Evaluation of a modified Arthritis Self-Efficacy Scale for an ankylosing spondylitis UK population

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Abstract

Objectives

To evaluate an Ankylosing Spondylitis-specific Arthritis Self-Efficacy Scale (ASES-AS) United Kingdom (UK) secondary care population.

Methods

The ASES-AS is based on the 8-item ASES with minor alterations in phraseology. Patients from ten secondary care rheumatology centres across England were asked to complete a postal questionnaire concerning sociodemographic and clinical characteristics: Bath AS Functional Index (BASFI), Bath AS Disease Activity Index (BASDAI), numerical pain rating scale (NRS), Hospital Anxiety and Depression Scale (HADS), Short Form 36 (SF-36), Evaluation of AS Quality of Life questionnaire (EASi-QoL) and ASES-AS. Respondents received repeat questionnaires at 2 weeks and 6 months including health transition questions assessing change in AS-specific and general health. The ASES-AS was assessed for data quality, reliability, validity, and responsiveness.

Results

Response rate was 64% (n=612), 72% (n=438) were male, mean age 50.8yrs (SD 12.2 yrs), mean disease duration 17.3 yrs (SD 11.7 yrs) and mean symptom duration 22.4 yrs (SD 12.4 yrs). Missing data for each item/total score range was 0.7%–3.1%. Item-total correlations range was 0.66 to 0.83. Cronbach's alpha was 0.93 and test-retest reliability (intraclass correlation coefficient) 0.77. A priori hypothesised associations between ASAS-AS and disease status measures were supported. Social variables potentially related to self-efficacy demonstrated evidence of convergent validity (employment $p<0.001$, educational level $p<0.005$). A Modified Standard Response Mean (MSRM) of 0.44 and 0.26 in AS-specific and general health respectively at 6 months indicates moderate responsiveness.

Conclusion

ASES-AS has good evidence supporting its application as an AS-specific self-efficacy measure in research including clinical trials at a group level.

Key words

ankylosing spondylitis, self-efficacy, patient outcome assessment, health status, health survey, cross-sectional studies, United Kingdom

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Introduction

Ankylosing Spondylitis (AS) is an incurable, inflammatory chronic disease, primarily affecting the sacroiliac joints and spine (1). Often presenting in early adulthood, the disease can have a profound impact on an individual's health-related quality of life in terms of physical, social and emotional wellbeing (2). There is an increasing awareness that psychosocial variables such as self-efficacy are important determinants influencing health status and treatment outcomes in chronic illnesses such as AS (3). 'Self-efficacy' describes an individual's degree of confidence in their ability to carry out a task, behaviour or management strategy related to a specific situation or condition (4). It relates to an individuals self perception of capability, rather than actual ability. AS patients often live with fluctuating disease levels, and may achieve improved health outcomes by strategies that aim to enhance self-efficacy. Benefits of these strategies have been demonstrated in a number of studies across a wide range of chronic illnesses and health behaviours (5-10). For example, Lorig *et al*. (11) demonstrated that patient education may improve health outcomes such as affecting health status by raising an individual's level of self-efficacy in their ability to cope with the consequences of chronic arthritis.

Although conventional biomedical indicators of disease are important, patients themselves can provide a unique insight into their experience of disease and health-care. Well-developed patient-reported outcome measures (PROMs), usually self-report questionnaires, can provide a structured and systematic assessment of the patient's perspective across a range of health-related concerns (12), supplementing information from more traditional assessments. Although originally developed for use in clinical research, growing interest in assessing the patient perspective has led to their use in routine practice, resource allocation, and the assessment of healthcare quality (13-14). PROMs may be generic, containing concepts of relevance to patients and the general population, or specific to a disease, a specific problem (for example, pain or self-efficacy), a described function (for example, activities of daily living), or a population (for example, children) (15). When PROMs are modified or completed by patients who differ significantly from those for whom the measures were originally developed, re-evaluation to re-establish patient acceptability and essential measurement properties is essential (16).

The arthritis self-efficacy scale (ASES) was developed to assess self-efficacy in arthritis patients (11). An Anglicised version of the ASES has been evaluated and is commonly used in patients with Rheumatoid Arthritis (RA). However, the ASES refers throughout to 'your arthritis'. The symptoms that AS patients experience are usually related to the spine and less frequently to peripheral joints, raising concerns that AS patients may not feel that 'your arthritis' encompasses their experience of disease. Therefore direct use of the ASES in an AS population is not feasible. In view of this, rephrasing the ASES to specifically assess the impact of AS on self-efficacy is necessary. The aim of this study was to evaluate the measurement and practical properties of the AS-specific ASES in a UK-wide secondary care AS population.

Materials and methods

Materials

-Modification of the Self-Efficacy Scale

The original 20-item ASES (11) and a shortened 8-item version (17) were developed and evaluated for use in a North American arthritis population. In the current study, the 8-item ASES scale was rephrased to ensure that patients indicated how their 'AS' impacted on their self-efficacy, rather than 'arthritis'. An earlier evaluation of the ASES in a UK arthritis population also raised concerns over the use of the term 'blue' to denote low mood (18), but no alternative was suggested. To reflect the Anglicised version of the SF-36 (version 2) (19), the current study has modified this term from 'blue' to 'downhearted and low'. The term 'confident' was also replaced with 'certain' in items 3 and 5 to ensure consistent terminology throughout the

scale. These changes were made with the aim of improving comprehension. The modified version of the ASES for an AS population (ASES–AS) is shown in Figure 1.

-Scoring of the ASES-AS

The 8-item scale asks patients to score from 1 (very uncertain) to 10 (very certain) how certain they are about their ability to do certain tasks at the present time. A high score on this scale represents high self-efficacy and a low score, low self-efficacy. The score for the scale is the mean of the completed items. At least six items must be completed to obtain a score.

1. How certain are you that you can decrease your pain quite a bit?
2. How certain are you that you can keep the pain from your Ankylosing Spondylitis from interfering with your sleep?
3. How certain are you that you can keep the pain from your Ankylosing Spondylitis from interfering with the things you want to do?
4. How certain are you that you can regulate your activity so as to be active without aggravating your Ankylosing Spondylitis?
5. How certain are you that you can keep the fatigue caused by your Ankylosing Spondylitis from interfering with the things you want to do?
6. How certain are you that you can do something to help yourself feel better if you are feeling downhearted and low?
7. As compared with other people with Ankylosing Spondylitis like yours, how certain are you that you can manage pain during your daily activities?
8. How certain are you that you can deal with the frustration of Ankylosing Spondylitis?

Fig. 1. Arthritis Self-Efficacy Scale specific for an Ankylosing Spondylitis UK population.

Methods

One thousand individuals with a confirmed diagnosis of AS (Modified New York Criteria, 1984) (20) were randomly selected from the existing databases of ten secondary care rheumatology centres across the UK. These locations represent the diverse socioeconomic and demographic profile of the AS population in the UK (21). Exclusion criteria included pregnancy, learning difficulties, and those with English literacy or comprehension difficulties. Subjects were recruited as part of a main study to evaluate a new AS quality of life questionnaire (22).

Patients were invited to self-complete a postal questionnaire which included the modified Arthritis Self-Efficacy Scale for AS (ASES–AS). Non-responders were sent reminders at 2 and 4 weeks. Responders were sent follow-up questionnaires at 2 weeks and 6 months. The North Staffordshire Local Research Ethics Committee approved the study. Written consent was obtained from all participants according to the Declaration of Helsinki.

Data collection

Demographic information including age, gender, education and social deprivation, were collected. Disease specific information such as disease duration, function, disease activity, pain and quality of life were obtained. The Bath AS Functional Index (BASFI) (23) and the Bath AS Disease Activity Index (BASDAI) (24) assessed functional impairment and disease activity, respectively. Both the BASFI and BASDAI indexes are scored between 0 and 10, with higher values indicating worse function and disease activity. Patients also completed a 100mm numerical rating scale (NRS) for pain (0=no pain, 100=most severe pain).

AS-specific quality of life was assessed by completion of the EASi-QoL (22). The EASi-QoL has four domains: physical function (scored 0–24), disease activity (scored 0–16), emotional well-being (scored 0–20), and social participation (scored 0–20), where lower scores indicate a better quality of life. Emotional wellbeing was also assessed with the Hospital Anxiety and Depression Scale (HADS) (25). The HADS consists of two domains: anxiety and depression. Each domain is scored from 0 to 21, with higher scores indicating increasing psychological distress. A HADS score of ≥8 suggests probable anxiety or depression.

Patients completed the Short Form 36-item Health Survey (SF–36) (Version 2) (19), a generic measure of health status. Scores are provided for 8 health domains: physical function (PF), role (physical) (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role (emotional) (RE) and mental health (MH). Each scale is scored from 0–100, where 0 is the lowest and 100 the highest possible scores. Two health transition questions exploring change in AS-specific and general health were included in the 2-week and 6-month questionnaires.

All analyses were performed using SPSS version 15.0 for windows (SPSS, Chicago, IL, USA).

Measurment evaluation

Data quality

Individual items of the ASES-AS were assessed for missing data and the distribution of item response scores determined to assess floor and ceiling effects. An acceptable level of ceiling and floor responses was considered to be less than 20% (16).

Reliability

Test-retest reliability assesses whether a measure generates the same results on repeated administrations, when the subjects have not changed (12). The test-retest reliability was evaluated using the ASES-AS scores at baseline and at 2-weeks, for those subjects who indicated no change on the general health and AS-specific health transition questions (16). This was assessed by calculating the intraclass correlation coefficient (ICC (2,1)) (26). To enable comparison between groups the value of the ICC should exceed 0.7 (16).

The internal consistency of the ASES-AS was evaluated by Cronbach's alpha, a measure of the overall correlation between items within a scale (16) with higher alpha values indicating higher internal consistency. The suggested alpha value should be in the range of

0.70–0.95 (27). The corrected item-total correlation of individual items was assessed to identify items that may adversely affect the reliability of the scale (16).

Validity

The validity of a measure is an evaluation of the extent to which it measures what it claims to measure (16). Hypothesised theoretical relationships between measures were considered a priori and the convergent validity of related dimensions assessed by correlation.

The self-efficacy construct shares a theoretical psychological basis with anxiety, depression, and pain. Self-efficacy has been shown to be associated with anxiety, depression (28) and pain (29-30) and therefore moderate to high levels of correlation (>0.5) were hypothesised between the ASES-AS and the HADS and the pain NRS. As self-efficacy reflects one's self-perception of capability, and is not a measure of actual physical performance or ability, moderate levels of correlation (0.4–0.5) with the BASDAI and BASFI were hypothesised. It was hypothesised that the ASES-AS would have a moderate to high level of correlation with the EASi-QoL emotional well-being domain and moderate correlations with the remaining EASi-QoL domains. A moderate to high level of correlation (>0.5) was hypothesised between the ASES-AS and the emotional wellbeing and mental health domains of SF-36 with moderate correlations for the remaining SF-36 domains.

Extreme group validity

Extreme group validity was assessed by comparing social variables that were likely to be related to self-efficacy. Higher self-efficacy scores were hypothesised in the patients in employment compared to those unemployed (31) and in subjects reporting a higher level of education (remaining in education beyond 16 years of age), compared with those leaving school at 16 years of age or before (32). Unpaired t–tests were used to test the difference in mean scores between these groups.

Responsiveness

Responsiveness is the ability of a measure to detect change in health over time, when change is present (33). This was assessed by examining the change in ASES-AS score from baseline for patients who reported change in health on the AS-specific and general health transition questions at 6 months. Responsiveness was evaluated by calculating the Modified Standard Response Mean (MSRM), which is equal to the mean change in scores divided by the standard deviation of change scores in subjects defined as stable (12). Proposed interpretation guidance suggests a score of around 0.8 represents a high level of responsiveness, a score of 0.5 –a moderate level and a score of ≤0.2 suggest a low level of responsiveness (12).

Longitudinal construct validity reflects the degree to which the measure is capable of measuring change in reported health (34). This was evaluated by comparing scores at baseline and at 6 months, in patients reporting change in AS-specific and general health, using a paired *t*-test.

Results

Demographic data

612 patients returned a completed questionnaire at baseline. After accounting for deaths and changes of address (n=44), the response rate was 64%. At 2 weeks and at 6 months, 489 (48.9%) and 470 (47.0%) subjects respectively returned a completed questionnaire. No information was available on non-responders. Patient characteristics of the cohort are shown in Table I.

Table I. Patient characteristics at baseline.

Patient characteristic	number (%)
Male gender	438 (71.6%)
Possible anxiety (HADS≥ 8)	273 (44.6%)
Possible depression (HADS≥ 8)	198 (32.4%)
Patients on anti TNF therapy	71 (10.9%)
Patient characteristic	**mean (SD)**
Age (yrs)	50.8 (12.2)
AS disease duration (yrs)	17.3 (11.7)
AS symptom duration (yrs)	23.0 (18.6)
Disease activity (BASDAI) (0 -10)	4.6 (2.6)
Function (BASFI) (0-10)	4.6 (2.9)
Pain (NRS) (0 -100)	48 (27)

Measurement evaluation

Data quality / missing data

Data quality was assessed for missing data and the distribution of responses, as shown in Table II.

The total score for the ASES-AS could not be calculated for 5 patients (0.8%). The percentage of missing data for the 8 items ranged from 0.7%–3.1%. The most frequently omitted item was item-7 (ability to manage pain during daily activities) (Fig. 1).

Data quality for the ASES-AS is reported in Table II. Item 2 (keeping the pain from AS from interfering with sleep) and item 5 (keeping the fatigue from AS from interfering with activity) had the highest floor effect *i.e.* low self-efficacy (16.7%). Item 8 (dealing with the frustration of AS), had the highest ceiling effect *i.e.* high self-efficacy (15.4%).

Reliability

Test-retest reliability

For those patients reporting no change in AS-specific health at 2 weeks (n=323), the ICC was 0.77 (95% confidence interval: 0.72, 0.81). For those reporting no change in general health (n=319), the ICC was 0.78 (95% confidence interval: 0.73, 0.82).

Internal consistency

A high level of internal consistency was found (Table II). Corrected item-total correlations were all above 0.65, and Cronbach's alpha was 0.93.

Validity

Construct validity was evaluated by correlating the scores for the ASES-AS with other measures as shown in Table III. As hypothesised, these results demonstrate moderate to high correlations between theoretically related constructs. The strongest correlation was between the ASES-AS and the EASi-QoL domains, with the ASES-AS correlating most strongly with the emotional well being domain. As hypothesised, the ASES-AS had moderate correlations with the HADS depression domain, BASFI, BASDAI and Pain (NRS), and the SF–36. However, the association between the ASES-AS and the HADS anxiety domain was slightly less than that hypothesised.

Table II. ASES-AS item and scale properties at baseline (n = 607).

Item	Percentage missing	Mean (S.D)	Response options % floor	Response options % ceiling	Corrected Item total - correlation	Cronbach α
1	1.5	5.24 (2.83)	13.2	8.0	0.655	
2	1.0	5.15 (3.02)	16.7	9.0	0.725	
3	1.0	4.98 (2.84)	14.9	6.9	0.833	
4	0.8	5.46 (2.80)	10.9	7.2	0.791	
5	0.8	4.76 (2.88)	16.7	6.7	0.772	
6	1.0	6.03 (2.82)	7.8	13.6	0.692	
7	3.1	6.18 (2.66)	6.2	11.8	0.818	
8	0.7	6.36 (2.74)	6.7	15.4	0.743	
Total score	0.8	5.52 (2.31)				0.928

Table III. Convergent validity: ASES-AS, AS-specific, domain-specific and generic PROMs.

Outcome measures		Pearson correlation coefficients [Δ]
AS specific instruments		
BASFI		- 0.57
BASDAI		- 0.66
EASI-QOL		
i.	Physical function	- 0.58
ii.	Social participation	- 0.67
iii.	Emotional well-being	- 0.70
iv.	Disease activity	- 0.69
Domain specific instruments		
HAD - anxiety		0.42
HAD – depression		0.56
Pain (NRS)		- 0.62
Generic instruments		
SF-36		
i.	Physical function	0.56
ii.	Role limitation (physical)	0.58
iii.	Role limitation (emotional)	0.56
iv.	Social functioning	0.56
v.	Mental health	0.55
vi.	Energy vitality	0.62
vii.	Pain	0.63
viii.	General health perception	0.59

[Δ] $p<0.01$.

Table IV. Mean (standard deviation) scale self-efficacy scores according to social factors.

	n.	Mean (S.D.)	*p*-values
Occupational status			
Employed	320	6.07 (2.17)	< 0.001
Unemployed	275	4.84 (2.31)	
Education			
Higher education	223	5.89 (2.25)	0.003
Lower education	377	5.30 (2.32)	

Extreme groups

The a priori hypotheses comparing social variables and self-efficacy scores were supported (Table IV). People in employment had significantly higher self-efficacy scores than those who were unemployed ($p<0.001$). Those who had a higher level of education had significantly higher self-efficacy scores than those with a lower education ($p=0.003$).

Responsiveness

Responsiveness data is shown in Table V. Moderate levels of responsiveness (MSRM values) were found in patients reporting an improvement in health. As hypothesised, the ASES-AS is more responsive to changes in AS-specific health than change in general health. A significant change in self-efficacy score was shown in those who reported an improvement in AS-specific health ($p=0.001$), and in those who reported an improvement in general health ($p=0.03$). Subjects reporting an improvement in their AS-specific health, had a mean score improvement of 0.71 over 6 months, the corresponding mean score improvement in those reporting an improvement in their general health was 0.43. There was a significant linear trend in mean change scores from those reporting health as better to those reporting it worse based on both the AS ($p<0.001$) and general health ($p=0.004$) transition items.

Discussion

The impact of chronic illness is a function of disease severity, duration, the patient *e.g.* age, gender, and psychosocial factors such as lifestyle, motivations, and self-efficacy (35-36).

Assessment of patient health status has undergone a dramatic shift in recent years, evolving from a reliance on biomedical and physical measurements, to taking into account the patient's personal assessment of their health status (37). This shift in paradigm towards the inclusion of patient centred values in healthcare supports the move towards including health outcomes that have relevance to patients in healthcare assessment.

Although physical symptoms and problems may signal the start of a disease, psychosocial factors soon become important in the development and course of a chronic disease (38). Despite the recent advent of more effective treatments such as anti-TNF therapy, the nature of AS remains for many patients painful, unpredictable and incurable. This can influence a patient's perception and sense of control of their chronic illness. This perception of an individual's ability to control their illness (self-efficacy) is important to their well-being (39). Awareness of a patient's self efficacy of control over their symptoms and the effects of their

Table V. ASES-AS mean score change (standard deviation) and MSRM at 6 months in AS-specific and general health.

AS health transition (n=456)				
Better		Unchanged	Worse	
(n=79)		(n=265)	(n=112)	
Mean (SD)	MSRM	Mean (SD)	Mean (SD)	MSRM
0.71 (1.80)*	0.44	0.11 (1.61)	-0.42 (1.67)*	-0.270
*p<0.05				
General health transition (n=429)				
Better		Unchanged	Worse	
(n=84)		(n=237)	(n=132)	
Mean (SD)	MSRM	Mean (SD)	Mean (SD)	MSRM
0.43 (1.80)*	0.26	0.15 (1.68)	- 0.24 (1.60)	-0.14
*p<0.05				

chronic disease are important, because these beliefs may affect their health outcomes, adherence to therapy and health behaviours (40). For example, patients reporting feelings of helplessness also report more psychological distress and pain (41).

Evaluation of the ASES-AS has shown low levels of missing data. The ASES-AS total score could not be calculated in 5/612 patients (0.8%), as at least six items must be completed to obtain a score. This provides evidence of acceptability to patients. Although item 7 (managing pain during daily activities) was the most frequently omitted (3.1%), this was within acceptable levels and did not affect the performance of the measure. The patients in the current study were recruited from ten secondary care rheumatology centres with diverse socioeconomic and demographic profiles across the United Kingdom. The large UK-wide sample and good response rate suggests that the results are generalisable to an AS secondary care population across the UK.

The ASES-AS has levels of test-retest and internal consistency reliability that supports its use with groups of patients, for example, in clinical trials (12). The corrected item-total correlations suggest that all items are measuring a single construct. The results are comparable to earlier evaluations of the modified 8-item ASES (17, 42-43).

The results of comparisons of the ASES-AS with other measures provided acceptable evidence in support of the construct validity of the modified measure. The moderate to high correlations with the domain-specific, AS-specific and generic measures are evidence that the ASES-AS is measuring the effects of AS-specific self-efficacy across different aspects of health. Notably, correlations between the ASES–AS and the AS-specific measures were generally the strongest, reflecting modestly greater sensitivity to AS-specific self-efficacy. The moderate to strong associations between the ASES-AS and measures of physical function, disease activity, pain, and psychological well being are consistent with self-efficacy studies in other musculoskeletal conditions which have shown high self-efficacy to be associated with low pain, low disease activity, high functional status and psychological well being (44-45). The strongest correlation was, as expected, with the emotional domain of the disease specific EASi-QoL. Contrary to the a priori hypothesis, the ASES-AS achieved only a moderate correlation with the HADS anxiety domain. It might be postulated that this is related to the less disease specific nature of the HADS.

Comparison of extreme groups supported the association between self-efficacy and higher social economic status such as employment and higher education attainment. Similarly, cross-sectional studies have reported better health outcomes to be associated with higher social economic status such as employment and level of education attainment (31-32). The mechanism by which socioeconomic status is associated with self-efficacy is unclear. Low socioeconomic status is unlikely to be the cause of poor self-efficacy outcomes, but may be considered to represent a surrogate marker for the many factors that may contribute, such as employment related strain, housing conditions, health and lifestyle habits, compliance with medical advice and coping strategies (46).

A moderate level of responsiveness was found for the ASES-AS, supporting the ability of the measure to detect change in self-reported self-efficacy over time. The longitudinal validity of the ASES-AS was supported by a significant correlation between self-efficacy and self reported change in AS-specific health, in agreement with the a priori hypothesis.

Although numerous PROMs are available to assess different domains of health in AS patients (37) no such AS-specific measure of self-efficacy exists. General measures of self-efficacy are available, such as the General Self-Efficacy Scale (GSES) (47). However in line with self-efficacy theory (4), that self-efficacy relates to specific behaviours and the situation in which they occur, an AS-specific self-efficacy scale should prove useful for research, clinical practice and healthcare provision (13-14). Although the ASES was originally developed for completion by North American patients with arthritis (11), there is growing evidence to support successful modification, evaluation and application of the ASES across a range of conditions such as fibromyalgia (42) and rheumatoid arthritis (48), and different populations and languages (18, 43, 49). An 8-item shortened version of the ASES has acceptable evidence of reliability and validity in Spanish speaking Hispanic-Americans with arthritis (43), and in a German population with fibromyalgia (42). In this study we modified the phraseology to better reflect AS patients' disease experience and to improve comprehension. These modifications have been carefully evaluated to support evidence of essential measurement properties before further application in routine practice or research settings (50). Selection of existing measures to inform validity of the ASES-AS was based on measures with good reported psychometric properties. The selected AS-specific instruments

have reported acceptable measurement properties (37). This newly developed ASES-AS may contribute to our understanding of AS more comprehensively. In addition, self-efficacy may be evaluated in a quantitative manner contributing to the multidimensional assessment of a patient's health status (51).

A comparison of health status across different rheumatic diseases is of interest in order to interpret differences in reported health status between patients with different rheumatic diseases (52). Such a comparison poses challenges. Differing instruments used to assess self-efficacy in different conditions has an effect on interpretation, resulting in difficulties in interpretation. The use of similar instruments modified specifically for a disease such as the original ASES for arthritis, and the modification we have developed the ASES-AS for AS, may prove useful to overcome some of the challenges of comparing and contrasting patients with different rheumatic diseases (53).

The study data may be influenced by a 'response bias'. The response rate was similar (64.0% *versus* 61.0%) to that reported in a previous study which modified the ASES short-form specific to patients with fibromyalgia (42). Although, the data collected has the potential to be affected by 'response bias', it is not possible to confirm/refute this as no information is available on non-responders. However response bias should not affect the validation assessment.

The study cohort was exclusively recruited from a secondary care sample, which may reflect a more severe presentation of AS, as compared to a community-based sample and less severe disease than a cohort derived from tertiary care centres. The influence of different health care settings on reported levels of self-efficacy is unknown, and this may need further evaluation prior to implementation in other settings and is an area of potential future study. The instrument's face validity was not assessed in this study, but no apparent difficulties with the mode of completion of the scale were demonstrated.

Self-efficacy is widely accepted as an important factor affecting health status and treatment outcomes, and as such has a considerable impact on healthcare outcomes. Accurate measurement of patient-reported outcome across health and disease is increasingly becoming an important medical and social issue.

This study has demonstrated the acceptability, reliability, validity and responsiveness of the ASES-AS, a modification of the 8-item ASES, following completion by people with AS attending secondary care centres across the UK. The measure can be recommended for application in research including clinical trials, and in secondary care if used at the group level.

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