15 (5.7%)	8 (7.4%)
Psoriasis	41 (15%)	10 (9.3%)
Family history[b]	125 (47%)	61 (56%)
Good response to NSAIDs	123 (46%)	38 (35%)
HLA-B27+	194 (73%)[d]	32 (30%)[d]
Elevated CRP (≥5 mg/L)	97 (37%)[d]	22 (20%)[d]
Positive MRI-SIJ (ASAS definition)[c]	107 (40%)[d]	3 (2.8%)[d]
Positive X-SIJ (mNY criteria)[c]	15 (5.7%)[d]	0[d]
ASAS classification criteria[c]	191 (72%)	n/a
Treatment		
NSAIDs at baseline	200 (75%)	71 (66%)
NSAIDs at 2 years	168 (63%)[d]	37 (34%)[d]
NSAIDs ('ever use' during the 2-year follow-up)	248 (94%)[d]	84 (78%)[d]
csDMARDs at baseline	17 (6.4%)	2 (1.9%)
csDMARDs at 2 years	21 (7.9%)	3 (2.8%)
bDMARDs at baseline	7 (2.6%)	1 (0.9%)
Anti-TNF	7	1[e]
Other bDMARDs	0	0
bDMARDs at 2 years	55 (21%)[d]	2 (1.9%)[d]
Anti-TNF	51	2[e]
Other bDMARDs	4	0
Patients employed (at both baseline and 2 years)	175 (66%)	73 (68%)

[a] Comparisons between groups using χ^2 test for dichotomous variables and unpaired *t* test for continuous variables.
[b] ASAS definition: presence in first- or second-degree relatives of SpA, psoriasis, uveitis, ReA or IBD.
[c] According to central reading.
[d] *P*-value <0.05.
[e] 1 patient with IBD; 1 patient with IBD and psoriasis. Anti-TNF: TNF inhibitor; ASAS: Assessment of Spondyloarthritis International Society; axSpA: axial spondyloarthritis; bDMARDs: biologic DMARDs; csDMARDs: conventional synthetic DMARDs; mNY: modified New York criteria; MRI-SIJ: MRI of the SI joints; n/a: not applicable; X-SIJ: radiographs of the SI joints.

absenteeism contributed to a mean (S.D.) WPL of 34.7% (29.3) in axSpA and 43.9% (29.7) in non-axSpA patients at baseline, which decreased to 21.9% (26.1) and 33.5% (31.1), respectively, at 2 years. ZINB regression (Table 3; Supplementary Fig. S5, available at *Rheumatology* online) showed that, at 2 years, axSpA (*vs* non-axSpA) was associated with 22% lower WPL [IRR (95% CI): 0.78 (0.62; 0.98)]. Separately, the statistical significance was only achieved for the differences in presenteeism [0.80 (0.64; 0.99)] and not absenteeism [0.60 (0.32; 1.13)]. Additionally, no significant differences between groups were observed for the odds of belonging to the 'certain zero' group, that is, having no WPL [WPL = zero *vs* WPL ≠ zero, OR (95% CI): 1.50 (0.74; 3.05)].

The mean (S.D.) AI was 39.6% (27.9) in axSpA and 48.5% (26.2) in non-axSpA patients at baseline and decreased to 22.7% (23.8) and 33.3% (27.9), respectively, at 2 years. At baseline, any impairment was present in 87% of axSpA and 94% of non-axSpA patients, and it persisted in most patients at 2 years (66% axSpA *vs* 74% non-axSpA). In multivariable analysis, axSpA (*vs* non-axSpA) was associated with 18% lower AI at 2 years [IRR (95% CI): 0.82 (0.70; 0.97)]. However, no differences were found for the odds of having no AI (AI = zero *vs* AI ≠ zero, OR (95% CI): 1.20 (0.66; 2.19)].

Discussion

Low HRQoL and WPL have been major concerns in longstanding axSpA. In fact, the 2022 updated ASAS-EULAR recommendations for the management of axSpA set maximizing HRQoL as the primary goal of treatment [26]. However, data on early axSpA are scarce, especially in comparison with patients with non-specific CBP. Therefore, we evaluated the differences in HRQoL and work productivity at baseline and after 2 years between early axSpA and non-axSpA patients.

This study showed that, in early axSpA, PCS, work productivity (based on presenteeism, absenteeism and WPL) and AI are seriously impaired; although they all (except absenteeism in non-axSpA) significantly improve after 2 years, substantial impairments persist. Moreover, to our knowledge, this is the first time that comparisons with non-axSpA CBP of short duration have been made in one single prospective study regarding these outcomes. In general, non-axSpA patients are more severely impaired at baseline but also improve over time, even though to a lesser degree than the observed improvement in axSpA.

Similarly to longstanding axSpA [23, 27–30], we found that, in early disease, considerable impairments were only noted for the physical component of HRQoL. MCS was comparable with the general population, a finding also observed in other rheumatic and musculoskeletal diseases such as RA and PsA [31, 32], and remained so at 2 years. In the DESIR (*Devenir des Spondyloarthrites Indifférenciées Récentes*) inception cohort, Molto *et al.* also observed impairments in PCS at baseline in axSpA patients fulfilling the ASAS classification criteria, but less than in our study (mean PCS: 41 *vs* 28.7) [33]. Notably, this difference was substantially less when comparing the DESIR results with our PCS scores not adjusted for age and sex (mean: 38.7 points). In fact, better PCS scores were achieved with non-adjusted values, reflecting the significant influence of age and sex on HRQoL. As the SPACE cohort reflects a younger population (overall mean age: 30 years) compared with the general population, this age and sex adjustment could partially explain the low PCS scores achieved in our study. After 2 years, although substantial impairments persisted, we observed significant improvements in PCS scores, with most axSpA patients achieving an MCID improvement. For patients with non-specific CBP, previous studies revealed mean PCS scores ranging between 28 and 45 points, which is consistent with our findings for non-axSpA CBP [13, 14, 34]. In our study, non-axSpA (*vs* axSpA) patients reported lower PCS at baseline and 2 years. However, similarly to axSpA, significant improvements were noted in this 2-year period, numerically higher in axSpA, but without a statistically significant difference between groups in the degree of improvement.

Previous studies on longstanding axSpA have revealed a mean WPL of 19–45% and a mean AI of 23–53% [35, 36]. We observed similar results in early axSpA (mean at baseline:

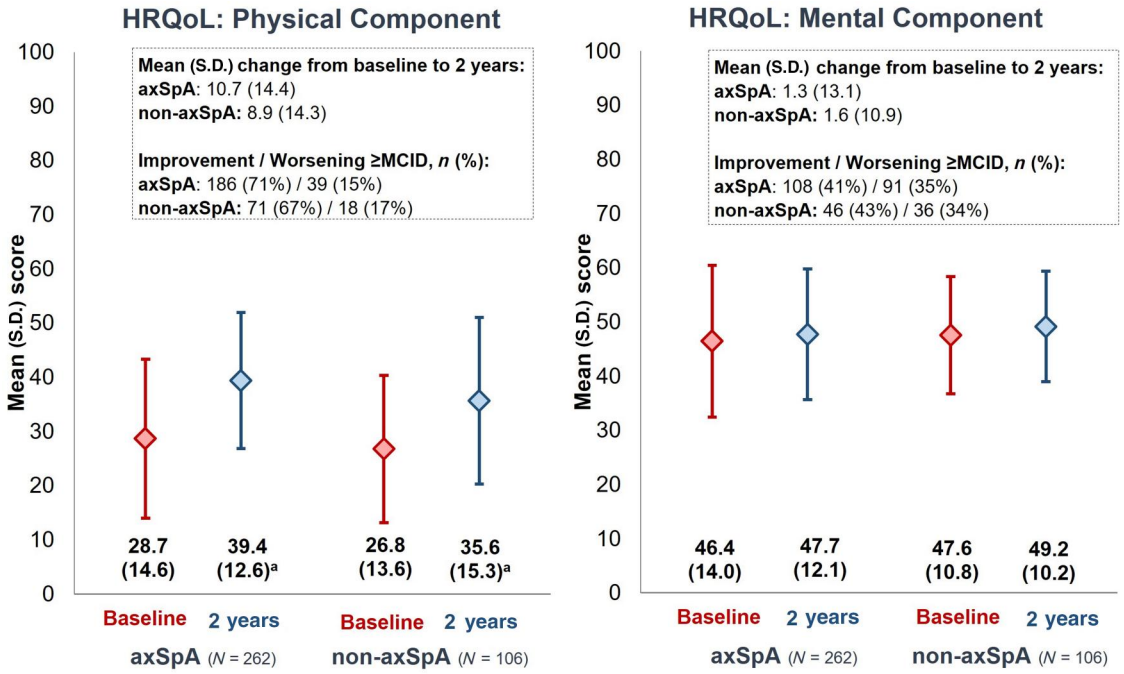

Figure 1. Baseline and 2-year physical and mental component of HRQoL in axSpA and non-axSpA patients (scores adjusted for country of inclusion, age and sex). Less than 2% of missing data. [a]Comparison of outcomes at baseline and at 2 years within groups: *P*-value <0.05. axSpA: axial SpA; HRQoL: health-related quality of life; MCID: minimal clinically important difference (≥3 points)

Table 2. Comparison of HRQoL between axSpA and non-axSpA patients at 2 years (PCS and MCS scores adjusted for country of inclusion, age and sex)[a]

	PCS β (95% CI)	MCS β (95% CI)
axSpA diagnosis (*vs* non-axSpA)	3.04 (−0.05; 6.13)	−0.75 (−2.99; 1.49)
Baseline outcome	0.42 (0.33; 0.51)[b]	0.44 (0.36; 0.52)[b]
Age at baseline	0.10 (−0.05; 0.26)	0.04 (−0.09; 0.16)
Female (*vs* male)	−2.98 (−5.52; −0.44)[b]	0.58 (−1.60; 2.77)
NSAIDs use: 'ever user' (*vs* never)	−4.59 (−8.29; −0.89)[b]	0.20 (−2.88; 3.29)

[a] Linear regression model, adjusted for the baseline value of the respective outcome, sex, age and use of NSAIDs.
[b] *P*-value <0.05. axSpA: axial SpA; HRQoL: health-related quality of life; MCS: mental component summary of the SF-36; PCS: physical component summary of the SF-36; SF-36: Medical Outcomes Study 36-Item Short-Form Health Survey.

34.7% WPL, 39.6% AI). Moreover, >80% of axSpA patients reported some degree of impairment. This differs from the results of another study performed in longstanding axSpA, where disease-related impairments in work performance were present in about half of the patients in the preceding 2 weeks [9]. After 2 years, we noted substantial impairments persisted in most patients. Nevertheless, significant improvements were still observed for WPL and AI. Similarly to HRQoL, higher degrees of impairment were noted in non-axSpA patients for both WPL and AI. A recent study conducted in Japanese patients with CBP aged 20–64 years showed a mean WPL of 37–48% and a mean AI of 47–50% [37], which seems comparable with our findings at baseline. Significant improvements were achieved for both outcomes after 2 years in non-axSpA patients, but to a lesser degree than the observed improvement in axSpA.

Overall, in our study, significant improvements in all outcomes (except MCS, which was not impaired at either time point) were observed in patients with CBP of short duration. For axSpA patients, this could have been expected owing to initiation of treatment with proven efficacy, such as NSAIDs and bDMARDs [38], and perhaps because of spontaneous symptom improvement due to regression to the mean. As for non-axSpA patients, there may be the preconceived notion that HRQoL and work productivity would tend to improve as a result of recovery of symptoms. However, we found little data on the evolution of these outcomes in non-specific CBP. The observed improvement could be partially explained by initiation of treatment of some sort. For instance, a Cochrane review of randomized trials showed NSAIDs are slightly more effective than placebo for pain relief and improvement in function in CBP, and their short-term use can be recommended for pain management in these patients [39]. In fact, in our study, 78% of non-axSpA patients used NSAIDs at some point during the 2-year follow-up. However, impairments persisted in most patients at 2 years, and only 34% were using NSAIDs at this time. Other factors may have also contributed to the observed improvement, most likely regression to the mean, but also due to non-pharmacological treatments, such as physiotherapy or even spontaneous remission of CBP. In fact, a meta-analysis of studies assessing the evolution of pain in patients with persistent low back pain revealed a substantial decrease in pain scores after 1 year (from 51, out of 100, to 23 points) [40]. From the rheumatologist's point of view, understanding the impact of non-specific CBP on HRQoL and work productivity is of considerable importance, as non-axSpA CBP patients account for a significant proportion of referred individuals to rheumatology clinics and, frequently, counselling them is part of routine clinical practice.

In the overall study population, also noteworthy is the larger impairment observed in PCS and WPL in patients using

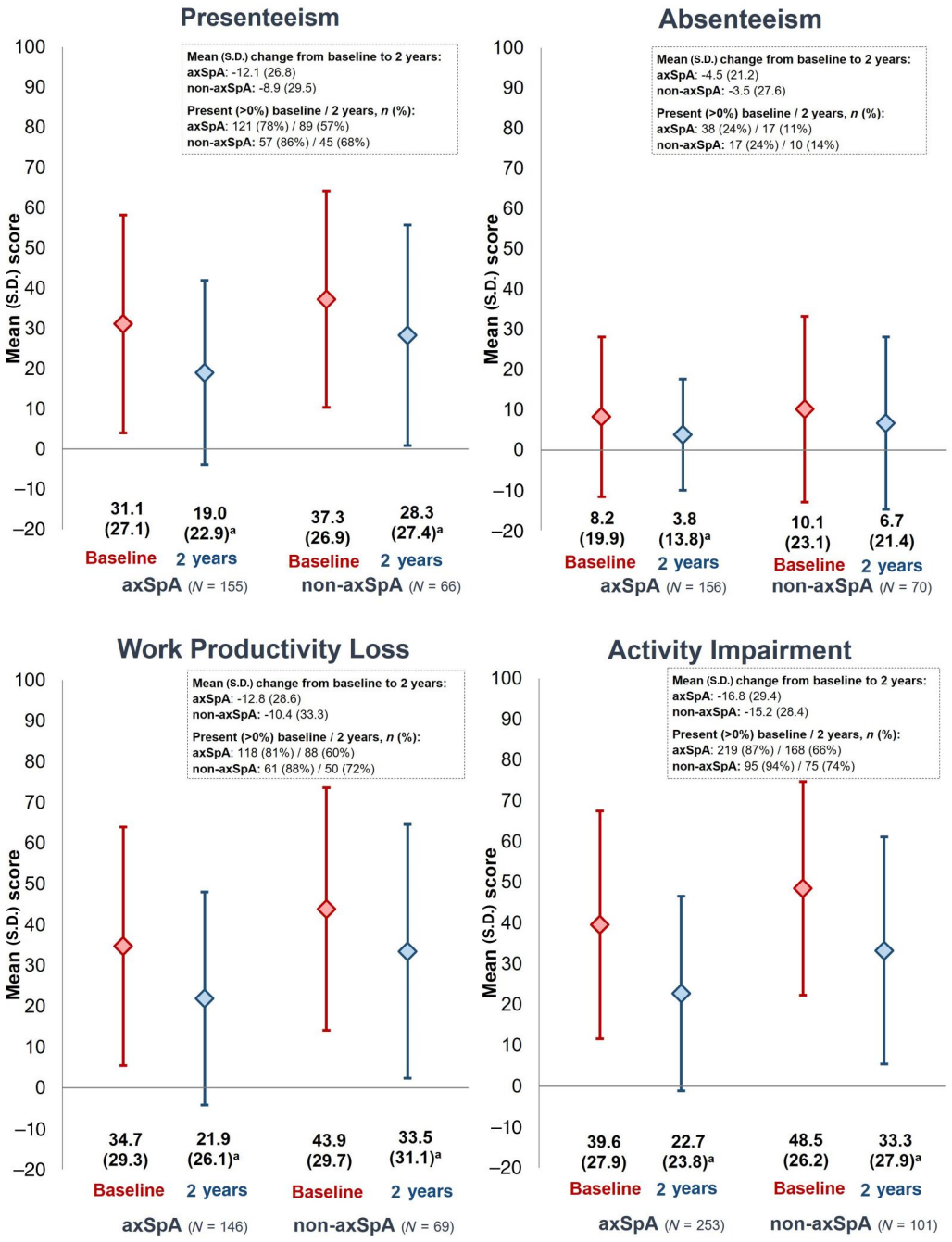

Figure 2. Baseline and 2-year work productivity and activity impairment in axSpA and non-axSpA patients. Less than 15% of missing data for work productivity loss, <10% of missing data for the remaining outcomes. [a]Comparison of outcomes at baseline and at 2 years within groups: *P*-value <0.05. axSpA: axial SpA

NSAIDs compared with 'never users'. This could perhaps be expected, as patients in need of treatment are usually those with more severe symptoms. Females (*vs* males) were also associated with worse PCS and AI. This has already been observed in longstanding axSpA, where women had significantly more AI compared with men (46% *vs* 36%), which may reflect differences in the type of daily activities performed by each gender [41].

Strengths of our study are the high number of included patients (although we cannot exclude a lack of power to capture a significant difference in these secondary outcomes in SPACE) and the high certainty surrounding the diagnosis of axSpA and non-axSpA, allowing for more reliable comparisons between groups. However, some limitations are worth mentioning. Given that all CBP patients were referred to a rheumatologist [21], the non-axSpA patients are an unusual group of CBP patients. Incomplete follow-up may also be a concern, possibly due to spontaneous remission of symptoms or identification of other diseases as being the cause of CBP. Additionally, referral bias may have influenced the results. For instance, both severity of symptoms and presence of other SpA features could have motivated referral of patients to the rheumatologist. In this cohort, as non-axSpA patients have less SpA features than axSpA patients, they may have

Table 3. Comparison of work productivity and activity impairment between axSpA and non-axSpA patients at 2 years[a]

	Presenteeism		Absenteeism		Work productivity loss		Activity impairment	
	Negative binomial model IRR (95% CI)	Logit model OR (95% CI)	Negative binomial model IRR (95% CI)	Logit model OR (95% CI)	Negative binomial model IRR (95% CI)	Logit model OR (95% CI)	Negative binomial model IRR (95% CI)	Logit model OR (95% CI)
axSpA diagnosis (*vs* non-axSpA)	0.80 (0.64, 0.99)[b]	1.48 (0.75, 2.94)	0.60 (0.32, 1.13)	1.59 (0.65, 3.88)	0.78 (0.62, 0.98)[b]	1.50 (0.74, 3.05)	0.81 (0.69, 0.97)[b]	1.20 (0.66, 2.19)
Baseline outcome	1.01 (1.00, 1.01)[b]	0.98 (0.96, 0.99)[b]	1.01 (1.00, 1.03)[b]	0.98 (0.97, 1.00)[b]	1.01 (1.01, 1.01)[b]	0.98 (0.97, 0.99)[b]	1.01 (1.00, 1.01)[b]	0.98 (0.97, 0.99)[b]
Age at baseline	1.00 (0.99, 1.01)	0.99 (0.95, 1.03)	1.03 (1.00, 1.06)[b]	1.00 (0.95, 1.06)	1.00 (0.99, 1.01)	1.00 (0.96, 1.04)	1.00 (0.99, 1.01)	1.00 (0.97, 1.03)
Female (*vs* male)	1.02 (0.84, 1.25)	0.69 (0.38, 1.25)	0.70 (0.38, 1.31)	1.29 (0.55, 3.02)	0.97 (0.79, 1.21)	0.67 (0.36, 1.23)	1.21 (1.04, 1.41)[b]	0.61 (0.37, 1.00)[b]
NSAIDs use: 'ever user' (*vs* never)	1.46 (1.01, 2.10)[b]	0.47 (0.19, 1.16)	1.69 (0.37, 7.74)	0.24 (0.03, 1.92)	1.46 (1.00, 2.12)[b]	0.48 (0.19, 1.23)	1.31 (0.99, 1.74)	0.51 (0.24, 1.07)

[a] Zero-inflated negative binomial (ZINB) model, adjusted for the baseline value of the respective outcome, sex, age and use of NSAIDs. ZINB generates two different models: a logit model and a negative binomial model. The logit model reflects the odds of being a 'certain zero' and the negative binomial model predicts the score of those not in the 'certain zero' group.
[b] *P*-value <0.05. axSpA: axial SpA; RR: incidence rate ratio; OR: odds ratio.

been referred mostly due to the presence of persistently severe symptoms, potentially overestimating the impairment in HRQoL and work productivity seen in this group. Nevertheless, there is no reason to assume this does not accurately reflect daily rheumatological clinical practice.

In conclusion, this study revealed that physical (but not mental) HRQoL and performance of work and non-work-related activities are importantly impaired in most patients with CBP of short duration referred to rheumatology outpatient clinics. After 2 years, although impairments persist in most patients, significant improvements are observed in both axSpA and non-axSpA. However, while no significant differences are observed at 2 years in physical HRQoL between these two groups, axSpA patients experience larger reductions in WPL and AI compared with those with non-axSpA. These results support the importance of early diagnosis and treatment of axSpA, aiming at decreasing the personal and societal burden associated with this disease.

Supplementary material

Supplementary material is available at *Rheumatology* online.

Data availability

All data pertaining to this study are available in the article and supplementary material.

Contribution statement

Study concept and design: A.B.S., F.v.G., D.v.d.H. and S.R. Data collection: F.v.G., A.B., M.v.L., M.v.d.S., C.F., S.E. and R.R. Statistical analysis and interpretation of the results: A.B.S., F.v.G., D.v.d.H., S.R., M.v.L. and M.L.M. A.B.S. was responsible for writing the first version of the manuscript. All co-authors were involved in further data interpretation, revising the manuscript, and gave final approval of the version to be published.

Funding

A.B.d.S. was supported by an Assessment of SpondyloArthritis international Society (ASAS) Fellowship. No other specific funding was received from any bodies in the public, commercial or not-for-profit sectors to carry out the work described in this article.

Disclosure statement: A.B.d.S. has received a research fellowship grant from the Assessment of SpondyloArthritis international Society (ASAS). S.R. has received research grants and/or consultancy fees from AbbVie, Eli Lilly, Galapagos, Janssen, MSD, Novartis, Pfizer, UCB and Sanofi. M.v.d.S. has acknowledged speakers fees from Janssen, Novartis, UCB and Beneke, consulting fees from Janssen, Novartis, Abbvie and UCB, and research support from Janssen, Novartis and UCB. S.E. has received consulting fees from Amgen, Janssen, Novartis, AbbVie and UCB. R.R. has received consulting and/or speaking fees from Advisory Boards from Abbvie, Novartis, Janssen, Lilly, MSD, Pfizer and UCB. D.v.d.H. has acknowledged consulting fees from AbbVie, Argenx, BMS, Galapagos, Glaxo-Smith-Kline, Janssen, Lilly, Novartis, Pfizer, Takeda and UCB; has acknowledged being associate editor of *Annals Rheumatic Diseases*, being an editorial board member of the *Journal of Rheumatology* and RMD Open, being an advisor for the Assessment of SpondyloArthritis international Society and being director of Imaging Rheumatology bv. F.v.G. has received grants/research support from Stichting ASAS, Novartis and UCB, and received honoraria or consultation fees from Novartis, BMS, AbbVie, MSD, Janssen, Lily and UCB. The remaining authors have declared no conflicts of interest.

Acknowledgements

The authors would like to acknowledge the Assessment of Spondyloarthritis international Society (ASAS) for having supported A.B.d.S. by granting her the ASAS fellowship.

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Rheumatology, 2024, 00, 1–9
https://doi.org/10.1093/rheumatology/keae346
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