Work disability in psoriatic arthritis: a systematic review

William Tillett1, Corinne de-Vries2 and Neil J. McHugh1,2

Abstract

Objective. Work disability (WD) is an important functional outcome measure in arthritis. There is a large body of information on WD in rheumatic diseases such as RA and AS; however, until now factors that influence WD in PsA have not been systematically reviewed. Our objective was to perform a systematic and critical review of the current literature on WD and its measurement in PsA.

Methods. A systematic literature search was conducted using Medline, Embase and Cochrane databases. The search strategy was supplemented by a manual search of cited articles. All original English language publications in the form of meta-analyses, randomized controlled trials (RCTs), observational studies and publications in abstract form were included. A quality assessment was made of the articles published in full form.

Results. Nineteen publications (nine in abstract form) were identified. There is intermediate quality evidence that levels of unemployment (20–50%) and WD (16–39%) are high and associated with longer disease duration, worse physical function, high joint count, low educational level, female gender, erosive disease and manual work. There is sparse low-quality evidence that WD is worse in those with PsA than psoriasis alone.

Conclusions. Disability at work in those with PsA is high; however, data on its associations are limited by the small number of reports and heterogeneity of data collected. Future work should focus on the validation of WD data collection tools for use in PsA.

Key words: psoriatic arthritis, work disability, employment, absenteeism, presenteeism.

Introduction

PsA is an inflammatory arthritis occurring in 7–42% of patients with psoriasis (PsO) [1]. Originally considered a benign disease, it is now recognized that PsA can be serious and progressive. Prospective studies have demonstrated progression of clinical joint scores and deteriorating functional status with increased disease duration [2–4]. Patients with PsA also suffer with PsO, which may itself cause significant physical, psychological, social and functional impairment [5].

Disability in the workplace inevitably has a significant impact on an individual’s quality of life and financial status as well as society as a whole [6]. There is increasing awareness that work disability (WD) in the form of absenteeism (time away from work) and presenteeism (reduced effectiveness at work) are important patient-centred, quality of life outcome measures in arthritis. Outcome measures in rheumatology (OMERACT) have included participation in the core set of outcome measures in PsA [7]. While there is a large body of information on the burden of WD and the validity of measurement tools in related rheumatic diseases such as RA and AS [8], to date there are few data on WD in PsA [9, 10]. Assessment and validation of WD outcome measures in PsA warrant separate examination given the features that make PsA a unique disease such as associated PsO, heterogeneity of disease phenotype and comorbidities such as depression, metabolic and cardiovascular disease.

There are a number of observational cohort and controlled PsA studies that have measured aspects of WD though the current body of evidence on WD in PsA has not yet been synthesized. This review describes a systematic and critical review of the current literature on the burden of WD and its measurement in PsA.
Methods

Search strategy

A search was performed on 2 December 2010 in the Medline (1950 to present), Embase (1988 to present) and Cochrane databases using the following MeSH indexing and keyword terms, respectively: ‘arthritis, psoriatic’, ‘psoriatic arthritis’, ‘work’, ‘employment’, ‘absenteeism’ and ‘presenteeism’. The search strategy was supplemented by a manual reference search of cited articles. All original English language publications in the form of meta-analyses, randomized controlled trials (RCTs) and observational studies were included. Following review of the abstracts all original articles that contained data on WD in PsA were included for final review. Review articles, those not specific to PsA or not related to WD were excluded. Publications in abstract form are included; however, they have not been subject to the same peer review process as fully published articles. In order to accommodate this and avoid placing undue weight on these data, the abstracts have not been subject to quality assessment and are described separately in the Results section and tables.

Quality assessment

Due to the differing methodologies employed, meta-analysis was not possible. Given the limited amount of published information on WD in PsA, we deemed it unfeasible to exclude articles with methodological weakness without significantly limiting the information available. Therefore, we have performed a quality assessment based on the presence of seven quality criteria: use of diagnostic criteria for PsA, analysis made only on those of working age, response rate >80% or loss to follow-up <30%, WD defined as due to PsA, use of external WD assessment, avoidance of recall bias and avoidance of confounding. Confounding was considered to be avoided if data were collected and analysed on more than three contextual factors that may influence WD including but not limited to: type of work, assistance at work, education, earnings, depression and comorbidities. An aggregate score out of 7 was generated. Study quality was stratified into three levels: low <3, intermediate 3–4 and good >5. The criteria used in this study are based on previously published critical reviews of prognostic markers of WD in rheumatic disease [11, 12].

Results

Search results

The search identified 260 titles, of which 94 were duplicates. Of 166 unique results, 145 were excluded at abstract review as not specific to PsA, not related to WD and review articles. Twenty-one original articles were included for full-text analysis and two further articles were excluded using the same criteria [13, 14]. Thus, 19 studies were included for final review. Ten studies were published in full form and nine in conference abstract form; no Cochrane reviews or meta-analyses were identified (Fig. 1).

Studies included

The 10 articles published in full included 8585 patients with PsA (Table 1). Study quality and WD associations are summarized in Table 2. There was considerable variability in the work outcome measures used. Furthermore, authors occasionally labelled the same work outcome differently. The term WD may be the label given to disability benefit collection [10] or alternatively not working due to ill-health [15] or even a self-explanatory term not clarified in the methodology [16]. In this review, we have made the exact measure used in each study explicit (Table 1).

Seven studies reported rates of unemployment ranging from 20 to 50% [15–21]. Only two cohort studies specifically reported on unemployment caused by PsA rather than all causes; these studies reported unemployment levels of 22% [21] and 23% [18]. Seven studies measured absenteeism (working individuals not currently at work) [15–17, 19–22]. Two studies measured presenteeism [17, 19]. Two studies used external objective measures of WD (disability benefit/ill-health benefit collection) [10, 18].

The study quality assessment is summarized in Table 3. Of the 10 fully published articles, only one study reached good-quality status [19], two studies were of intermediate quality [10, 21] and seven of low quality [15–18, 20, 22, 23]. WD was the primary outcome measure in only four studies [10, 15, 18, 23].

Age

One cohort study [15] investigated the relationship between age and WD and found no association.

Disease duration

Three studies [10, 15, 23] reported on the association between WD and disease duration. A cross-sectional Norwegian database study identified longer disease duration independently predicated WD as defined by disability benefit collection [10]. In a German study of patients with rheumatic disease, a reduced standardized employment ratio (SER) was demonstrated with increased disease duration irrespective of gender or geographical location (SER falling from 0.94 at 5 years to 0.70 at 10 years in men) [23]. However, no such association was seen in the British Society for Rheumatology Biologics Register (BSRBR) study of WD [15]. There are no studies investigating WD in early PsA.

Joint count and radiographic damage

One study reported a positive association between a high 28-joint DAS (DAS-28) count and WD [15]. One study reported higher levels of WD in those with axial vs peripheral PsA (39 vs 59%) [21] and another higher rates in ‘deforming PsA’ 62% vs DIP joint and RA-like patterns 3% [22]. One cross-sectional study reported an independent association between those with WD and erosive disease [10].

Physical function and quality of life

Two studies investigated the association between WD and physical function (HAQ) [10, 15]. Both studies reported a positive association independent of other
measured parameters. One further study [17] reported a positive association between the EQ5D (EuroQol) health utility questionnaire and WD independent of age and gender. It should be noted that such a correlation would be expected as contained within the EQ5D is a question referring to problems with usual activities including work.

Psoriasis

Two cross-sectional studies compared WD in patients with PsA as compared with PsO alone [17, 20]; both reported increased work problems in those with PsA. A large cross-sectional study of 2009 patients with PsO included data on 338 PsA patients [20]. Fifty per cent of those with PsA were working vs 60% of those with PsO [20]. Of those working, significantly more patients in the PsA group had taken time off work during the preceding year (25 vs 12%). The questionnaire for this study did not specify being unfit for work/periods of absence from work specifically due to PsO rather than PsA, which may have biased the results. The second study also reported more work problems in the PsA group (32%) vs PsO alone (11%) \( (P = 0.0005) \) [17]. No studies have investigated the relative contribution of skin and joint disease to WD in patients with PsA; however, the Infliximab Multinational Psoriatic Arthritis Trial (IMPACT) did demonstrate less WD in those who achieved both 20% improvement in ACR response criteria (ACR 20) and 75% improvement in the Psoriasis Area and Severity Index (PASI 75) rather than one or neither outcome [19].

Treatment effect

One RCT [19] and one observational study [15] investigated the effects of anti-TNF treatment on WD. Analysis from the IMPACT RCT study investigating the efficacy and safety of infliximab in PsA reported on working status, sick days, productivity visual analogue scale (VAS) and patient-reported employability (out of work but could work) [19]. Productivity improved between baseline and 14 weeks by 67% in treatment arm vs 9% in placebo (median VAS improvement 2.6 vs 0.3). The BSRBR measured WD in patients with PsA, RA and AS over the first 3 years of biologic therapy [15]. Baseline disability of the 229 patients with PsA was 39%. The study did not demonstrate significant change in work status over 3 years. Nine working patients became work disabled (6.9%) and six work-disabled patients started working (6.1%).

Environmental factors

There are very limited data on the role of environmental factors such as type of work, support at work, job satisfaction or labour market fluctuation on WD. The study by Mau et al. [23] reported large differences in SER across the economic divide of the old and new federal states in Germany. BSRBR data demonstrated an increased rate of becoming WD in those with manual vs non-manual jobs [15].
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample Size</th>
<th>Follow-up</th>
<th>Country</th>
<th>Age (mean years)</th>
<th>Disease duration (mean years)</th>
<th>Work measure</th>
<th>Work Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christophers et al. [17]</td>
<td>CS</td>
<td>53</td>
<td>NA</td>
<td>Multinational</td>
<td>49</td>
<td>NA</td>
<td>EDQ</td>
<td>59% PsA patients unemployed</td>
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<td></td>
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<td></td>
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<td></td>
<td>32% PsA WD</td>
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<td></td>
<td></td>
<td>11% PsO WD</td>
</tr>
<tr>
<td>Gottlieb et al. [16]</td>
<td>CS</td>
<td>1122</td>
<td>NA</td>
<td>USA</td>
<td>48</td>
<td>7.2</td>
<td>Disability and employment</td>
<td>0.4% temporarily disabled, 4% disabled, 8% unemployed</td>
</tr>
<tr>
<td>Kaarela et al. [18]</td>
<td>PC</td>
<td>13</td>
<td>7.6 years</td>
<td>Finland</td>
<td>37</td>
<td>NA</td>
<td>Disability pension collection: Ill-health retirement Absenteeism</td>
<td>69% of PsA patients were at work compared with 36% RA and 85–90% AS</td>
</tr>
<tr>
<td>Kavanaugh et al. [19]</td>
<td>RCT</td>
<td>200</td>
<td>14 weeks</td>
<td>USA</td>
<td>47</td>
<td>5.9</td>
<td>Sick days</td>
<td>16–19% work disabled and 27–33% unemployed; productivity improved by:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Productivity VAS Employability Employment</td>
<td>67% in treatment arm vs 9% in placebo</td>
</tr>
<tr>
<td>Mau et al. [23]</td>
<td>CS</td>
<td>6041</td>
<td>NA</td>
<td>Germany</td>
<td>45</td>
<td>NA</td>
<td>SER</td>
<td>PsA had reduced employment (SER 0.92)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PsA (0.94) vs RA; SLE, granulomatosis with polyangiitis and SSc (0.76–0.81).</td>
</tr>
<tr>
<td>Radtke et al. [20]</td>
<td>CS</td>
<td>338</td>
<td>NA</td>
<td>Germany</td>
<td>53</td>
<td>NA</td>
<td>Employment, absenteeism,</td>
<td>50% of PsA patients working vs 60% of those with PsO.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>25% of working PsA patients had taken time off work vs 12% of those with PsO</td>
</tr>
<tr>
<td>Roberts et al. [22]</td>
<td>PC</td>
<td>168</td>
<td>1–10 years</td>
<td>UK</td>
<td>NA</td>
<td>NA</td>
<td>Employment, absenteeism,</td>
<td>&gt;1 year of work time was lost</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>62% of those with ‘deforming arthritis’ vs 3% with DIP Joint and RA like</td>
</tr>
<tr>
<td>Verstappen et al. [15]</td>
<td>PC</td>
<td>254</td>
<td>3 years</td>
<td>UK</td>
<td>45</td>
<td>14</td>
<td>Patient-reported disability</td>
<td>39% WD</td>
</tr>
<tr>
<td>Wallenius et al. [10]</td>
<td>CS</td>
<td>271</td>
<td>NA</td>
<td>Norway</td>
<td>36</td>
<td>6</td>
<td>Disability benefit collection</td>
<td>33% women and 17% men WD</td>
</tr>
<tr>
<td>Zhu et al. [21]</td>
<td>RC</td>
<td>125</td>
<td>1 year</td>
<td>Hong Kong</td>
<td>48</td>
<td>6.9</td>
<td>Employment</td>
<td>59% of those with peripheral disease were employed vs 39% of those with axial disease</td>
</tr>
</tbody>
</table>

RCT: R; PC: Prospective Cohort; RC: Retrospective Cohort; CS: Cross sectional Cohort; C: Case series/report; N/A: Not available.
| Study                | Phenotype | High Joint count | Poor physical function (HAQ) | Low educational level | Female gender | Erosive disease | Disease duration | Manual work | Were CASPAR or Moll and Wright diagnostic criteria used | Was the sample representative of working age (WD analysis limited to >18 and <65 years) | Was baseline response >80% or loss to follow-up <30%? | Was WD defined as due to PsA? | Were external criteria used to assess WD? | Was recall bias avoided? | Was confounding avoided? | Quality score |
|---------------------|-----------|------------------|-----------------------------|-----------------------|---------------|----------------|-----------------|-------------|-----------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------|---------------------------|-------------------------------|---------------------------------|---------------------------|-----------------|---------------|
| Christophers et al. [17] | –         | –                | –                           | –                     | –             | –              | –               | –           | –                                                  | –                                                                                | +                             | –                         | –                            | –                               | –                         | 1               |
| Gottlieb et al. [16]  | –         | –                | –                           | –                     | –             | –              | –               | –           | –                                                  | +                                                                                | –                             | –                         | –                            | –                               | –                         | 2               |
| Kaarela et al. [18]   | –         | –                | –                           | –                     | –             | –              | –               | –           | –                                                  | –                                                                                | –                             | +                         | +                            | –                               | –                         | 2               |
| Kavanaugh et al. [19] | –         | –                | –                           | –                     | –             | –              | –               | –           | +                                                  | –                                                                                | +                             | –                         | +                            | +                               | +                         | 5               |
| Mau et al. [23]       | –         | –                | –                           | –                     | –             | +              | –               | –           | –                                                  | +b                                                                               | –                             | +                         | –                            | –                               | –                         | 2               |
| Radtke et al. [20]    | –         | –                | –                           | –                     | –             | –              | –               | –           | –                                                  | –                                                                                | –                             | –                         | –                            | –                               | –                         | 0               |
| Roberts et al. [22]   | +         | –                | –                           | –                     | –             | –              | –               | +           | –                                                  | –                                                                                | –                             | –                         | –                            | –                               | –                         | 1               |
| Verstappen et al. [15]| +         | +                | –                           | –                     | +             | –              | +               | –           | +                                                  | –                                                                                | –                             | –                         | –                            | +                               | +                         | 2               |
| Wallenius et al. [10] | –         | +                | +                           | +                     | +             | +              | +               | +           | –                                                  | –                                                                                | –                             | +                         | +                            | +                               | +                         | 3               |
| Zhu et al. [21]       | +         | –                | –                           | –                     | –             | –              | –               | –           | +                                                  | –                                                                                | –                             | –                         | –                            | –                               | –                         | 3               |

If the information was not available or collected but not analysed a negative answer has been assumed.

(1) Confounding is considered to be avoided if >3 contextual factors that may influence WD have been corrected for, including: Work type, Assistance at work, Education, Earnings, Comorbidities, Depression.

(2) *Although data on confounders were not collected, we assume randomization has been effective in mitigating confounding.*

*Although this was a UK biologics registry trial, diagnostic criteria are not required to qualify for anti-TNF therapy.*
<table>
<thead>
<tr>
<th>Source</th>
<th>Study design</th>
<th>Number of patients</th>
<th>WD data collected</th>
<th>Follow-up</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brodszky et al. [29]</td>
<td>CS Cost of illness in PsA</td>
<td>183</td>
<td>Sick Leave, reduced hours, disability benefit</td>
<td>NA</td>
<td>49% of total cost was due to WD</td>
</tr>
<tr>
<td>Gladman et al. [24]</td>
<td>RCT</td>
<td>127</td>
<td>WLQ</td>
<td>12 weeks</td>
<td>23% unemployed</td>
</tr>
<tr>
<td>Sampalis et al. [27]</td>
<td>Subanalyses from ACCLAIM</td>
<td></td>
<td></td>
<td></td>
<td>WLQ was reliable and correlated well with patient global activity</td>
</tr>
<tr>
<td>Gladman et al. [30]</td>
<td>PC Study of etanercept in PsA</td>
<td>110</td>
<td>HLQ</td>
<td>2 years</td>
<td>Reduction in frequency of absenteeism after 2 years treatment</td>
</tr>
<tr>
<td>Gladman et al. [25]</td>
<td>RCT Subanalyses from ACCLAIM</td>
<td>127</td>
<td>WLQ</td>
<td>12 weeks</td>
<td>Improvement of WLQ after 12 weeks of adalimumab therapy</td>
</tr>
<tr>
<td>Kavanaugh et al. [26]</td>
<td>RCT GOREVEAL</td>
<td>450</td>
<td>Employability Productivity Absenteesim</td>
<td>1 year</td>
<td>Improvement in productivity, employability and reduced absenteeism at Week 24</td>
</tr>
<tr>
<td>Kumar et al. [31]</td>
<td>CS Willingness to pay</td>
<td>72</td>
<td>Employment</td>
<td>NA</td>
<td>WTP was highest for intimacy, physical comfort, social comfort, emotional health and ability to sleep (median $1000 each)</td>
</tr>
<tr>
<td>Strober et al. [28]</td>
<td>RCT Subanalyses from CHAMPION and REVEAL</td>
<td>847 PsO patients</td>
<td>WPAI</td>
<td>NA</td>
<td>The presence of any comorbidity in those with PsO (including PsA) had impaired quality of life and worse work productivity.</td>
</tr>
<tr>
<td>Tang et al. [32]</td>
<td>CS Study from the 2008 National Health and Wellness Survey</td>
<td>413</td>
<td>WPAI</td>
<td>NA</td>
<td>413 (0.66% of 62,000 respondents) had PsA: average work productivity loss of 42.9% average activity impairment of 54.1%</td>
</tr>
</tbody>
</table>

R: RCT; PC: prospective cohort; RC: retrospective cohort; CS: cross-sectional cohort; C: case series/report; WLQ: Work Limitations Questionnaire; HLQ: Health and Labour Questionnaire; WPAI: Work Productivity Activity Index; WTP: willingness to pay; NA: not applicable.

Work disability in PsA

Personal factors

Limited information is available on the association of WD and gender, marital status, education and earnings in PsA patients. Two large cohort studies have reported female gender to be independently associated with WD [10, 15]. Two cohort studies have reported low educational level to be independently associated with WD [10, 23] and one with greater cost of illness [21]. The IMPACT study noted no difference in WD between genders after 14 weeks of treatment [19].

Comparison with other rheumatic diseases

Two prospective cohort studies [15, 18] and one cross-sectional study [23] have compared WD in PsA with other rheumatic diseases. One long-term follow-up study reported that 69% of PsA patients were at work compared with 36% of RA and 85–90% of AS patients [18]. This study contained only 13 patients with PsA. The BSRBR registry reported high levels of WD in 39% of PsA patients compared with 41% of AS patients, 49% of RA patients [15]. Mau et al. [23] used the SER to compare WD in those with PsA, RA, AS, granulomatosis with polyangiitis (Wegener’s), SLE and SSC. Those with PsA had reduced employment (SER 0.92) at a level equivalent to AS (0.94), but better than RA, SLE, granulomatosis with polyangiitis and SSC (0.76–0.81).

Fatigue, depression and comorbidities

No studies have investigated the potential relationship between WD and fatigue, depression and comorbidities.

Data published in abstract form

Nine studies relating to WD in PsA were published in abstract form. The primary findings are summarized in Table 3. They confirm high rates of unemployment and disability reported in the fully published studies. Interestingly, these high rates are present irrespective of study design: biologic RCTs [24–28], cohort studies [29–31] or population studies [32]. Two aspects are noteworthy from these abstract data. First, the emerging use of standardized WD questionnaires. The abstracts include data collected with: the work productivity activity index (WPAI) [28, 32, 33], work limitations questionnaire (WLQ) [24, 27], employment disadvantages questionnaire (EQD) [17] and health and labour questionnaire (HLQ) [30]. Only one of these studies undertook a validation exercise and these data have been published in two abstracts [24, 27] (Table 3). The WLQ was found to demonstrate reliability and sensitivity to change. There was a significant linear relationship between the WLQ index and patient global assessment (PGA). For every 6.5% improvement in PGA, there was a 10% improvement in WLQ index ($P < 0.001$). The second finding of interest is the possibility that medical treatment can mitigate WD. The GOREEAL RCT reported improvement in productivity at Week 24 and additional improvements in time lost from work and employability at Week 52 [34]. The ACCLAIM RCT demonstrated an improvement in presenteeism independent of age, gender or disease duration at 12 weeks [24, 25, 27]. Finally, a study of etanercept showed reduced absenteeism after 2 years; baseline: 0.8 days (±2.5 days) within the prior 2 weeks falling to 0.2 days (±1.5 days) at Month 24 [30].

Discussion

Employment is highly contextualized with multiple potential contributory factors that may influence an individual’s level of function or indeed readiness to reduce their working hours. Such factors may include age and proximity to retirement, desire to work, support and flexibility of the employer, family and financial circumstances, education, ability to be flexible in role at work, the extent of, and access to, benefits as well as the current local economic climate. It is on this background that we attempt to measure WD in patients with PsA.

WD was the primary outcome measure in only four studies [10, 15, 18, 23]. The study by Wallenius et al. [10] is a large cross-sectional study measuring disability benefit collection. This is an important study that has identified a number of WD associations (Table 2). The study weaknesses should be noted including: disability pension measure was not specific to PsA; clinical diagnosis rather than diagnostic criteria for PsA were used for entry into the database; and the age range included was not full working age (18–45) raising the potential for selection bias. The study by Verstappen et al. [15] investigates WD during the first 3 years of anti-TNF therapy. WD was high (39%) and did not change over the 3 years of treatment. This negative result may in part be related to the timing of the baseline data. Recruitment was determined as ‘within 6/12’ of starting therapy; therefore, although the study was prospective in design there is a potential here of missing the point of maximal disability before biologics and introducing recall bias despite the prospective study design. The 1987 study by Kaarella et al. [18] is a Finnish cross-sectional study of inflammatory arthritis. Sixty-nine per cent of PsA patients were at work compared with 36% of RA and 85–90% of AS patients. This study is limited by the very small numbers (13 patients with PsA) and calendar bias. Finally, the elegant study by Mau et al. [23] measuring employment status on 6041 PsA patients was compared with RA, AS, granulomatosis with polyangiitis, SLE and SSC using a SER. An SER of 1 would mean no difference from the regional average. Those with PsA had reduced employment at a level equivalent to AS but better than RA, SLE, granulomatosis with polyangiitis and SSC. The study uses an objective measure but is weakened by the lack of objective diagnostic criteria at entry and the limited scope of WD information collected.

It is apparent that the broad spectrum and variable use of terminology is hindering our understanding of WD in PsA. The majority of the studies report on WD though this may be the umbrella term for: benefit collection, percentage unemployed, frequency of absenteeism, self-reported disability, employability or the index values of a composite score. The most frequently reported measures of WD are employment status (in work or not), absenteeism and to a lesser extent productivity/
Presenteeism and disability benefit or retirement collection. A common theme of the more recent studies has been the inclusion of a presenteeism measure. Only two of the trials published in full form assessed presenteeism [17, 19] though six of the RCTs published in abstract form included this measure [24, 27, 28, 30, 32, 34]. Presenteeism is an appealing concept as it is arguably the most feasible and responsive patient-reported centred WD measure. Absolute levels of employment and absenteeism are likely to be less responsive than presenteeism.

When we consider the use of questionnaires to measure WD a large number are available [35], though none is validated for use in PsA. Of the WD measures used in PsA only WLQ has been subject to any form of validation exercise published in abstract form [25, 27]. This problem is not isolated to PsA. Despite high-quality validation exercises for WD data collection in other diseases such as the WPAI in AS [36], there is still work required to identify a fully validated questionnaire. Recent data comparing estimates of presenteeism reported poor correlation between WLQ, HLQ, HPQ and WPAI [37]. Although there are a number of measures available and there was consensus at OMERACT 9 that WD is an important measure [35] no single tool has yet been endorsed.

The quality assessment process has identified a theme of common weaknesses in the WD data included in these studies. The purpose of our quality assessment was to assist the interpretation of the WD data within each study not to assess the overall quality of the study itself. Table 2 emphasizes that despite the apparently moderate number of publications there are common themes that weaken the results. Lack of diagnostic criteria for PsA, failure to apply analysis to the working-age population and failure to account for potential confounding factors are the most frequent study deficits. It should be highlighted that our quality assessment has some weaknesses. First, confounding is not avoided by simply accounting for three or more contextual factors though we felt it important that studies collect data and analysed for potential confounders given the large number of biological, psychosocial influences on WD. Secondly, we have assumed that defining WD as due to PsA is positive, though due to the complex interplay between PsA and its associated comorbidities restricting the outcome in this way may underestimate the burden of disability. Finally, the divisions of quality level, though necessary for reporting, are arbitrary. The use of quality scores has been debated [38]; however, the technique allows analysis of a topic where sparse information is available.

In conclusion, two factors make the synthesis of WD in PsA difficult. First, the heterogeneity of the data currently reported and secondly the contextual nature of WD itself with multiple potential known and unknown biological, psychological and social confounders. This systematic critical review has synthesized the current body of evidence for WD in PsA. We find intermediate quality evidence that WD in PsA is high and is associated with longer disease duration, high HAQ, high joint count, low educational level, female gender, erosive disease and manual work. There is sparse low-quality evidence that WD may be worse in those with PsA than PsO alone. There is no data on WD in early PsA, the relative contribution of PsO in those with PsA or the role of other comorbidities such as fatigue, depression or the metabolic syndrome. The evidence that disability at work is mitigated by treatment is limited to a small number of short-duration biologic RCTs. There are no WD data collection tools that fulfil the OMERACT criteria for validity for use in PsA. Future study of WD in PsA should focus on validating an assessment tool that can be used to capture data on employment, presenteeism and absenteeism.

### Rheumatology key messages

- Levels of unemployment and WD are high in PsA.
- WD in PsA is associated with both disease and social factors.
- A validated assessment tool is required to accurately measure PsA-related WD.

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