

1 **Supplementary Materials: Brown, T.M., Hammond, A., Ching A., & Parker. J. Work limitations**
2 **and associated factors in working people with rheumatoid arthritis, axial spondyloarthritis,**
3 **osteoarthritis and fibromyalgia. (2023) Musculoskeletal Care. DOI: 10.1002/msc.1760.**

4

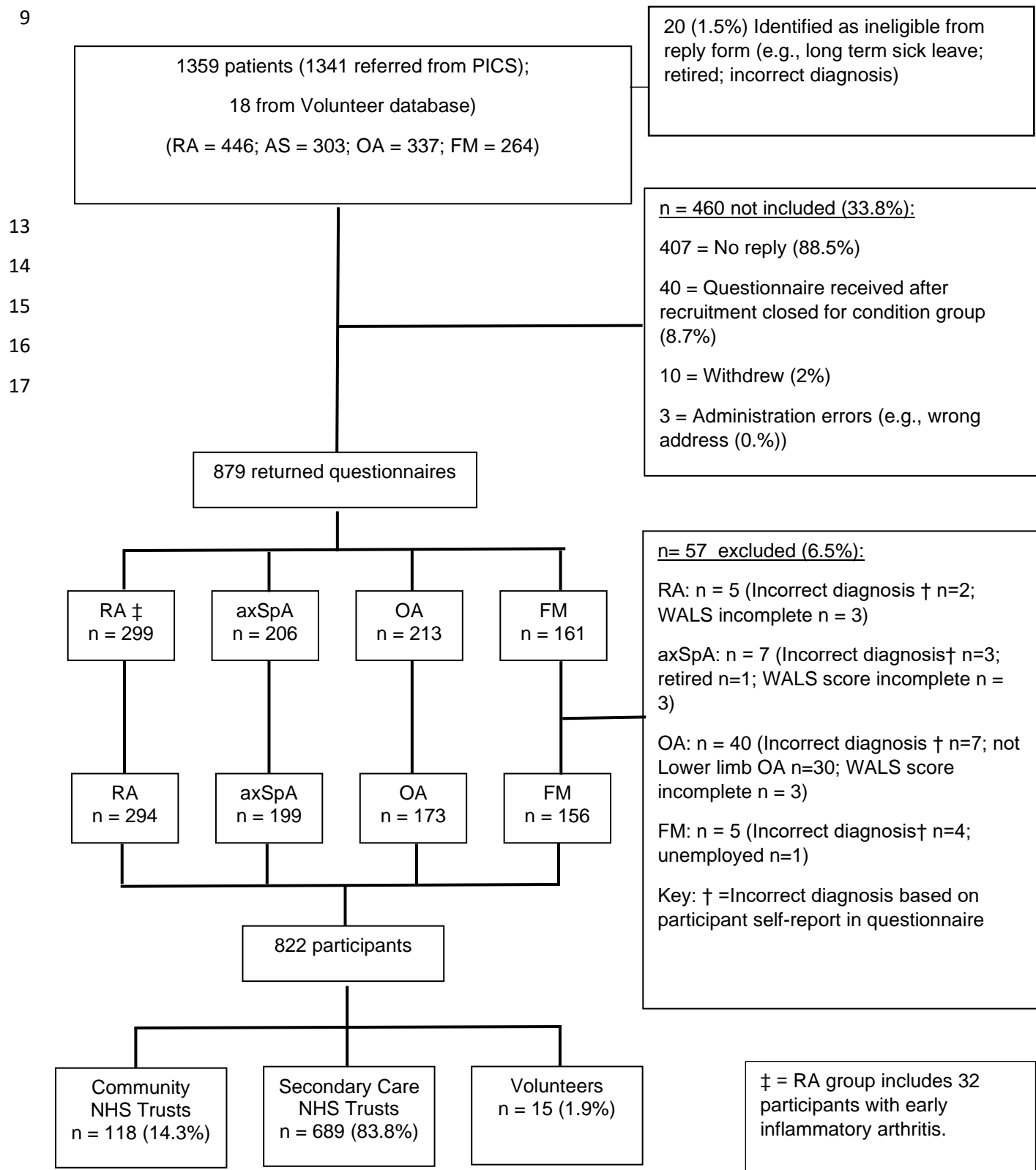
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8 **Supplementary Figure 1: Recruitment Flowchart**



18 **Supplementary File 1: Literature search and review.**

19

20 **1. INTRODUCTION**

21 Many factors have been identified as potentially affecting people with rheumatic and musculoskeletal
22 diseases' (RMD) ability to work. The International Classification of Functioning, Disability and Health
23 (ICF) (World Health Organization (WHO), 2001) can be used as a structure to understand work
24 participation (Heerkens et al, 2004; Heerkens et al, 2017). An extension of the ICF for Occupational
25 Health Care (ICF-OHC) has been proposed to describe personal, work- related personal and work-
26 related environmental contextual factors which are associated with work participation and health in
27 employed people (Heerkens et al, 2004; Heerkens et al, 2017). This is considered as work in
28 development, rather than a fixed model, by the authors. The expansion of personal factors, in particular,
29 enables a better understanding of work issues from a biopsychosocial perspective (Heerkens et al,
30 2017). The authors note that there is a problem of overlap of work-related personal factors with other
31 ICF components, which may be resolved with ongoing development of the ICF. Work productivity loss
32 (presenteeism, absenteeism, work disability) is considered a participation outcome in the ICF (Tang et
33 al, 2011).

34

35 The ICF-OHC model proposes that work participation can be influenced by:

36 *Functioning and disability factors:*

- 37 1. The person's health condition: e.g., RMD.
38 2. Body Function and Structures: e.g., pain, fatigue, cognitive abilities (e.g., memory).
39 3. Activities and Participation: work-related activities e.g., walking, maintaining body positions, hand
40 and arm use, handling stress and other psychological demands, focusing attention/ thinking,
41 conversation.

42 *Contextual factors:*

- 43 4. Personal factors: e.g., sociodemographic factors, psychological factors, and work-related personal
44 factors (see Supplementary Table 1).

45 5. Work-related environmental factors: e.g., task content, social relations at work, working conditions,
46 organisational characteristics (see Supplementary Table 1).

47 6. Non-work-related environmental factors: e.g., attitude and support of family members (included
48 within the existing ICF Environmental Factors) (Heerkens et al, 2017).

49 Environmental contextual factors can be considered as facilitators (i.e., factors which can improve
50 functioning, e.g., provision of work accommodations, positive attitudes of management and co-workers,
51 supportive workplace policies) or barriers (i.e., factors limiting functioning, e.g., absence of assistive
52 technology, discrimination, lack of policies to support flexible working) (WHO, 2001).

53

54 The Outcome Measures in Rheumatology (OMERACT) Worker Productivity Group (OWPG) conducted
55 a literature review, using the ICF as a structure, identifying 70 potential personal and environmental
56 contextual factors in 15 sub-domains (Tang et al, 2011). Further work was conducted to identify
57 contextual factors for ankylosing spondylitis, reviewing research to January 2014. There was limited
58 evidence for which factors are associated with sick leave and presenteeism, as too few studies
59 examined personal and environmental factors (Stolwijk et al, 2015). We conducted an overview review,
60 with the aim of identifying factors related to work participation specifically in people with rheumatoid
61 arthritis (RA), axial spondyloarthritis (axSpA), osteoarthritis (OA) or fibromyalgia (FM). This was to
62 provide a theoretical basis for selecting which variables, from those available in the Work Patient
63 Reported Outcome Measures (WORK- PROM) dataset, to include in this secondary analysis study.

64

65 **2. METHOD**

66 The focus of the review was defined as:

67 **Population:** people with rheumatoid arthritis (RA), axial spondyloarthritis (axSpA), osteoarthritis (OA)
68 or fibromyalgia (FM); either working or no longer working due to their condition. (These are the four
69 RMD included in the WORK-PROM study dataset).

70 **Concept:** functioning and disability factors, and contextual factors (personal, work-related personal,
71 and work-environmental) associated with or affecting work participation (i.e., presenteeism/ work
72 limitations/ at-work productivity, absenteeism, and/or work disability).

73 **Context:** any work-related setting; 2012 –December 2022.

74 The literature search in RA, axSpA, and FM was conducted to December 2022 in: EBSCO, The
75 Cumulative Index to Nursing and Allied Health Literature (CINAHL: EBSCOhost), MEDLINE (Ovid), and
76 Google Scholar, and limited to start from January 2012 and in English. The following key terms were
77 used, in conjunction with RA, axSpA and FM: work or occupation, combined with limitation\$, barrier\$,
78 function, restriction\$, absenteeism, presenteeism, work productivity, work participation. For OA, a
79 search had already been conducted by one of the authors (AC) for another study. This included four
80 electronic databases: Allied and Complementary Medicine (Ovid; 1985–March 2022); CINAHL
81 (EBSCOhost; 1976 – March 2022); MEDLINE (Ovid; 1946 – March 2022); and APA PsycInfo (Ovid;
82 1806 – March 2022). The search strategy was developed using medical subjects heading (MeSH) terms
83 and text words related to OA, absenteeism, presenteeism, work impairment, productivity, and
84 biopsychosocial factors that may impact work participation. This search was updated to December 2022
85 in MEDLINE and CINAHL.

86

87 We took a broad approach to identifying factors associated with work participation by including
88 quantitative (univariable and multivariable observational) and qualitative studies, as well as systematic
89 and narrative reviews. Review articles included research pre-dating 2012. As this was an overview
90 review, we did not undertake quality assessment of included papers, as the aim was to identify as broad
91 a range of factors as possible, rather than weighing the importance of different factors.

92

93 Title and abstract reviews were conducted to identify those articles reporting work-associated factors.
94 Articles were excluded if: not reporting factors associated with reduced work participation (e.g., articles
95 focused on reporting the extent of absenteeism or levels of work disability); not including RA, axSpA,
96 OA or FM as the target population; or not reporting results separately for these conditions. Full texts of
97 included articles were read, data extracted into tables for each condition, with factors identified in each
98 article listed.

99

100 Factors were then extracted from these summary tables, linked to the ICF using linking rules (Cieza et
101 al, 2005), in order to map factors onto the extended ICF-OHC, including work-related personal and

102 work-related environmental contextual factors. For each condition, the references identifying that factor
103 were listed. Relevant variables available in the WORK-PROM dataset were then matched to these
104 factors, where available (Supplementary Table 1).

105

106 **3. RESULTS**

107 Fifty-nine articles were reviewed (RA = 14; axSpA =19; OA = 14; FM = 12). From this, 78 factors were
108 identified of which 33 could be matched to variables in the WORK PROM study dataset. Some factors
109 were overlapping and matched to the same variable: poorer mental health and depression to the Mood
110 numeric rating scale (NRS); poorer mental health, anxiety, and work-related stress to the Long-Term
111 Conditions Job Strain Scale (LTCJSS); and ability to concentrate and perform job social functions to
112 the Mental-Interpersonal Demands subscale of the Work Limitations Questionnaire-25 (WLQ-25).
113 Some factors could be matched to more than one WORK-PROM variable, particularly: functional
114 limitations, as there were four condition-specific function measures; and combined disease symptoms,
115 as there were four condition-specific symptom measures. For two factors the matching variables had
116 more than one subscale, i.e., disclosure (to employer; to co-workers), and work-life balance (Work
117 Health Personal Life Perceptions Scale (WHPLPS) parts 1 and 2

118

119 The 33 factors which could be matched to WORK-PROM variables across all four conditions were:

120 *Functioning and disability factors:*

- 121 • Body function and structure factors (n = 8): with the commonest being poorer mental health
122 (anxiety, depression); disease symptoms (combined symptom measures, e.g., Bath Ankylosing
123 Spondylitis Disease Activity Index (BASDAI); pain; and fatigue.
- 124 • Activities and participation factors (n=6): with the commonest being functional limitations and
125 ability to concentrate/ remember at work.

126 *Contextual factors:*

- 127 • Personal factors (n = 5): with the commonest being age (older), sex (predominantly in axSpA,
128 being female) and educational level.

- 129 • Work-related personal factors (n = 5): with the commonest being work self-efficacy; and
130 disclosure of condition at work.
- 131 • Work-related environmental factors (n = 9): with the commonest being physical job demands
132 (e.g., manual work; demands from sedentary work of prolonged sitting; and repeated hand/arm
133 actions); relationships with managers and co-workers (lack of support); and lack of workplace
134 accommodations.

135

136 There were a further 35 factors identified in the review which could not be matched to the WORK-PROM
137 dataset. The commonest factors not linked were: for functioning and disability, health-related quality of
138 life (e.g., measured using the EQ-5D) (RA, axSpA: six articles) and commuting time (RA, axSpA and
139 FM: four articles); for personal factors, social support (RA, FM: five articles); and for work-related
140 environmental factors, lack of understanding about fatigue/ condition in the workplace (RA, axSpA, OA
141 and FM: six articles); The remaining factors were only identified once or twice each across any of the
142 four conditions.

143

144 Overall, for RA, 26 factors identified were matched to WORK-PROM variables (with 12 not matched);
145 for axSpA, 21 factors (plus 12 not matched); for OA, 19 factors (plus six not matched); and in FM, 25
146 factors (plus 16 not matched).

147

148 **4. DISCUSSION**

149 The aim of this review was to identify factors associated with work participation in RMD in order to then
150 identify which variables, from those available in the WORK-PROM study dataset, to include in the
151 multivariable regression analyses in this study. An extensive range of factors were identified from the
152 literature, which were mapped to the main components of the ICF-OHC model. Of these, 33 could be
153 matched with WORK-PROM variables. Eleven were common to all four conditions: age, sex, education
154 level, pain, fatigue, poorer mental health (including anxiety, depression), functional limitations, physical
155 job demands, relationship with manager; relationships with co-workers; and work accommodations.

156 A strength of this review is that the variables matched from the WORK-PROM dataset captured the
157 most frequently identified factors from the review associated with work participation in RMD. Of the 34
158 factors not matched to variables in the dataset, most were only cited once or twice in the literature
159 reviewed, suggesting these are less important. However, there were four factors identified more
160 frequently which could not be matched: lack of understanding about fatigue/ the condition in the
161 workplace, health related quality of life, commuting time and social support. A limitation of the study is
162 that these four factors could not be included in the multivariable regression analyses. In particular, the
163 factor "lack of understanding of the condition in the workplace", is potentially an important omission, as
164 this was identified across all four conditions. The WORK-PROM dataset was not collected purposively
165 for this secondary data analysis, as the WORK-PROM study was primarily designed to evaluate the
166 psychometric properties of several work-related PROM, including the Work Activity Limitations Scale
167 (WALS). However, the review indicates the dataset captured the majority of contextual factors identified
168 to date in research as commonly associated with work participation.

169

170 The ICF-OHC model was designed to extend the ICF to better categorise contextual factors impacting
171 on work participation. The model is based on literature review and the experience and suggestions of
172 researchers, students and (occupational) health professionals (Heerkens et al, 2017). Factors identified
173 in this literature review, and the WORK-PROM variables, could be linked to the ICF-OHC model
174 suggesting it is a useful model for structuring contextual factors. Currently, the ICF-OHC includes an
175 extensive number of potential contextual factors. The OWPG identified over 70 potential contextual
176 factors (Tang et al, 2011). This was further refined to six key contextual factors identified from a Delphi
177 exercise: (1) type of job (e.g., level of physical demand, manual vs. sedentary), (2) personal factors
178 (e.g., attitude, self-esteem, personal satisfaction, motivation), (3) disease state, (4) financial need, (5)
179 societal incentive (e.g., insurance, government support, return to work transition programs), and (6) age
180 (Escorpizo et al, 2020). The OWPG have subsequently proposed a classification of 12 contextual factor
181 domains, including 25 items, for studies in inflammatory arthritis (Boonen et al, 2021) (Supplementary
182 Table 3). In this review we identified most of the factors in this classification, but some were not identified
183 in the literature, notably those related to economic need (income needs, quality of benefits) and
184 workplace organisation (team dynamics at work, compensation of absence (e.g., replacement
185 practices). These items were also missing in the WORK PROM dataset.

186 The matching process between the literature review and WORK-PROM data set enabled the
187 identification of factors to use in this secondary data analysis exploring factors impacting on work
188 limitations. It also highlighted the need for clinicians and researchers exploring work participation to
189 consider including measures of “understanding of fatigue/ condition in the workplace”, “health-related
190 quality of life,” “commuting time” and “social support” factors. Additionally, factors related to economic
191 need and workplace organisation should also be considered.

192

193

Supplementary Table 1: Contextual factors influencing worker productivity: ICF extended for Occupational Health Care (Heerkens et al, 2017)

Personal Factors	Work-related Environmental Factors
<i>Social and physical context:</i> e.g., partnership/ marriage; housing; income; position in family (e.g., being main earner, being a carer).	<i>Terms of employment:</i> e.g., working hours; type of contract; working time flexibility.
<i>Personal history:</i> e.g., major life events in personal life, education and/or work	<i>Task content:</i> e.g., job demands (emotional, mental and physical); work autonomy (i.e., control over work); job tasks; work pace; role responsibilities.
<i>General mental/psychological factors:</i> e.g., coping style; perceived health, perceived stress, quality of life, self-efficacy, self-management.	<i>Social relations at work:</i> e.g., the attitudes, communication with, conflict with or support from employers, supervisors, co-workers and/ or subordinates; management style of the organisation.
<i>Disease-related factors:</i> e.g., comorbidities, knowledge about condition; adherence with therapy; illness beliefs; acceptance of condition.	<i>Working conditions:</i> e.g., physical conditions in the workplace (e.g., noise, temperature, light), emotional conditions (e.g., discrimination), ergonomic conditions (e.g., workplace accessibility; availability of adaptations for furniture, tools; assistive technology for e.g., computer equipment, etc.); job accommodations.
<i>Lifestyle (habits):</i> e.g., leisure, smoking, alcohol use; hobbies, exercise and relaxation habits.	<i>Organisational characteristics:</i> e.g., company size; work sector; policies on working conditions; professional support from the organisation (e.g., occupational health).
<u>Work-related personal factors:</u> e.g., disclosure; job satisfaction; attitude to staying at work; work motivation; personal meaning of work.	<i>Societal level/ macro-economic circumstances: which influence companies' policies and productivity:</i> e.g., employment and equality legislation, employment services available.

Supplementary Table 2: Factors identified through literature review as associated with work participation in RA, axSpA, OA and FM

Factors	Articles identifying factors related to work participation in:				Relevant variable(s) in WORK-PROM study questionnaire	ICF-code
	RA	axSpA	OA	FM		
Functioning and Disability: Body Function and Structures factors						
Lower health status	Boot et al, 2018	Boonen et al, 2015; Garrido-Cumbrera et al, 2020	Dibonaventura et al, 2012	Rivera et al, 2010	Perceived health status in last month	No code
Pain	Hoving et al, 2013; Van Vilsteren et al, 2015 Kim et al, 2017 Holland & Collins, 2018; Deb et al, 2018; Jones et al, 2020	Maksymowych et al, 2010; Haglund et al, 2015	Dibonaventura et al, 2011; Hermans et al, 2012; Agaliotis et al, 2013; Allaire et al, 2013; Wilkie et al, 2015; Agaliotis et al, 2017; Agaliotis et al, 2018 Jackson et al, 2020	Mannerkorpi & Gard, 2012; Antao et al, 2013; Chen et al, 2019; Mukhida et al, 2020 Salaffi et al, 2022	Pain NRS [OA: WOMAC Pain – converted to Pain NRS score]	b280
Fatigue	Hoving et al, 2013; Sverker et al, 2014; Helme et al, 2018; Druce et al, 2018; Holland & Collins, 2018; Gwinnutt et al, 2020; Jones et al, 2020	Helme et al, 2018; Macfarlane et al, 2019 Druce et al, 2018; Hollick et al, 2020	Helme et al, 2018;	Rivera et al, 2010; Mannerkorpi & Gard, 2012; Antao et al, 2013; Chen et al, 2019; Mukhida et al, 2020	Fatigue NRS	b130; b455

Problems in more than one joint	-	-	Agaliotis et al, 2017	-	No. body parts affected (0-16)	b710-b715
Poorer mental health:	Van Vilsteren et al, 2015; Boot et al, 2018; Deb et al, 2018; Jones et al, 2020	Garrido-Cumbrera et al, 2020	Dibonaventura et al 2012; Agaliotis et al, 2013; Nakata et al 2018	-	Mood NRS or Job Strain scale (<i>work-related anxiety only</i>)	b152
Depression	Allaire et al, 2013; Gonzalez-Lopez et al, 2013; Druce et al, 2018; Gwinnutt et al, 2020	Healey et al, 2011; Haglund et al, 2015; Sag et al, 2018; Druce et al, 2018	Nakata et al, 2018	Antao et al, 2013	Mood NRS	b152
Anxiety	Allaire et al, 2013; Druce et al, 2018; Gwinnutt et al, 2020	Healey et al, 2011; Haglund et al, 2015; Sag et al, 2018; Druce et al, 2018	-	Antao et al, 2013 Mukhida et al, 2020	Job Strain scale (<i>work-related anxiety only: see Stress at work under Activities & Participation</i>)	b152
Disease symptoms (as a combined term, e.g., pain, stiffness)	Holland & Collins, 2018; Xavier et al, 2019	Maksymowych et al, 2010; Healey et al, 2011; Boonen et al, 2010; Boonen et al, 2015; Haglund et al, 2015; de Hooge et al, 2016; Sag et al, 2018; Boonen et al, 2018; Macfarlane et al, 2018; Goh et al, 2019; Garrido-Cumbrera et al, 2020;	-	Rivera et al, 2010; Mannerkorpi & Gard, 2012; Allaire et al, 2013; Liedberg & Bjork, 2014; Palstam & Mannerkorpi, 2017; Chen et al, 2019; Depelteau et al, 2021 Salaffi et al, 2022	RA: RAID AS: BASDAI OA: WOMAC Pain and Stiffness FM: FIQ-R Symptoms	Ch1 Mental Functions; Ch 2 Sensory Function and Pain; Ch 7 Neuromusculoskeletal and movement related functions. (Codes vary with different measures). [RAID also includes “functional ability” (d410-499; d510-599; d610-650); and “coping” (PF)]

		Hollick et al, 2020				
Functioning and Disability: Activities and Participation factors						
Stress at work	-	-	-	Mannerkorpi & Gard, 2012; Laroche et al, 2019	Job Strain scale (see Anxiety under Body Functions and Structures)	d240
Ability to concentrate/remember at work	Hoving et al, 2013; Jones et al, 2020	-	Alheresh and Keysor, 2021	Mannerkorpi & Gard, 2012; Antao et al, 2013; Chen et al, 2019	Mental- Interpersonal Demands sub-scale (Work Limitations Questionnaire-25)	d160; d163; d175;d177 (b140;b144)
Performing job functions: social	Jones et al, 2020	-	-	Mannerkorpi & Gard, 2012; Allaire et al, 2013; Chen et al, 2019	Mental- Interpersonal Demands sub-scale (Work Limitations Questionnaire-25)	d310-d329; d330-349; d350-399; d710; d720; d730
Functional limitations	Gonzalez-Lopez et al, 2013; Sverker et al, 2014; Boot et al, 2018 Holland & Collins, 2018; Deb et al, 2018; Gwinnutt et al, 2020; Jones et al, 2020	Maksymowych et al, 2010; Boonen et al, 2010; Boonen et al, 2015; Haglund et al, 2015; de Hooge et al, 2016; Boonen et al, 2018; Macfarlane et al, 2018; Goh et al, 2019; Hollick et al, 2020	Dibonaventura et al 2012; Agaliotis et al 2013; Wilkie et al 2014; Wilkie et al 2015; Nakata et al 2018; Agaliotis et al, 2018; Alheresh and Keysor 2021	Rivera et al, 2010; Mannerkorpi & Gard, 2012; Antao et al, 2013; Salaffi et al, 2022	RA: HAQ AS: BASFI OA: WOMAC Function FM: FIQ-R: Function sub-scale	Ch 4 Mobility. Ch 5 Self-Care. Ch 6 Domestic Life. (Codes vary with different measures).
Hand and arm function	Allaire et al, 2013; Sverker et al, 2014;	-	-	-	MAPHAND	d430; d440; d445

	Holland & Collins, 2018.					
Work-life balance (and handling symptoms alongside this)	Hoving et al, 2013;	-	-	Mannerkorpi & Gard, 2012; Palstam et al, 2013; Palstam & Mannerkorpi, 2017; Chen et al, 2019;	Work Health Life Perceptions Scale [2] 1: Condition negatively affects work 2: Work and personal life affect condition	Ch 6 Domestic Life (d610-699); d850; Ch 9 Community Social and Civic Life (d910-d999); d570
Contextual factors: Personal factors						
Age	Allaire et al, 2013; Gonzalez-Lopez et al, 2013; Druce et al, 2018	Healey et al, 2011; Boonen et al, 2015; Stolwijk et al, 2015; Boonen et al 2018; Druce et al, 2018	Allaire et al, 2013; Wilkie et al, 2014; Nakata et al, 2018	Liedberg & Bjork, 2014	Age (years)	PF
Sex (female)	Gwinnutt et al, 2020	Gordeev et al, 2014; Boonen et al 2015; Haglund et al, 2015; Stolwijk et al, 2015; Boonen et al, 2018; Druce et al, 2018; Garrido-Cumbrera et al, 2020;	Allaire et al, 2013	Chen et al, 2019	Sex	PF
Marital status	Gonzalez-Lopez et al, 2013	Garrido-Cumbrera et al, 2020	Nakata et al, 2018	-	Living situation (with others/ alone)	PF
Education level	Allaire et al, 2013	Haglund et al 2015; Garrido-Cumbrera et al, 2020	Nakata et al, 2018	Liedberg & Bjork, 2014	Education level	PF

Comorbidities	-	-	Agaliotis et al 2017; Nakata et al 2018	Rivera et al, 2010;	Rheumatic Disease Comorbidity Index	PF
Contextual factors: Work- related personal factors:						
Self-confidence/ self-efficacy	Hoving et al, 2013	Healey et al, 2011; Haglund et al, 2015; Stolwijk et al, 2015	-	Mannerkorpi & Gard, 2012; Mukhida et al, 2020	Work Self-efficacy Scale	PF
Motivation to work		-	-	Depelteau et al, 2021	Motivation to continue to work	PF
Work as Important	Hoving et al, 2013	Boonen et al, 2015	-		Importance of continuing to work	PF
Job satisfaction	Van Vilsteren et al, 2015	-	-	-	Job Satisfaction (0- 10)	PF
Disclosure of condition at work	Hoving et al, 2013; Sverker et al, 2014	-	Agaliotis et al, 2018	Antao et al, 2013; Chen et al, 2019; Mukhida et al, 2020	Disclosure to: - Employer - co-workers	PF
Contextual Factors: Work-related environmental factors						
Working longer hours	Allaire et al, 2013	Boonen et al, 2015		Mannerkorpi & Gard, 2012	Hours worked	No code
Organisation size		Boonen et al, 2018; Stolwijk et al, 2015			Organization size	No code
Occupation type/ job educational requirements	-	-	Hubertsson et al, 2017	-	Job Skill level	No code
Physical job demands (manual or sedentary)	Allaire et al, 2013; Gonzalez-Lopez et al, 213; Gwinnutt et al, 2020; Jones et al, 2020	Boonen et al, 2015; Stolwijk et al, 2015; Boonen et al, 2018; Macfarlane et al, 2018; Hollick et al, 2020	Hermans et al 2012; Allaire et al, 2013; Agaliotis et al, 2013; Agaliotis et al, 2018; Alheresh & Keysor, 2021	Rivera et al, 2010; Mannerkorpi & Gard, 2012; Allaire et al, 2013; Palstam & Mannerkorpi, 2017; Chen et al, 2019; Laroche et al, 2019	Physical job demands	No code

Job control /autonomy	Allaire et al, 2013; Holland & Collins, 2018	Boonen et al, 2018; Hollick et al, 2020	-	Mannerkorpi & Gard, 2012;	Control over Work	No code
Relationship with/support from manager (or lack of)	Allaire et al, 2013; Hoving et al, 2013	Hollick et al, 2020; Stolwijk et al, 2015;	Agaliotis et al, 2018	Mannerkorpi & Gard, 2012; Antao et al, 2013 ; Liedberg & Bjork, 2014; Palstam & Mannerkorpi, 2017; Chen et al, 2019; Laroche et al, 2019; Mukhida et al, 2020; Depelteau et al, 2021	Perceived Workplace Support --manager	e330
Relationship with colleagues/ low co-worker support	Allaire et al, 2013; Hoving et al, 2013; Jones et al, 2020;	Boonen et al, 2015; Stolwijk et al, 2015; Boonen et al, 2018; Hollick et al, 2020	Agaliotis et al, 2017; Agaliotis et al, 2018	Liedberg & Bjork, 2014; Palstam & Mannerkorpi, 2017; Chen et al, 2019; Laroche et al, 2019; Mukhida et al,2020; Depelteau et al, 2021	Perceived Workplace Support -co-workers	e325
Lack of organizational support	-	-	-	Chen et al, 2019	Perceived Work Support scale - Organisation	e590
Work accommodations	Hoving et al, 2013; Sverker et al, 2014; Helme et al, 2018; Holland & Collins, 2018	Boonen et al, 2015; Helme et al, 2018; Hollick et al, 2020	Helme et al, 2018; Agaliotis et al, 2018 Alheresh & Keysor, 2021	Chen et al, 2019; Mukhida et al, 2020	Work Accommodations, Benefits, Policies and Practices Scale: number of accommodations <u>needed</u>	e125; e135; e50; e590

Others factors <u>not</u> included in the WORK-PROM dataset.						
Functioning & Disability: Body Function and Structures						
Health-related quality of life	Van Vilsteren et al, 2015; Gwinnutt et al, 2020	Maksymowych et al, 2010; Gordeev et al, 2014; Haglund et al, 2015; Goh et al, 2019	-	-		No code
Inflammatory bowel disease	-	Garrido-Cumbrera et al, 2020	-	-		b525; b5355
Disease remission	Kim et al, 2017	Van Lunteren et al, 2017	-	-		No code
Unpredictability of disease/ uncertainty about condition in future	Hoving et al, 2013	-	Agaliotis et al, 2018	-		No code (personal uncertainty = PF)
Functioning & Disability: Activities and Participation						
Physical role limitations (SF36)	Van Vilsteren et al, 2015	-	-	-		Multiple codes: Activities and Participation
Driving difficulties	Sverker et al, 2014	Morton et al, 2021	-	-		d475
Commute time/ commuting	Allaire et al, 2013	Stolwijk et al, 2015	-	Allaire et al 2013; Laroche et al, 2019		d470; d475
Working with screens	-	-	-	Laroche et al, 2019		d440;d445
Lack of information about self-managing condition	-	-	-	Chen et al, 2019		d570
Lower income/ social deprivation	-	Stolwijk et al, 2015	Allaire et al, 2013			d870
Contextual Factors: Personal factors						
Loss of control (illness related)	-	--	-	Antao et al, 2013		PF
Helplessness		Gordeev et al, 2014				PF

Fear avoidance	-			Mukhida et al, 2020		PF
Sense of personal failure	-	-	-	Antao et al, 2013		PF
Smoking	-	Haglund et al, 2015	-	-		PF
Contextual Factors: Environmental factors						
Management of disease	Hoving et al, 2013	-	-	-		e580
Ever treated with a biologic	Van Vilsteren et al, 2015	-	-	-	Medication regimen data insufficient to identify if ever used biologic.	e110
Higher prescription medication use	-	-	Nakata et al, 2018	-	Medication regimen data insufficient to identify extent of medication use.	e110
Medication side effects	-	-	-	Antao et al, 2013		e110
Social support	Allaire et al, 2013	-	-	Palstam et al, 2013; Allaire et al, 2013; Chen et al 2019; Mukhida et al, 2020		e310; e315, e320; e325
Benefits, funding, social security	-	-	-	Antao et al, 2013		e570
Work-related Personal Factors						
Fear: losing job/ losing benefits/ financial losses	-	-	-	Antao et al, 2013; Mukhida et al, 2020		PF
Unwilling to initiate discussion re performance even though disclosed		Hollick et al, 2020				PF
Longer time since first job		Boonen et al, 2018				PF

Work-related environmental factors						
Job insecurity	-	-	Agaliotis et al, 2017	-		No code
No career progression	-	-	-	Laroche et al, 2019		No code
Cold environments	Allaire et al, 2013					e298
Noisy workplace	-	-	-	Mannerkorpi & Gard, 2012; Laroche et al, 2019		e250
Working overtime	-	-	Alheresh and Keysor, 2021	-		No code
Scepticism from others; battle for legitimacy of diagnosis e.g., at work	-	-	-	Chen et al, 2019		e430; e435
Miscommunication	Hoving et al, 2013	-	-	-		e430; e435; [d310]
Lack of understanding of fatigue/ condition in workplace	Helme et al, 2018	Helme et al, 2018; Hollick et al, 2020	Helme et al, 2018; Agaliotis et al, 2018	Chen et al, 2019		e430; e435
Stigma/ discrimination	-	-	-	Antao et al, 2013; Mukhida et al, 2020		e430; e435
Company policies	-	-	-	Chen et al, 2019		e590
Sick pay entitlement		Hollick et al, 2020				e590

Key: RA = rheumatoid arthritis; axSpA = axial spondyloarthritis; OA = osteoarthritis; FM = fibromyalgia; PF = Personal Factor (these are not coded in the ICF).

Supplementary Table 3: Proposal for classification of contextual factors relevant for studies with work participation as an outcome. influencing worker productivity (OMERACT Worker Productivity Group classification) (Boonen et al (2021)).

Personal Contextual Factors	Environmental Contextual Factors
<p>1. Health:</p> <ul style="list-style-type: none"> • Pain • Fatigue • Physical Function 	<p>7. Nature of work:</p> <ul style="list-style-type: none"> • Physical/ mental demands • Job autonomy
<p>2. Demographics:</p> <ul style="list-style-type: none"> • Age and gender • Education 	<p>8. Workplace Support:</p> <ul style="list-style-type: none"> • Assistance by co-workers • Attitude of employer
<p>3. Economic Need:</p> <ul style="list-style-type: none"> • Income needs • Quality of benefits 	<p>9. Workplace organisation:</p> <ul style="list-style-type: none"> • Team dynamics at work • Compensation of work absences (e.g., by replacement workers)
<p>4. Personal Appraisal of work:</p> <ul style="list-style-type: none"> • Job satisfaction • Career perspectives 	<p>10. Workplace accommodations</p> <ul style="list-style-type: none"> • Adaptive devices • Modified hours/ duties
<p>5. Related skills/ abilities:</p> <ul style="list-style-type: none"> • Work self-efficacy • Coping skills 	<p>11. Economic climate/ labour regulation:</p> <ul style="list-style-type: none"> • Income compensation • Employment opportunities
<p>6. Work-life balance:</p> <ul style="list-style-type: none"> • Competing social roles • Quality of leisure 	<p>12. Non-workplace support:</p> <ul style="list-style-type: none"> • Support from family • Task assistance at home

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Supplementary Table 4: Summary of factors associated with work limitations (WALS)

	RA	axSpA	OA (condition -specific)	OA (all)	FM
Functioning and Disability:					
Function	✓	✓	✓		✓
Anxiety/job strain	✓	✓	✓	✓	
WHPLPS Part 1: condition negatively affects work.	✓		✓	✓	✓
MID-WLQ-25	✓		✓		
Pain				✓	✓
Perceived health		✓			
Work-related personal					
Work self-efficacy				✓	
Work-related environmental					
No. work accommodations needed	✓	✓	✓	✓	(✓)
Perceived work support		✓			✓