The WORKWELL programme: a randomised controlled trial of job retention vocational rehabilitation for people with inflammatory arthritis

HAMMOND, Alison <http://orcid.org/0000-0002-5266-9991>, PARKER, Jennifer <http://orcid.org/0000-0002-2235-5748>, COTTERILL, Sarah <http://orcid.org/0000-0001-5136-390X>, SUTTON, Chris <http://orcid.org/0000-0002-6406-1318>, MIRZA, Selman <http://orcid.org/0009-0000-4314-3640>, CHING, Angela <http://orcid.org/0000-0002-3765-2534>, O'NEILL, Terence W <http://orcid.org/0000-0002-8896-4677>, HOLLAND, Fiona <http://orcid.org/0000-0003-2702-307X>, MARSDEN, Antonia, HOLLAND, Paula <http://orcid.org/0000-0002-8324-9957>, RADFORD, Kathryn <http://orcid.org/0000-0001-6246-3180>, VERSTAPPEN, Suzanne M M <http://orcid.org/0000-0001-6181-0646>, EDEN, Martin <http://orcid.org/0000-0002-1542-2527>, DALAL, Garima <http://orcid.org/0000-0002-4073-4215>, BATTISTA, Simone <http://orcid.org/0000-0002-7471-1951>, CULLEY, June, WALKER-BONE, Karen <http://orcid.org/0000-0002-5992-1459>, WOODBRIDGE, Sarah <http://orcid.org/0000-0002-6843-0395>, O'BRIEN, Rachel <http://orcid.org/0000-0002-4720-1956>, HOUGH, Yvonne and PRIOR, Yeliz <http://orcid.org/0000-0001-9831-6254>

The WORKWELL programme: a randomised controlled trial of job retention vocational rehabilitation for people with inflammatory arthritis.

Alison Hammond[1, 2], Jennifer Parker[1, 2], Sarah Cotterill[3], Chris Sutton[4], Selman Mirza[3], Angela Ching[1, 2], Terence W O'Neill[5,6] Fiona Holland[3], Antonia Marsden[3], Paula Holland[7] Kathryn Radford[8,9], Suzanne M.M. Verstappen[5,6], Martin Eden[10] Garima Dalal[10], Simone Battista[1,2], June Culley[11], Karen Walker-Bone [12, 13], Sarah Woodbridge[1,2] , Rachel O-Brien[14], Yvonne Hough[15] Yeliz Prior[1,2]

1. Centre for Human Movement and Rehabilitation, School of Health and Society, University of Salford, Salford, United Kingdom,
2. Versus Arthritis/MRC Centre for Musculoskeletal Health and Work, University of Salford, Salford, United Kingdom,
3. Centre for Biostatistics, School of Health Sciences, The University of Manchester, Manchester, United Kingdom,
4. Lancashire Clinical Trials Unit, Allied Health Research Hub, University of Central Lancashire, Preston, United Kingdom,
5. Centre for Epidemiology Versus Arthritis, Centre for Musculoskeletal Research, The University of Manchester, Manchester, United Kingdom,
6. NIHR Manchester Biomedical Research Centre, Manchester University NHS Foundation Trust, Manchester Academic Health Science Centre, Manchester United Kingdom,
7. Faculty of Health and Medicine, Lancaster University, Lancaster, United Kingdom,
8. Centre for Rehabilitation and Ageing Research, School of Medicine, University of Nottingham, Nottingham, United Kingdom,
9. NIHR Nottingham Biomedical Research Centre, Nottingham, United Kingdom.
10. Manchester Centre for Health Economics, The University of Manchester, Manchester, United Kingdom,

11. Patient Research Partner, Derby, United Kingdom,
12. Monash Centre for Occupational and Environmental Health, Monash University, Melbourne, Australia
13. Versus Arthritis/MRC Centre for Musculoskeletal Health and Work, University of Southampton, Southampton, United Kingdom
14. School of Health and Social Care, Sheffield Hallam University, Sheffield, United Kingdom,
15. Occupational Therapy, St Helens & Knowsley NHS Trust, St Helens Hospital, St Helens, United Kingdom.

Corresponding author details:

Full name: Professor Yeliz Prior

Postal address: PO.54 Brian Blatchford, Frederick Road Campus, The University of Salford, Salford, UK.

Email address: y.prior@salford.ac.uk

Alison Hammond: 0000-0002-5266-9991

Jennifer Parker: 0000-0002-2235-5748

Sarah Cotterill: 0000-0001-5136-390X

Chris Sutton: 0000-0002-6406-1318

Selman Mirza: 0009-0000-4314-3640

Angela Ching: 0000-0002-3765-2534

Terence O'Neill: 0000-0002-8896-4677

Fiona Holland: 0000-0003-2702-307X

Antonia Marsden: 0000-003-3955-2649

Paula Holland: 0000-0002-8324-9957

Kathryn Radford: 0000-0001-6246-3180

Suzanne Verstappen: 0000-0001-6181-0646

Martin Eden: 0000-0002-1542-2527

Garima Dalal: 0000-0002-4073-4215

Simone Battista: 0000-0002-7471-1951

Karen Walker-Bone: 0000-0002-5992-1459

Sarah Woodbridge: 0000-0002-6843-0395

Rachel O'Brien: 0000-0002-4720-1956

Yeliz Prior: 0000-0001-9831-6254

Objective: People with inflammatory arthritis (IA) frequently experience work instability, absenteeism, and reduced productivity, culminating in early job loss. This study evaluated the effectiveness and cost-effectiveness of WORKWELL job retention vocational rehabilitation (JRVR) delivered by occupational therapists, compared to a control group receiving written self-help advice.

Methods: A pragmatic, multi-centre randomised controlled trial was conducted across 18 UK NHS Trusts. Employed adults (n=249) with IA experiencing moderate to severe work instability, were randomised (1:1) to intervention or control groups. WORKWELL included structured work assessment, individually tailored action plans, and interventions over 2-4 months. Follow-up was at 6, 12, and 36 months. The primary outcome was the Work Limitations Questionnaire-25 (WLQ-25). Analyses used linear mixed-effects regression adjusted for baseline characteristics and occupational skill level. An NHS perspective was used for the within-trial cost-effectiveness analysis. Much of the trial was affected by the COVID-19 pandemic.

Results: At 12 months, there was no significant difference in WLQ-25 between groups (adjusted mean difference: -1.8; 95% CI -7.4 to 3.8; p=0.53), or in most secondary outcomes at 12- or 36-months. However, absenteeism showed a relative reduction of 46% at 12 months (p=0.08), and employment retention at 36 months was higher in the intervention (93%) vs. control group (85%). The intervention was not cost-effective from an NHS perspective.

Conclusion: WORKWELL did not lead to improved work productivity compared to self-help advice. Future research should explore more flexible delivery methods, including digital tools,

to support sustainable employment for people with IA. A plain-language abstract is available in the supplementary material.

Trial registration: ClinicalTrials.gov; NCT03942783. ISRCTN Registry; ISRCTN61762297.

Keywords: Inflammatory arthritis; Vocational rehabilitation; Job retention; Occupational therapy; Randomised controlled trial; Work productivity; Presenteeism; Employment outcomes; Self-management; Rheumatology rehabilitation

Key Messages:

1. The WORKWELL wasn't effective or cost-effective in the NHS, though wider societal benefits remain unmeasured.
2. At 36 months, most participants in both groups remained in paid work, with no significant differences between the intervention and control arms.
3. Future approaches to supporting work participation in people with inflammatory arthritis should explore more flexible, scalable delivery models, including digital self-help tools.

Introduction

Work ability decreases in employed people with inflammatory arthritis (IA). Amongst those with rheumatoid arthritis (RA), 40-67% experience presenteeism (reduced work productivity), 30-84% absenteeism, and 50% stop working within 4.5-22 years of diagnosis, despite modern medication [1-3]. Employment rates have changed little from 1980 to 2022 [4].

Job retention vocational rehabilitation (JRVR) is a work-focused intervention helping employed individuals with health conditions stay in work by addressing job-related challenges through tailored support, workplace strategies, and self-management. As work impacts occur early, JRVR can potentially keep people with IA working. The European Alliance of Associations for Rheumatology (EULAR) recommends using the biopsychosocial framework of health to address work needs, sustain work ability and productivity, and prevent long-term absence [5]. Two recent systematic reviews highlighted inconsistent results of JRVR in IA [6,7]. Two Dutch trials of multidisciplinary JRVR (n=150;1-2y follow-up) showed no evidence of effect on work outcomes [8-10]. In one, initially 40% of participants were on long-term sick leave, meaning JRVR was potentially too late [8]. In the other, initially 50% had little presenteeism and work instability (a mismatch between ability and job demands), suggesting JRVR was too early [10]. Two small UK trials (n ≤55) with short follow-up (6-9m), recruiting participants with moderate to severe work instability indicated beneficial effects on presenteeism [11,12]. Two longer US trials (2-4.5y follow-up) reduced job loss [13,14], although not presenteeism [15]. Interventions in the latter four trials tested JRVR delivered by a single professional (either a VR counsellor, occupational therapist or physiotherapist). The findings suggest that tailored JRVR, delivered by a consistent professional with VR training, have some beneficial effects on work outcomes. Cost-effectiveness evidence is required for resource allocation decision-making [15].

Work participation is a complex interplay between biopsychosocial consequences of health-related, personal and environmental contextual factors [16]. These factors help explain the impact of arthritis on work participation and can modify the effects of work-focussed interventions [17-19]. Factors influencing remaining in work and fewer work limitations include younger age (<50 years), higher education, shorter disease duration, no comorbidities, lower disease activity, less pain, less fatigue and better function, better psychological status, less physically and mentally demanding jobs, higher work self-efficacy, and workplace support [4, 20, 21]. EULAR guidance recommends including such factors in trials of work outcomes in IA to examine their effects [22]. These findings highlight that work participation is determined by interacting clinical, personal and occupational factors, rather than disease status alone. Interventions aiming to improve work outcomes therefore need to address this broader context, including workplace demands, individual capacity, and self-management. Vocational rehabilitation interventions are designed to target these multiple determinants by supporting individuals to adapt work tasks, manage symptoms, and negotiate workplace adjustments.

The aims of this study were to: (i) examine the effects of WORKWELL JRVR on presenteeism and other work outcomes at 6-, 12- and 36-months post-randomisation among people with IA experiencing work instability; (ii) investigate what contextual factors (if any) influenced the results; and (iii) assess the cost-effectiveness of WORKWELL for resource allocation decision-making.

Method

Study design and ethics.

The WORKWELL trial was a definitive, pragmatic, multi-centre superiority randomised controlled trial (RCT). Ethical approval was obtained on 15/11/2018 (West Midlands – Solihull Research Ethics Committee:18/WM/0327). Participants were recruited from 18 National

Health Service (NHS) Trust rheumatology departments in England, Wales, and Scotland. Sites opened from February to August 2019, following each site's approval. Initially, a 12m follow-up was approved, with 36m follow-up approved later. The first participant was randomised in March 2019, and the last in February 2021. The last 12m questionnaire was returned in March 2022, and last 36m questionnaire in March 2024. Trial and process evaluation protocols have been published [23, 24]. The CONsolidated Standards of Reporting Trials (CONSORT) reporting guidelines were followed [25, 26].

Participants

Inclusion criteria were: aged ≥18 years, diagnosed with RA, early IA (EIA, i.e., not meeting full diagnostic criteria for RA but treated as if RA) or psoriatic arthritis (PsA) by a rheumatology consultant; in paid work for ≥ 15 hours/ week; and experiencing work instability (score ≥10 on the RA-Work Instability Scale (RA-WIS), i.e., at medium to high risk of work instability meaning JRVR is appropriate) [27]. Exclusion criteria were on long-term sick leave (> four weeks); retiring in ≤12m; and already receiving JRVR. Rheumatology clinicians or therapists identified patients during appointments, from department databases, or medical or therapy records. Patients were provided with an invitation letter and information sheet. If interested, they were screened (in person or by telephone) by an NHS research practitioner, therapist, or member of the research team, and the study explained. Eligible patients provided written consent. The baseline questionnaire was completed at home and mailed to the trial manager. Freepost envelopes were provided throughout the trial for postal returns.

Recruitment primarily occurred through NHS rheumatology services. During the COVID-19 pandemic, when recruitment slowed due to reduced clinical capacity and fewer eligible patients in employment, additional participants were recruited through two national arthritis charities. These organisations disseminated study information to individuals with IA who were invited to contact the research team directly for eligibility screening.

Interventions

Both groups continued receiving usual care.

Control group

Participants received a work self-help information pack about coping at work, sources of help and employment rights, with a letter encouraging them to read the booklets enclosed, identify work problems and find solutions [24].

Intervention group

Participants received the same information pack. WORKWELL sessions were held in person, with flexible appointment times, usually at the applicable Therapy department. JRVR included a structured work assessment (the Work Experience Survey–Rheumatic Conditions (UK WES-RC) [28], prioritised goals, and tailored support including self-management, job accommodations, and employer communication. Up to four sessions were delivered over 2–4 months, followed by a brief telephone review. A work site visit and/or letters for employers about work support recommended were offered, if required [23, 24].

Therapist training

Occupational therapists, with experience supporting employed people with IA, delivered WORKWELL. Beforehand, therapists completed a JRVR training programme, demonstrated competency in a mock WES-RC and JRVR plan. Ongoing support was available via mentoring, peer discussion by email, and the WORKWELL Solutions Manual (including biopsychosocial strategies for addressing work-related problems) [29].

Randomisation, procedures and blinding

Following baseline questionnaire receipt, participants were assigned 1:1 to intervention or control groups, and stratified by job skill level (i.e., low: categories1 to 2; or high: categories 3 to 4) using the Office for National Statistics classification [30]. Job skill level was selected as a stratification factor because occupational demands and job control are known to influence work functioning and the ability to remain in employment among people with IA. Stratification was by permuted blocks of random sizes (4, 6 or 8) conducted by the Lancashire Clinical Trials Unit (LCTU) using Sealed Envelope, a web-based central randomisation service [31]. Participants were allocated to both groups from the start of recruitment at each site. After randomisation, the LCTU mailed all participants the information pack and referred WORKWELL participants to the relevant therapist. Therapists contacted participants within five days of referral and JRVR began within four weeks. Participating therapists were unblinded to group allocation. Data management staff were blinded to group allocation, as was the trial statistician when conducting the primary outcome analysis at 12m [23].

Data collection

The postal baseline questionnaire collected demographic (e.g., age, sex, education), employment (e.g., job title, hours worked, organisation size) and health and healthcare resource use information. This included detailed information on prescribed medications (csDMARDs, biologic and targeted therapies, and corticosteroids). All outcomes were collected using validated self-reported questionnaires widely used in occupational health and rheumatology research. These instruments are designed for self-completion and capture perceived work limitations, work instability and productivity. Data quality was supported through structured follow-up procedures, including reminders and telephone completion of minimum datasets where questionnaires were not returned.

Outcomes were collected using questionnaires at 6m, 12m, and 36m. Follow-up questionnaires were available as mailed paper copies or online, with an e-mailed secure weblink. If not returned, after two weeks, participants were sent a text/ email/ telephone reminder, and at three weeks a second questionnaire copy or weblink. At four weeks, if not returned, trial managers attempted to collect a minimum dataset by telephone [23]. Intervention participants not completing JRVR continued in follow-up unless they withdrew.

Outcomes

The primary outcome, at 12m post-randomisation, was the Work Limitations Questionnaire-25 (WLQ-25PDmod), a measure of presenteeism [32], as modified in 2016 [33], using the summed score of the four sub-scales. Secondary outcomes included these WLQ sub-scales, WLQ-25PDMod productivity loss score, and the Workplace Activities Limitations Scale (WALS-12, 12 items, measuring work ability) [21]. The WLQ-25PDmod and WALS-12 were collected using the dual-key scored outcome measure. Both were scored using the original and dual-key methods, as the latter is more sensitive to change [34].

The scales used in this study have established scoring ranges and directions of interpretation. For the WLQ-25PDmod, higher scores indicate greater work limitations and reduced productivity. The WALS-12 ranges from 0–36, with higher scores reflecting greater difficulty performing work activities. The RA-Work Instability Scale (RA-WIS) ranges from 0–23, with higher scores indicating greater risk of work instability. The Work Self-Efficacy scale measures confidence in managing work demands, with higher scores indicating greater self-efficacy. The RA Impact of Disease (RAID) and RA-Disease Activity Index-5 (RADAI-5) both range from 0–10, with higher scores indicating greater disease impact or activity. For all measures, negative change scores represent improvement where higher scores denote worse outcomes.

Other secondary outcomes were the Work Productivity and Activity Impairment questionnaire v2.0 (WPAI) (0m, 6m, 12m) [35]; employment status; absenteeism (number of days off sick, collected monthly by text, email or telephone) (0 through 12m); the RA-Work Instability Scale (RA-WIS) (0m, 12m) [27]; Work Self-Efficacy (WSE) (0m, 12m); and satisfaction with work support received (6m).

Analysis of contextual factors, potentially influencing the intervention's impact on the primary outcome, included (0m, 12m): the Short-Form12v2 Health Survey (SF12v2) [36], RA Impact of Disease (RAID) [37] and RA-Disease Activity Index-5 (RADAI-5) [38]; job skill level (0m, 12m, 36m) [30]; Work Demands (WD) (0m,12m) [39]; and Rheumatic Disease Comorbidities Index (0m) [40]. Although RA-specific instruments were originally developed for RA populations, they capture domains such as pain, fatigue, function and disease impact that are common across IA conditions, including early IA and PsA. These instruments have therefore been used in mixed IA cohorts to provide consistent patient-reported outcome measurement.

For a within trial cost-effectiveness analysis (CEA), the EQ-5D-5L questionnaire was used (0m, 6m,12m) to determine participants' health-related related quality-of-life (HRQoL) [41], as was NHS resource use via a participant questionnaire. This included use of hospital services (e.g. inpatient / outpatient / day case / A&E), use of primary / community-based services (e.g. General Practice / mental health services / occupational therapy), and any prescribed medication. Resource use associated with delivering the intervention was determined from trial documentation completed by therapists.

COVID-19 effects on trial and impacts.

The trial paused in March 2020 for safety reasons, with JRVR suspended. To enable re-start, trial adaptations were discussed with the Patient and Public Involvement Group (PPIG) and therapists. Following site approval, 13 sites re-started in July or August 2020, and five between

September 2020 and January 2021. Periodic lockdowns (restrictions on the public's movements) continued until April 2021. Non-essential workers worked remotely from home (WRFH) until January 2022. If unable to WRFH, they could be furloughed (the Coronavirus Job Retention Scheme) until September 2021. Essential workers continued attending work throughout. Participants in follow-up received questionnaires to schedule. At 6m and 12m, most participants completed questionnaires whilst COVID-19 restrictions were in place (6m: n=174 (80%); 12m n = 192 (94%)).

Following re-start, recruitment slowed due to reduced site staff availability and fewer eligible patients due to job loss or furlough. Additional participants were recruited via two arthritis charities to reach the target sample size.

At restart, the trial website included downloadable documents for electronic completion, and an online Workwell Solutions Manual. JRVR was delivered remotely by telephone or videoconferencing. In-person treatment became possible later. Two therapists in the research team provided participants' JRVR remotely for seven sites, due to therapist redeployment or sickness, and treated charity-recruited participants. Normally, participants were treated by one therapist, occasionally by a second if the original unavailable [42].

Sample size

To identify a minimal clinically important difference (13 points) [43] in the primary outcome at 12m, assuming 90% power, SD=23.02 (conservative estimate from our feasibility trial [12, 23]), 5% significance level, and an intra-class correlation coefficient (ICC) of 0.05 in the intervention arm to account for a potential therapist clustering effect (with an average of 5 (variance=5) participants per therapist), 90 participants were needed in each group [24]. Allowing for a 25% drop-out, the recruitment target was 240.

Statistical analysis

The analysis followed a pre-specified Statistical Analysis Plan[1] and was by intention-to-treat, using STATA version 17 [44]. Baseline characteristics were described overall and by group, reporting mean (SD), median (IQR) or number (proportion) as appropriate. Primary effectiveness analysis used a linear mixed-effects (lme) regression model to estimate the effect of group allocation on WLQ-25PDmod scores at 6m, 12m and 36m, controlling for the stratification variable (job skill level) and baseline value of the WLQ-25PDmod. A participant-specific random effect nested within a therapist-level random effect was specified. As the therapist effect only occurred in those who received the WORKWELL intervention, this was a partially-nested design. Therapist effect was allocated by the therapist seen most frequently. The model estimated the variance of residual errors separately in the intervention groups to allow for between-group heteroscedasticity. Outcomes were analysed in a single model with an interaction term between time-point and intervention group to determine the treatment effect at each time-point separately. Of primary interest was the treatment effect at 12 months. Sensitivity analyses using alternative definitions of a per-protocol analyses were conducted: 1) excluding intervention participants not receiving JRVR, and control participants reporting at 12m they received JRVR; and 2) excluding intervention participants not receiving JRVR or only attending the first treatment appointment (i.e., work assessment), and control participants reporting receiving JRVR. Secondary outcome analyses also used appropriate generalised linear mixed effects modelling methods (i.e., linear, logistic, or ordinal logistic), controlling for the stratification variable, baseline value of that outcome variable, and random therapist effect. The interaction between time-point and group was not included for measures collected post-randomisation at 12m only.

[1] There was a minor deviation from the SAP. We originally analysed the 6/12 months results in a 2-time point longitudinal model, in a blinded analysis, as described in the SAP, and we planned to analyse the 36-month outcomes in a separate 1--timepoint model. However, we later decided to publish all time points together in this article, and to avoid confusion, we analysed the 6-,12- and 36-month outcomes in one 3-time point model, which could not be blinded. The findings were not sensitive to the model fitted, so this has not led to any changes in the results at any time point.

We considered the association of various contextual factors with the primary outcome in an exploratory analysis, adding a three-way interaction term (time-point, intervention group, contextual factor) into the main model.

The primary within-trial economic evaluation followed the NICE reference case [45]. Published unit costs were attached to reported NHS resource use. Quality-adjusted life-years (QALYS) were calculated using utility scores mapped to reported EQ-5D-5L states [46]. Missing cost and outcomes data were imputed using multiple imputation by chained equations in STATA. Costs and QALYs were adjusted for previous NHS resource use prior to trial enrolment and baseline HRQoL, respectively. An incremental cost-effectiveness ratio (ICER) was calculated using the following:

$$\text{ICER} = \frac{(\text{Cost of JRVR} - \text{Cost of Control})}{(\text{Effectiveness of JRVR} - \text{Effectiveness of Control})}$$

The ICER represents the cost of generating an additional QALY using JRVR. An ICER under the willingness-to-pay threshold of £20-30,000 is deemed cost-effective under current decision rules [45]. Using the lower £20,000 bound of threshold, an incremental net monetary benefit (INMB) was determined using the following:

$$\text{INMB} = \frac{£20\text{k} \times \text{Difference in Effectiveness between JRVR and Control}}{\text{Difference in Cost}}$$

A positive INMB indicates that JRVR is cost-effective from an NHS and Social Care perspective. To generate confidence intervals around the ICER and INMB point estimates, bootstrapping was used to recalculate costs and outcomes in 1000 resamples [47].

Results

Recruitment and response rates

Figure 1 shows participant flow through the trial: 249 were randomised (control = 125; intervention = 124). Of these, 34 (14%) were recruited via charities. All participants were mailed the self-help information pack. Questionnaire response rates were: 216 (87%) at 6m; 204 (82%) at 12m; and 180 (72%) at 36m.

Participants

Participant mean age was 49 years, 81% were women, median time since diagnosis was 4.4 years, and 58% worked full-time. Demographic and employment characteristics are in table 1. At baseline, the mean WLQ-25PDmod summed score (0-100) was 30.9 (SD 17.0) in the control, and 30.8 (SD 19.8) in the intervention groups, i.e., low to moderate presenteeism (table 2). Baseline disease characteristics are presented in Supplementary Table S3. Participants had moderate disease impact at study entry, with mean RAID scores of approximately 6 and RADAI-5 scores between 5 and 6, indicating ongoing disease burden despite treatment. Approximately one third of participants had early disease (≤2 years duration). Participants had a mean duration of current employment of 11.0 years (SD 9.8), suggesting relatively stable employment at study entry. The majority of participants were employed on permanent contracts (95.2%), indicating a relatively stable employed population at study entry.

Intervention provision

Overall, 96/124 (77%) completed JRVR, of whom: 30/33 were treated before the pandemic, 24/36 were paused participants, and 42/55 recruited after re-start (supplementary table S1). Of 355 appointments, 189 (53%) were in-person, 106 (30%) telephone, 60 (17%) videocall.

26 (21%) participants were treated by research team therapists. On average, participants received 3.6 (SD1.5) appointments. Work barriers identified are detailed elsewhere [31]. Intervention delivery was not contingent on continued employment, and participants were able to continue receiving the intervention where appropriate. During the trial, a small proportion of participants reported changes in employment status; however, most remained in work at 12 months (97.2% control; 98.0% intervention).

Primary outcome

The regression model was analysed longitudinally based on 219/249 (88%; 114 control and 105 intervention) of randomised participants with a baseline and at least one 6m, 12m or 36m follow-up score. At 12m, the primary endpoint, after adjusting for the stratification variable and baseline scores there was no evidence of an effect of the intervention on presenteeism, compared to the control group (adjusted mean difference of -1.8 (95% CI: -7.4 to 3.8), p=0.53). Whilst the point estimate of -1.8 favoured the intervention, the lower confidence limit (-7.4) did not extend beyond the clinically important difference of -13. At 36m the trial also found no evidence of an effect (-3.0 (95% CI -9.4 to 3.5, p = 0.37). Results are shown in table 2 and sensitivity analyses in supplementary table S2.

Secondary outcomes

Across the secondary outcomes, at all three time-points, mean differences between the two groups were mostly small and, while favouring the intervention group, were not statistically significant. Those approaching statistical significance were the WLQ-25 mental-interpersonal demands scale (6m) (p=0.07), absenteeism, with a relative reduction of 46% (12m) (95% CI: 73% reduction to a 7% relative increase, p=0.08), and the WALS-12 (36m) (p=0.07) (table 2). Health outcomes remained stable from 0-12m (table 3). At 12m, satisfaction with work advice received was higher in the intervention (8.7/10, SD 1.6) than control group (7.2/10, SD 2.5). At 12m, most participants remained employed, although by 36m employment was higher in

the intervention group (93%) compared to control (85%). The proportion changing jobs due to health was higher at 36m in the intervention group (15%) compared to control (7%).

Contextual factors analysis

Most personal, environmental and health-related variables explored were not found to be contextual factors influencing the level of the primary outcome. There was a trend towards a significant interaction for Work Demands help from colleagues at 36m (p=0.08), and a significant interaction for Work Demands mentally demanding work (p=0.02). However, the group with little/no mentally demanding work was small at baseline (n=17) (table 4, supplementary tables S3 and S4).

Cost-effectiveness analysis

There was little observed between-group difference in either costs or outcomes (table 5). The mean INMB from 1000 bootstrapped resamples was -£196 (pseudo 95% CI: -£1,712 to £1,239). Over 40% of bootstrapped ICERs indicated that JRVR was more expensive and less effective (Supplementary Figure S1). The probability that the intervention would be considered cost-effective under current decision rules was 6.38% (Supplementary Figure S2).

Adverse events

No adverse events resulting from trial participation were reported.

Discussion

This study found no evidence of a clinically important effect of the WORKWELL JRVR intervention on work participation outcomes at 6, 12 or 36 months. Differences between groups were small across all timepoints and outcomes, and consistent across sensitivity analyses. From an NHS and Social Care perspective, WORKWELL is unlikely to be cost-effective within this study given the higher associated costs without improvement in HRQoL. The findings suggest that, within this cohort of individuals with IA who had relatively short disease duration and were largely established in employment, the WORKWELL JRVR

intervention did not provide additional benefit beyond usual care. The high proportion of participants remaining in work throughout the study and relatively stable employment characteristics at baseline may have limited the scope for improvement.

In this study, no meaningful differences were observed between groups across work outcomes, despite a structured and tailored intervention. The high employment retention and relatively stable baseline employment characteristics suggest limited scope for improvement in this population. Previous trials of JRVR have reported mixed findings, with some showing benefits in specific contexts. Participant interviews in the present study suggested that factors such as the timing of intervention, workplace support, and flexibility of delivery may influence effectiveness. Participants with longer disease duration may already have adapted their work roles, reducing the potential additional impact of the intervention [48].

To further understand these findings, process evaluation data provide additional context. The intervention was well received by therapists and participants and showed good fidelity during delivery [48,49]. Therapist interviews suggested that, although positive about remote delivery, additional workload pressures arising from the pandemic may have reduced its impact [49]. These insights highlight the importance of adaptable, co-designed, tailored solutions, for which further research is needed.

The high employment retention rate at 36m in both groups (over 80%) indicates that most participants remained in work throughout the study, which may have limited the potential for additional benefit from the WORKWELL JRVR intervention. Both groups also received written self-help advice, which may have contributed to maintaining work participation. Process evaluation findings indicated that the self-help pack helped participants in understanding their employment rights and prompted some to seek additional work support [48].

Our study was large, pragmatic, focused on people with medium to high risk of work instability, and included an economic evaluation. However, the COVID-19 pandemic had a major impact throughout the trial. Many participants were WRFH, with potential benefits from reduced commuting, increased work flexibility, and ability to self-manage their condition but also disadvantages of increased stress and poorer work facilities. Others were furloughed and essential workers found their jobs increasingly pressured [50]. JRVR delivery was affected and JRVR completion rates reduced, potentially masking JRVR benefits.

There were some limitations. The WLQ-25PDmod, WALS and WPAI ask about recent (1–2 weeks) work difficulties. If participants were not working, furloughed or on long-term sick leave at follow-ups, these could not be completed, limiting capturing presenteeism changes. Many participants were white, on permanent contracts in large organisations, and the sample thus does not fully reflect the working population. A number of assumptions had to be made for costing NHS resource use due to an absence of data. This could have had an impact on the cost estimates for both interventions. There may also be wider societal impacts and effectiveness which we could not measure in this RCT.

This trial demonstrates the feasibility of delivering tailored JRVR within routine rheumatology services, even during a pandemic. The findings, in the light of the participant interviews, raise questions about the optimal design and timing of JRVR, which may be more effective earlier in the disease course, or at key employment transition points. Furthermore, scalable approaches combining interactive digital tools, short interventions, and tailored self-guided resources could help meet diverse needs across clinical and occupational settings.

In conclusion, although WORKWELL JRVR did not significantly improve work outcomes, it represents an important step in testing pragmatic JRVR within NHS services. Future research should focus on personalisation, digital delivery, and integration with employer-facing support to enhance sustainability and effectiveness.

Funding Statement

This trial was funded by Arthritis UK grant number 21761.

Acknowledgements:

Participating sites: we would like to thank the occupational therapy and Rheumatology departments and the participating principal investigators, occupational therapists (OT), research facilitators (RF) and Consultants at St Helens and Knowsley Teaching Hospitals NHS Trust; Manchester University NHS Foundation Trust; Worcestershire Acute Hospitals NHS Trust; Salford Royal NHS Foundation Trust; Countess of Chester Hospital NHS Foundation Trust; Newcastle upon Tyne Hospitals NHS Trust; Barnsley Hospitals NHS Foundation Trust; Sherwood Forest Hospitals NHS Foundation Trust; Northumbria Healthcare NHS Foundation Trust; The Royal Wolverhampton NHS Trust; The Leeds Teaching Hospitals NHS Trust; Oxford University Hospitals NHS Foundation Trust; Northern Devon Healthcare NHS Trust; Royal United Hospitals Bath NHS Foundation Trust; North Bristol NHS Trust; Aneurin Bevan University Health Board; Cardiff and Vale University Health Board; NHS Fife. *Lancashire Clinical Trials Unit*: We would like to thank the staff of Lancashire Clinical Trials Unit for their support in the conduct of this study, specifically Denise Forshaw (CTU Deputy Director), Alex Haig (CTU Trial Manager), Shakil Patel (former CTU Trial Manager), Glen Holt for technical support, as well as Carol Bruce for data management procedures support. *Public and patient involvement and engagement members*: Sarah Long and Alison Heard for providing insights from a patient perspective. *Charities:* National Rheumatoid Arthritis Society and Arthritis UK for assistance with recruiting participants. Finally, we extend our sincere gratitude to all the study participants for their invaluable contributions and willingness to dedicate their time to this research.

Terence O'Neill and Suzanne Verstappen are supported by the National Institute for Health and Care Research (NIHR) Manchester Biomedical Research Centre (BRC) (NIHR203308).

A plain language summary of this article is available in the supplementary material (Supplementary Data S1).

Conflict of interest statement: The authors have declared no conflicts of interest.

Ethics

Ethical approval was received from the Health Research Authority West Midlands - Solihull Research Ethics Committee (18/WM/0327) and the University of Salford Research, Enterprise, and Engagement Ethical Approval Panel (HSR1819-010).

Data availability Statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Trial registration

ClinicalTrials.gov NCT03942783. Registered on 08 May 2019. ISRCTN Registry ISRCTN61762297. Registered on 13 May 2019. Retrospectively registered.

References

1. Bechman K, Cook ES, Alveyn E, Houssen A, Stevens M, Russell MD et al. Occupational impacts of early inflammatory arthritis: results from the National Early Inflammatory Arthritis audit. Rheumatology 2024; 63(7):1856-1867.
2. Kim D, Kaneko Y, Takeuchi T. Importance of obtaining remission for work productivity and activity of patients with rheumatoid arthritis. J Rheum 2017;44:1112-1117
3. Gwinnutt, J. M., Leggett, S., Lunt, M., Barton, A., Hyrich, K. L., Walker-Bone, K., Verstappen, S. M. M., RAMS and BRAGGSS co-investigators. Predictors of presenteeism, absenteeism and job loss in patients commencing methotrexate or biologic therapy for rheumatoid arthritis. Rheumatology 2020: 59(10), 2908-2919.
4. Kirkeskov L, Bray K. Employment of patients with rheumatoid arthritis - a systematic review and meta-analysis. BMC Rheumatol 2023;7.
5. Boonen A, Webers C, Butink M, Barten B, Betteridge N, Black C, et al. EULAR points to consider to support people with rheumatic and musculoskeletal diseases to participate in healthy and sustainable paid work. Ann Rheum Dis 2023;82: 57-64.
6. Madsen CMT, Bisgaard SK, Primdahl J, Christensen JR, von Bulow CI. A Systematic review of job loss prevention interventions for persons with inflammatory arthritis. J Occup Rehabil. 2021;31(4):866–85
7. Butink MHP, Webers C, Verstappen SMM, Falzon L, Betteridge N, Wiek D, et al. Non-pharmacological interventions to promote work participation in people with rheumatic and musculoskeletal diseases: a systematic review and meta-analysis from the EULAR taskforce on healthy and sustainable work participation. RMD Open 2023;9(1):e002903.
8. de Buck PD, le Cessie S, van den Hout WB, Peeters AJ, Ronday HK, Westedt ML, et al. Randomized comparison of a multidisciplinary job retention vocational rehabilitation

program with usual outpatient care in patients with chronic arthritis at risk for job loss. Arthritis Rheumatol 2005;53(5):682–90.

9. Van den Hout WB, de Buck PDM, Vliet Vlieland TPM. Cost-utility analysis of a multidisciplinary job retention vocational rehabilitation program in patients with chronic arthritis at risk of job loss. Arthritis Rheum 2007; 57(5);778-786.
10. van Vilsteren M, Boot CR, Twisk JW, van Schaardenburg D, Steenbeek R, Voskuyl AE, et al. Effectiveness of an integrated care intervention on supervisor support and work functioning of workers with rheumatoid arthritis. Disabil Rehabil 2017;39(4):354–62.
11. Macedo AM, et al. Functional and work outcomes improve in patients with rheumatoid arthritis who receive targeted, comprehensive occupational therapy. Arthritis Rheumatol 2009;61(11):1522–30.
12. Hammond A, O'Brien R, Woodbridge S, Bradshaw L, Prior Y, Radford K, et al. Job retention vocational rehabilitation for employed people with inflammatory arthritis (WORK-IA): a feasibility randomized controlled trial. BMC Musculoskeletal Disord 2017;18(1):315.
13. Allaire SH, Li W, LaValley MP. Reduction of job loss in persons with rheumatic diseases receiving vocational rehabilitation: a randomized controlled trial. Arthritis Rheumatol 2003;48(11):3212–8.
14. Keysor JJ, LaValley MP, Brown C, Felson DT, AlHeresh RA, Vaughan MW, et al. Efficacy of a work disability prevention program for people with rheumatic and musculoskeletal conditions: a single-blind parallel-arm randomized controlled trial. Arthritis Care Res 2018;70(7):1022–9.
15. Robinson R. Cost-utility analysis. BMJ 1993;307:859–62.
16. Verstappen SMM. Outcomes of early rheumatoid arthritis--the WHO ICF framework. Best Pract Res Clin Rheumatol 2013;27(4):555-70.
17. Nielsen SM, Boers M, de Wit M, Shea B, van der Windt DA, Reeves BC, et al. OMERACT consensus-based operational definition of contextual factors in

rheumatology clinical trials: A mixed methods study. Semin Arthritis Rheum. 2021;51(3):601-6.

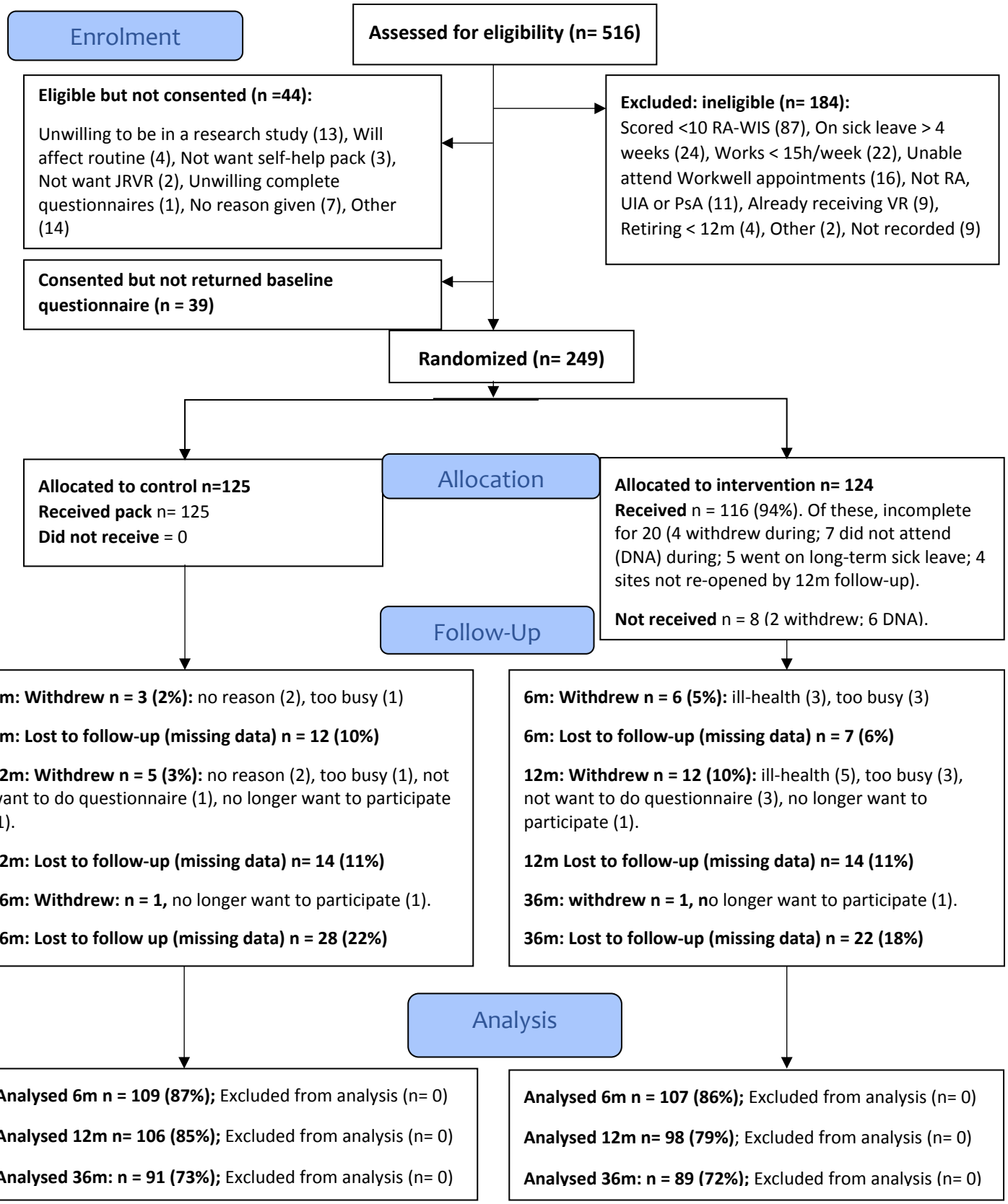
18. Tang K, Boonen A, Verstappen SM, Escorpizo R, Luime JJ, Lacaille D, et al. Worker productivity outcome measures: OMERACT filter evidence and agenda for future research. J Rheumatol 2014;41(1):165-76.
19. Finger ME, Boonen A, Woodworth TG, Escorpizo R, Christensen R, Nielsen SM, et al. An OMERACT Initiative Toward Consensus to Identify and Characterize Candidate Contextual Factors: Report from the Contextual Factors Working Group. J Rheumatol 2017;44(11):1734-9.
20. Lacaille D, White MA, Backman CL, Gignac MAM. Problems faced at work due to inflammatory arthritis: new insights gained from understanding patients' perspectives. Arthr Rheum 2007; 57 (7):1269-1279.
21. Gignac M, Cao X, Tang K, Beaton DE. Examination of arthritis-related workplace activity limitations and intermittent disability over four-and-a-half years and its relationship to job modifications and outcome. Arthritis Care Res 2011;63: 953-962.
22. Boonen A, Putrik P, Marques ML, Alunno A, Abasolos L, Beaton, D et al. EULAR Points to Consider (PtC) for designing, analysing, and reporting of studies with work participation as an outcome domain in patients with inflammatory arthritis. Ann Rheum Dis 2021;80:1116 – 1123.
23. Hammond A, Sutton C, Cotterill S, Woodbridge S, O'Brien R, Radford K, et al. The effect on work presenteeism of job retention vocational rehabilitation compared to a written self-help work advice pack for employed people with inflammatory arthritis: protocol for a multi-centre randomised controlled trial (the WORKWELL trial). BMC Musculoskeletal Disord 2020:21;607
24. Hammond A, Radford KA, Ching A, Prior Y, O'Brien R, Woodbridge S, et al. The Workwell trial: protocol for the process evaluation of a randomised controlled trial of job retention vocational rehabilitation for employed people with inflammatory arthritis. Trials 2022:23; 937

25. Schulz KF, Altman DG, other D, CONSORT group. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. BMJ 2010;340:c332.
26. Boutron I, Altman DG, Moher D, Schultz KF, Ravaud P for the CONSORT NPT Group. CONSORT Statement for Randomized Trials of Nonpharmacologic Treatments: A 2017 Update and a CONSORT Extension for Nonpharmacologic Trial Abstracts. Ann Int Med 2017;167(1):40-47.
27. Gilworth G, Chamberlain A, Harvey A, Woodhouse A, Smith J, Smith G, et al. Development of a Work Instability Scale for rheumatoid arthritis. Arthritis Rheum 2003;49:349-354.
28. Hammond A, O'Brien R, Woodbridge S, Parker J, Ching A. The Work Experience Survey – Rheumatic Conditions (United Kingdom): psychometric properties and identifying the workplace barriers of employed people with inflammatory arthritis receiving vocational rehabilitation. Musculoskeletal Care 2023; 21(4):1578-1591.
29. Hammond A, Woodbridge S, O'Brien R, Prior Y, Ching A. Parker J. Upskilling rheumatology occupational therapists in work rehabilitation, an evaluation of a job retention vocational rehabilitation training course (the Workwell trial). Musculoskeletal Care 2025;23(1):e70067
30. Office for National Statistics. Standard Occupational Classification. 2010. https://www.ons.gov.uk/methodology/classificationsandstandards/standardoccupationalclassificationsoc/soc2010
31. Sealed Envelope. Available from: https://www.sealedenvelope.com/
32. Lerner D, Amick BC, Rogers WH, Malspeis S, Bungay K, Cynn D. The work limitations questionnaire. Med Care 2001;39(1):72-85.
33. Beaton DE, Dyer S, Boonen A, Verstappen SMM, Escorpizo R, Lacaille DV et al. OMERACT Filter Evidence Supporting the Measurement of At-work Productivity Loss as an Outcome Measure in Rheumatology Research. J Rheumatol 2016;43:214–22

34. Donaldson M, Kobza A, Beaton DE, Xie H, Sayre EC, Gignac MAM, et al. Predictive validity of presenteeism measures with dual answer keys in inflammatory arthritis. Ann Rheum Dis 2018;77(Suppl):A849.
35. Reilly MC, Zbrozek AS, Dukes EM. The Validity and Reproducibility of a Work Productivity and Activity Impairment Instrument. Pharmacoeconomics 1993;4(5):353-65.
36. Ware JE, Kosinski M, Keller SD. A 12-item short-form health survey - Construction of scales and preliminary tests of reliability and validity. Med Care 1996;34(3):220-33
37. Gossec L, Paternotte S, Aanerud GJ, Balanescu A, Boumpas DT, Carmona L, et al. Finalisation and validation of the rheumatoid arthritis impact of disease score, a patient-derived composite measure of impact of rheumatoid arthritis: a EULAR initiative. Ann Rheum Dis 2011;70(6):935-42.
38. Leeb BF, Haindl PM, Brezinschek HP, Nothnagl T, Rintelen B. RADAI-5 to monitor rheumatoid arthritis. Clin Exp Rheumatol 2014;32(5):S55-S8.
39. Gignac MAM, Sutton D, Badley EM. Re-examining the arthritis-employment interface; perceptions of arthritis work spillover among employed adults Arthr Care Res 2006;55(2):233-240.
40. England BR, Sayles H, Mikuls TR, Johnson DS, Michaud K. Validation of the rheumatic disease comorbidity index. Arthritis Care Res. 2015;67(6):865–72.
41. EuroQol Group. EuroQoL: a new facility for the measurement of health-related quality of life. Health Policy 1990;16:199-228.
42. Ching A, Parker J, Haig A, Sutton CJ, Cotterill S, Forshaw D, et al. Job retention vocational rehabilitation for employed people with inflammatory arthritis: adaptations to the Workwell trial due to the impact of the COVID-19 pandemic. Trials 2022:23; 1030.

43. Roy JS, MacDermid JC, Amick BC, Shannon HS, McMurtry M, Roth JH et al. Validity and responsiveness of presenteeism scales in chronic work-related upper extremity disorders. Phys Ther. 2011;91:254-266.
44. StataCorp. Stata Statistical Software: Release 17. College Station, TX: StataCorp LP; 2021.
45. NICE. Guide to the methods of technology appraisal 2013. [Foreword and The Reference Case]. https://www.nice.org.uk/process/pmg9/chapter/
46. Hernández Alava M, Pudney S, Wailoo A. Estimating the Relationship Between EQ-5D-5L and EQ-5D-3L: Results from a UK Population Study. Pharmaco Economics. 2023; 41:199–207.
47. Campbell MK, Torgerson DJ. Bootstrapping: estimating confidence intervals for cost-effectiveness ratios. QJM. 1999;92:177–82.
48. Battista S, Parker J, Ching A, Culley J, Long S, Heard A, Hammond A, Radford K, Holland P, O'Neill T, Walker-Bone K, Prior Y. WORKWELL process evaluation: qualitative data analyses of the participant interviews at 12- and 36-month follow-ups. Rheumatol Adv Pract 2025;9: rkaf034
49. Morton L, Stelfox K, Beasley M, Jones GT, McFarlane GJ, Walker-Bone K, et al. Enabling work participation for people with musculoskeletal conditions: lessons from work changes imposed by COVID-19: a mixed-method study. BMJ Open 2022;12:e057919.
50. Prior Y, Battista S, Mathew A, Parker J, Gates S, Ching A et al. WORKWELL process evaluation: insights from therapists and line managers. Rheumatol Adv Pract 2025; 9(3):rkaf076.

Figure 1: Workwell CONSORT Flow Diagram



Alt Text: A CONSORT flow diagram for the WORKWELL trial showing participant progression from assessment to analysis. Of 516 people assessed, 249 were randomised: 125 to control and 124 to the intervention. The diagram details reasons for ineligibility, non-consent, and missing baseline questionnaires. It shows numbers receiving the intervention or control materials, withdrawals, losses to follow-up at 6, 12, and 36 months, and final numbers analysed: control (109 at 6m, 106 at 12m, 91 at 36m) and intervention (107 at 6m, 98 at 12m, 89 at 36m).

Table 1: Baseline participant demographic and employment characteristics (n = 249)

	Control (n = 125)	Intervention (n =124)	Overall (n = 249)
Demographic:			
Age (years), mean (SD)	48.3 (10.2)	48.8 (9.5)	48.6 (9.9)
Sex (female/male/prefer not to say), n (%)	105 (84.0)/19 (15.2)/1 (0.8)	97 (78.2)/26 (21.0)/1 (0.8)	202 (81.1)/45 (18.1)/2 (0.8)
Diagnosis, n (%)			
- RA	81 (64.8)	84 (67.7)	165 (66.3)
- Early IA	10 (8.0)	13 (10.5)	23 (9.2)
- PsA	24 (27.2)	27 (21.8)	61 (24.5)
Time since diagnosis (years), median (IQR)	4.0 (1.4, 10.5)	5.0 (1.2, 11.3)	4.4 (1.3, 10.6)
Symptom duration (years), median (IQR)	6.0 (2.8, 13.0)	6.5 (2.8, 13.3)	6.0 (2.8, 13.3)
Medication regimen, n (%)			
- 0 DMARD/ biologic/biosimilar	13 (10.4)	6 (4.8)	19 (7.6)
- 1 DMARD	37 (29.6)	45 (36.3)	82 (32.9)
- 2 or more DMARD	30 (24.0)	27 (21.8)	57 (22.9)

	Control (n = 125)	Intervention (n =124)	Overall (n = 249)
- Biologics/ biosimilars (+/- DMARD)	45 (36.0)	46 (37.1)	91 (36.6)
Living status, n (%)			
- Living alone	22 (17.6)	21 (16.9)	43 (17.3)
- Living with family/ spouse/ significant other(s)	103 (82.4)	103 (83.1)	206 (82.7)
Education level, n (%)			
- Low education (ISCED 0 – 2)	34 (27.2)	24 (19.4)	58 (23.3)
- Medium education (ISCED 3 – 4)	28 (22.4)	23 (18.6)	51 (20.5)
- High education (ISCED 5 – 8)	62 (49.6)	76 (61.3)	138 (55.4)
- Missing	1 (0.8)	1 (0.8)	2 (0.8)
Ethnic group, n (%)			
- White	122 (97.6)	120 (96.8)	242 (97.2)
- Mixed/ multiple ethnic	1 (0.8)	1 (0.8)	2 (0.8)
- Asian/ Asian British	1 (0.8)	1 (0.8)	2 (0.8)
- Black/ African/ Caribbean/ Black British	0 (0.0)	0 (0.0)	0 (0.0)
- Other	1 (0.8)	1 (0.8)	2 (0.8)
- Prefer not to say	0 (0.0)	1 (0.8)	1 (0.4)
Employment:			
Employment status, n (%)			

	Control (n = 125)	Intervention (n =124)	Overall (n = 249)
- Full-time (≥ 35h/ week)	69 (55.2)	75 (60.5)	144 (57.8)
- Part-time (< 35h/week)	56 (44.8)	49 (39.5)	105 (42.2)
No. hours contracted to work/ week, mean (SD)	30.9 (8.6)	33.2 (8.3)	32.1 (8.5)
No. hours normally work/week, mean (SD)	33.2 (9.0)	35.2 (10.1)	34.2 (10.1)
Job contract/ type, n (%)			
- Permanent contract	108 (86.4)	111 (89.5)	219 (88.0)
- Fixed term contract	4 (3.2)	3 (2.4)	7 (2.8)
- Zero hours contract	1 (0.8)	0 (0.0)	1 (0.4)
- Agency contract	1 (0.8)	2 (1.6)	3 (1.2)
Self-employed	11 (8.8)	8 (6.5)	19 (7.6)
ONS Job Skill level, n (%)			
- 1 (lowest)	9 (7.2)	7 (5.6)	16 (6.4)
- 2	49 (39.2)	51 (41.1)	100 (40.2)
- 3	24 (19.2)	32 (25.8)	56 (22.5)
- 4 (highest)	43 (34.4)	34 (27.4)	77 (30.9)
Sole income earner (yes), n (%)	40 (32.0)	46 (37.1)	86 (34.5)
Organization size (people), n (%)			
- 1 person (self)	9 (7.2)	6 (4.8)	15 (6.0)

	Control (n = 125)	Intervention (n =124)	Overall (n = 249)
- Micro (2-9)	9 (7.2)	6 (4.8)	15 (6.0)
- Small (10-49)	12 (9.6)	16 (12.9)	28 (11.2)
- Medium (50-249)	21 (16.8)	17 (13.7)	38 (15.3)
- Large (≥ 250)	74 (59.2)	79 (63.7)	153 (61.5)
Belong to a Trade Union/ professional organisation (yes), n (%)	52 (41.6)	51 (41.1)	103 (41.4)
Disclosed condition to employer (yes/no), n (%)	114 (91.2) / 2 (1.6)	113 (91.1) / 4 (3.2)	227 (91.1) / 6 (2.4)
- Not applicable n, (%)	9 (7.2)	7 (5.6)	16 (6.4)
Occupational Health available in main job (yes), n (%)	68 (57.1)	71 (58.7)	139 (57.9)

Key: DMARD = disease modifying anti-rheumatic drug; IA = inflammatory arthritis; ISCED = International Standard Classification of Education (ISCED 0 – 2 = no formal qualifications through to lower secondary education, e.g., GCSE; 3 – 4 = upper secondary, and post-secondary non-tertiary education, e.g., A Levels, BTEC, City & Guilds; 5 – 8 = short cycle tertiary (e.g., diploma), Bachelor/ Master/ PhD degrees); ONS = Office for National Statistics, Skill level: 1 = elementary occupations, 2 =administrative, caring, leisure, sales, customer service, process, plant, and machine operatives, 3 = skilled trades, associated technical and professional, 4 = professional, and managerial; PsA = psoriatic arthritis; RA = rheumatoid arthritis. + Medication regimen reflects the number of DMARD and/or biologic/biosimilar agents. Detailed medication classes (including csDMARDs, targeted therapies, biologics and corticosteroids) were collected at baseline but are not presented here.

Table 2: Work outcome measures

Outcome, mean (SD) unless otherwise stated:	Time	n	Control	n	Intervention	Adjusted difference in means (95% CI)	p
WLQ-25PDmod Summed score (0-100)	0m	125	30.9 (17.0)	124	30.8 (19.8)		
	6m	101	32.2 (21.9)	88	27.9 (18.1)	-4.6 (-10.2, 1.1)	0.11
	12m	98	32.4 (22.6)	91	30.4 (21.5)	-1.8 (-7.4, 3.8)	0.53
	36m	70	35.2 (24.6)	70	31.6 (21.8)	-3.0 (-9.4, 3.5)	0.37
WLQ-25 Productivity Loss (%)	0m	121	8.2 (4.4)	122	8.0 (5.1)		
	6m	96	8.7 (5.8)	86	7.3 (4.9)	-1.3 (-2.8, 0.3)	0.11
	12m	95	8.5 (5.9)	89	8.1 (5.7)	-0.6 (-2.1, 0.9)	0.45
	36m	67	9.3 (6.2)	69	8.2 (5.6)	-1.0 (-2.8, 0.8)	0.26
WLQ sub-scales (0-100):							
- Time demands	0m	124	35.1 (20.5)	124	35.0 (23.2)		
	6m	100	31.0 (21.6)	88	28.6 (20.1)	-2.6 (-8.8, 3.7)	0.42
	12m	98	35.5 (25.8)	91	32.1 (24.1)	-2.7 (-9.0, 3.5)	0.39
	36m	70	39.0 (28.1)	70	32.6 (25.5)	-5.6 (-12.8, 1.5)	0.12
- Physical demands (modified)	0m	122	39.6 (22.1)	123	39.6 (24.1)		
	6m	98	40.8 (23.9)	86	36.5 (20.9)	-3.6 (-9.4, 2.2)	0.22
	12m	95	41.2 (24.4)	89	36.2 (21.9)	-4.5 (-10.3, 1.2)	0.12
	36m	69	42.9 (26.5)	69	40.3 (27.2)	-0.4 (-7.0, 6.2)	0.91

Outcome, mean (SD) unless otherwise stated:	Time	n	Control	n	Intervention	Adjusted difference in means (95% CI)	p
- Mental-Interpersonal demands	0m	125	24.2 (17.7)	124	24.0 (20.3)		
	6m	101	28.9 (26.1)	88	23.2 (21.8)	-6.1 (-12.7, 0.4)	0.07
	12m	98	27.1 (25.0)	91	26.8 (23.7)	-0.6 (-7.1. 6.0)	0.86
	36m	70	29.0 (25.6)	70	27.2 (22.4)	-1.9 (-9.5, 5.7)	0.63
- Output demands	0m	124	30.1 (20.1)	123	29.1 (22.1)		
	6m	99	32.3 (27.1)	88	26.2 (23.1)	-5.9 (-13.0, 1.2)	0.10
	12m	98	30.8 (26.9)	91	29.4 (25.1)	-1.7 (-8.7, 5.4)	0.64
	36m	68	34.8 (26.9)	70	29.6 (22.2)	-5.0 (-13.2, 3.2)	0.23
Dual WLQ-25PDmod (0-100)	0m	121	29.7 (15.4)	120	28.7 (18.0)		
	6m	96	27.3 (16.6)	85	24.5 (13.5)	-2.0 (-6.0. 1.9)	0.31
	12m	95	27.3 (17.6)	86	26.3 (16.5)	-1.5 (-5.4, 2.5)	0.46
	36m	65	32.1 (20.9)	68	28.9 (18.7)	-2.7 (-7.1, 1.8)	0.25
WALS-12 (0-36)	0m	125	12.2 (5.4)	124	12.0 (5.3)		
	6m	101	10.8 (5.7)	88	10.6 (5.3)	-0.0 (-1.4, 1.3)	0.99
	12m	98	11.7 (6.0)	91	10.7 (5.9)	-0.9 (-2.2, 0.5)	0.22
	36m	72	13.9 (7.3)	74	11.9 (6.1)	-1.4 (-3.0, 0.1)	0.07
Dual WALS-12 (0-100)	0m	109	35.7 (17.2)	111	34.4 (18.0)		
	6m	84	31.3 (19.2)	77	30.2 (17.1)	-1.4 (-6.1, 3.3)	0.56
	12m	85	33.7 (19.9)	77	31.8 (17.9)	-1.4 (-6.0, 3.3)	0.56

Outcome, mean (SD) unless otherwise stated:	Time	n	Control	n	Intervention	Adjusted difference in means (95% CI)	p
	36m	59	38.4 (21.9)	64	35.6 (20.8)	0.1 (-5.1, 5.3)	0.97
Numbers in employment, n [1]							
Full-, part-time, unemployed	0m	125	69/ 56/ 0	124	75/49/0		
	6m	109	61/48/0 [a]	107	60/46/1 [b]		
	12m	106	56/47/3 [c]	98	59/37/2 [d]		
	36m	91	44/33/14 [e]	89	49/34/6 [f]		
Data collected at 0, 6 and 12 m only							
WPAI, past 7 days:							
-% work time missed due to health problems	0m	124	5.4 (10.9)	116	6.1 (13.8)		
	6m	100	3.4 (10.7)	83	2.9 (10.7)	-0.7 (-3.6, 2.1)	0.61
	12m	95	2.4 (7.5)	87	3.4 (9.6)	1.0 (-1.9, 3.8)	0.50
-% impairment while working due to health	0m	124	45.9 (22.8)	118	45.3 (23.5)		
	6m	99	40.4 (24.9)	88	43.1 (23.9)	2.5 (-3.8, 8.7)	0.44
	12m	96	42.0 (25.1)	87	38.9 (23.2)	-3.9 (-10.2, 2.4)	0.23
-% overall work impairment due to all health	0m	124	47.8 (23.7)	116	47.6 (24.6)		
	6m	99	42.0 (25.3)	83	43.3 (25.3)	1.4 (-5.2, 7.9)	0.68
	12m	95	43.2 (25.8)	87	40.4 (24.4)	-4.4 (-10.9, 2.2)	0.19

Outcome, mean (SD) unless otherwise stated:	Time	n	Control	n	Intervention	Adjusted difference in means (95% CI)	p
-% activity impairment due to all health	0m	125	62.8 (22.8)	124	58.1 (25.0)		
	6m	109	49.5 (27.8)	106	51.1 (25.3)	4.3 (-2.3, 10.9)	0.20
	12m	104	48.8 (26.2)	97	46.2 (25.1)	0.4 (-6.4, 7.2)	0.91
0 and 12m only							
Absenteeism							
- Participant monthly self-report of number of days off-sick	6m	121	10. (23.6)	118	7.5 (17.0)	-30% (-64%, 37%) [g]	0.30
	12m	111	9.5 (16.9)	109	8.5 (24.3)	-46% (-73%, 7%) [g]	0.08
RA-WIS (0-23)	0m	125	16.2 (4.2)	124	15.8 (4.6)		
	12m	97	14.9 (5.5)	90	14.4 (5.5)	-0.3 (-1.5, 0.9)	0.64
Work Self-Efficacy (0-30)	0m	125	17.9 (5.3)	124	18.0 (5.5)		
	12m	102	18.4 (6.7)	93	19.1 (6.)	0.4 (-1.0, 1.8)	0.56
Exploratory outcomes:							
Satisfaction with work advice received in trial (0-10)	6m	105	7.2 (2.5)	102	8.7 (1.6)	-	0.001

Key: [1] Employment status: of those in employment, numbers not attending work due to shielding/ furlough/ sick leave/ authorised leave; at 6m: [a] Control = 6, [b] Intervention = 10; [c] at 12m: Control = 6, [d] Intervention = 6; at 36m, [e] Control = 7; [f] Intervention = 5.

[g] =% relative reduction in sick leave of intervention compared to control group.

RA-WIS; Rheumatoid Arthritis - Work Instability Scale; WALS: Work Activity Limitations Scale; WLQ-25PDmod: Work Limitations Questionnaire-25: Modified Physical Demands scale (i.e. items are not reverse scored)); WPAI Work Productivity Activity Impairment.

Table 3: Health secondary outcome measures

Outcome, mean (SD)	Time	n	Control	n	Intervention	Adjusted difference in means (95% CI)	p
SF-12v2: Physical Component Score (0-100)	0m	125	36. (7.5)	124	36.9 (7.9)		
	6m	107	37.0 (8.8)	102	37.8 (8.8)	0.1 (-1.8,1.9)	0.94
	12m	101	39.7 (9.5)	89	39.6 (8.8)	-1.1 (-3.0, 0.8)	0.24
SF-12v2: Mental Component Score (0-100)	0m	125	41.0 (9.1)	124	41.6 (9.7)		
	6m	107	44.6 (9.3)	102	44.1 (9.4)	-1.0 (-3.3, 1.2)	0.37
	12m	101	41.5 (10.1)	89	42.3 (10.1)	0.1 (-2.3, 2.4)	0.95
RAID (0-10)	0m	125	6.2 (1.7)	124	5.8 (1.8)		
	12m	101	5.6 (2.2)	89	5.3 (1.9)	0.1 (-0.4, 0.5)	0.76
RADAI-5 (0-10)	0m	125	6.1 (1.8)	124	5.6 (1.8)		
	12m	101	5.3 (2.1)	89	5.2 (1.8)	0.0 (-0.5, 0.5)	0.87

RAID: Rheumatoid Arthritis Impact of Disease; RADAI-5: Rheumatoid Arthritis Disease Activity Index-5; SF-12v2: Short Form 12v2 Health Survey.

Table 4: Contextual factor analysis by group and time

	N (%) Baseline	Difference between intervention and control (SE)	Adjusted difference in means (95%CI)	P-value for the interaction
Age 12m	249	0.0 (0.3)	0.3 (-0.5; 1.1)	0.41
Age 36m		-0.2 (0.4)	0.2 (-0.7; 1.1)	0.73
Gender 12m:				
Male	45	-11.0 (6.4)	1.1 (-17.3; 19.6)	0.91
Female	202	-0.2 (3.2)		
Gender 36m:				
Male		-11.5 (7.8)	0.4 (-20.1; 20.9)	0.97
Female		-1.4 (3.6)		
Disease duration 12m:				
≤2 years	81	0.3 (5.0)	-4.2 (-19.6; 11.2)	0.59
>2 years	168	-2.9 (3.4)		
Disease duration 36m:				
≤2 years		2.0 (5.7)	-8.5 (-25.2; 8.3)	0.32
>2 years		-5.4 (4.0)		
Comorbidities 12m:				
0	56	0.3 (5.6)	1.6 (-15.3; 18.4)	0.86
≥1	193	-2.7 (3.3)		
Comorbidities 36m:				

	N (%) Baseline	Difference between intervention and control (SE)	Adjusted difference in means (95%CI)	P-value for the interaction
0		-6.0 (6.7)	8.6 (-9.9; 27.1)	0.36
≥1		-2.2 (3.7)		
SF12v2 Physical Component Score (0-100) 12m	249	-0.2 (0.4)	-0.2 (-1.2; 0.7)	0.63
SF12v2 Physical Component Score (0-100) 36m		-0.2 (0.4)	-0.2 (-1.3; 0.8)	0.67
SF12v2 Mental Component Score (0-100) 12m	249	0.2 (0.3)	-0.1 (-0.9; 0.7)	0.85
SF12v2 Mental Component Score (0-100) 36m		-0.1 (0.4)	-0.3 (-1.2; 0.6)	0.45
RAID-Total (0-10)12m	249	-0.2 (1.5)	0.5 (-3.5; 4.5)	0.80
RAID-Total (0-10) 36m		-1.2 (1.8)	-0.5 (-5.0; 4.0)	0.83
RADAI-5 (0-10) 12m	249	-1.2 (1.6)	1.3 (-2.8; 5.4)	0.53
RADAI-5 (0-10) 36m		-1.2 (2.0)	1.4 (-3.2; 6.0)	0.55
ONS-Manual Work 12m:				
Non-manual	133	3.3 (3.9)		0.27
Manual	116	-7.5 (4.0)	-8.1 (-22.4; 6.2)	
ONS-Manual Work 36m:				
Non-manual		-5.6 (4.3)		0.27
Manual		0.5 (4.9)	8.8 (-6.9; 24.4)	
RA-WIS (0-23) 12m:				
Low	23	-12.5 (8.5)		

	N (%) Baseline	Difference between intervention and control (SE)	Adjusted difference in means (95%CI)	P-value for the interaction
Moderate	119	-0.9 (4.1)	6.4 (-19.3; 32.1)	0.62
High	107	-0.1 (4.2)	-13.5 (-40.8; 13.9)	0.34
RA-WIS (0-23) 36m:				
Low		2.2 (9.8)		
Moderate		-6.0 (4.5)	20.0 (-6.0; 46.0)	0.13
High		0.6 (5.2)	6.0 (-22.0; 33.9)	0.67
Work Self-Efficacy Total (0-30) 12m	249	0.8 (0.6)	0.3 (-1.2; 1.7)	0.70
Work Self-Efficacy Total (0-30) 36m		-0.3 (0.7)	0.8 (-2.4; 0.9)	0.40
Work Demands: Control over Work Schedule 12m				
Somewhat – a great deal	128	2.1 (4.0)		
A little – not at all	121	-5.7 (4.0)	-10.2 (-24.6; 4.1)	0.16
Work Demands: Control over Work Schedule 36m				
Somewhat – a great deal		-4.8 (4.3)		
A little – not at all		-0.9 (5.0)	1.5 (-14.3; 17.2)	0.85
Work Demands: Job Flexibility 12m				
Somewhat – a great deal	94	-3.0 (4.5)		
A little – not at all	155	-1.0 (3.6)	-4.8 (-19.4; 9.8)	0.52
Work Demands: Job Flexibility 36m				
Somewhat – a great deal		-4.1 (4.9)		

	N (%) Baseline	Difference between intervention and control (SE)	Adjusted difference in means (95%CI)	P-value for the interaction
A little – not at all		-2.7 (4.4)	-5.4 (-21.1; 10.4)	0.50
Work Demands: Ability to Postpone Work Tasks 12m				
Somewhat – a great deal	64	5.7 (5.7)		
A little – not at all	185	-4.4 (3.3)	-9.5 (-26.0; 7.0)	0.26
Work Demands: Ability to Postpone Work Tasks 36m				
Somewhat – a great deal		-4.1 (6.2)		
A little – not at all		-3.5 (3.9)	1.8 (-15.7; 19.4)	0.84
Work Demands Receive help from colleagues 12m				
Somewhat – a great deal	87	2.3 (4.9)		
A little – not at all	159	-4.4 (3.5)	-10.8 (-26.0; 4.4)	0.17
Work Demands: Receive help from colleagues 36m				
Somewhat – a great deal		2.7 (5.4)		
A little – not at all		-7.9 (4.2)	-14.6 (-31.1; 1.8)	0.08
Work Demands: Physically demanding job 12m				
Somewhat – a great deal	125	-2.0 (4.0)		
A little – not at all	124	-2.0 (4.1)	4.3 (-10.3; 18.8)	0.57
Work Demands: Physically demanding job 36m				
Somewhat – a great deal		-2.7 (4.7)		
A little – not at all		-2.7 (4.6)	4.4 (-11.4; 20.2)	0.59

	N (%) Baseline	Difference between intervention and control (SE)	Adjusted difference in means (95%CI)	P-value for the interaction
Work Demands: Mentally demanding job 12m				
Somewhat – a great deal	232	-2.4 (2.9)		
A little – not at all	17	4.8 (10.2)	3.7 (-24.1; 31.6)	0.79
Work Demands: Mentally demanding job 36m				
Somewhat – a great deal		-1.3 (3.4)		
A little – not at all		-30.9 (14.0)	40.4 (6.7; 75.0)	0.02

Notes: Disease duration ≤2y = early disease, >2y = established disease. Work Demands (5-point Likert scale, re-categorised as a little/ not at all vs. somewhat/quite a bit/a great deal).

ONS: Office for National Statistics; RAID: Rheumatoid Arthritis Impact of Disease; RADAI-5: Rheumatoid Arthritis Disease Activity Index-5; RA-WIS; Rheumatoid Arthritis - Work Instability Scale; SF-12v2: Short Form 12v2 Health Survey; WALS: Work Activity Limitations Scale; WLQ-25PDmod: Work Limitations Questionnaire-25: Modified Physical Demands scale (i.e. items are not reverse scored); WPAI Work Productivity Activity Impairment.

Table 5: Cost-effectiveness analysis results

	Control	Intervention	Incremental (Intervention – Control)
Costs	n=106	n=98	
Intervention cost - Mean (SD)	£0 (0)	£105.77 (55.57)	£105.77
Per person resource use - Mean (SD)	£6,565.62 (6781.73)	£6,005.68 (6031.49)	-£559.94
Total per person costs (unadjusted) - Mean (SD)	£6,565.62 (6781.73)	£6,113.69 (6034.47)	-£451.93
Total per person costs (adjusted for previous use)*	-	-	£346.24
QALYs	n=103	n=92	
Per person QALYs (unadjusted)	0.51	0.54	0.03
Per person QALYs (adjusted for baseline HRQoL)*	-	-	-0.003
Incremental Net Benefit (INB)			
Mean** Incremental Net Benefit (pseudo 95% CI) *	-	-	-£195.86 (-£1,711.54 to £1238.66)

*using imputed data – n=249
**1000 bootstrapped INB estimates

QALY: Quality Adjusted Life Year.