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RESEARCH ARTICLE

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Prescribing hand strengthening exercise for patients with rheumatoid arthritis; clinical cues influencing occupational therapists' and physiotherapists' judgements

Graham Boniface[1] | Nicola White[2] | Christopher Tomlinson[3] | Meriel Norris[1] | Neil O'Connell[1] | Esther Williamson[4] | Priscilla Harries[5]

[1]Department of Health Sciences, Centre for Health and Wellbeing Across the Lifecourse, Brunel University London, London, UK

[2]Marie Curie Palliative Care Research Department, Division of Psychiatry, University College London, London, UK

[3]Bibliotheca Hertziana, Max-Planck-Institut für Kunstgeschichte, Rome, Italy

[4]Nuffield Department of Orthopaedics Rheumatology and Musculoskeletal Sciences (NDORMS), University of Oxford, Oxford, UK

[5]Centre for Applied Health and Social Care Research, Kingston University, Kingston, UK

Correspondence
Neil O'Connell, Department of Health Sciences, Brunel University London, Mary Seacole Building, 8 Kingston Lane, Uxbridge UB8 3PN, UK.
Email: neil.oconnell@brunel.ac.uk

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Abstract

Objective: To explore the clinical judgements of therapists in prescribing the intensity of hand strengthening exercise in rheumatoid arthritis (RA).

Methods: Phase I: Eleven therapists knowledgeable in treating patients with RA subjectively identified seven clinical cues. These were incorporated into 54 hypothetical patient case scenarios. Phase II: Therapists with ≥2 years post-registration experience and current or recent experience in treating patients with RA were asked to assess 69 case scenarios in total (54 + 15 repeats) and judge what intensity of hand strengthening exercise they would prescribe using the OMNI-Resistance Exercise Scale of perceived exertion. Using responses to the repeated cases, the Cochran-Weiss-Shanteau index of expertise was used to identify therapists who prescribed more consistently. Multiple regression was used to determine which clinical cues were most strongly associated with the intensity of exercise prescribed. A sub-group analysis explored differences between consistent and inconsistent prescribers.

Results: Fifty-three therapists took part. Thirty completed all 69 case scenarios. Across all therapists, the three most important clinical cues associated with lower intensity of exercise prescribed were (1) Patient's reported pain intensity whilst practising the exercise ($\beta = -1.150$, $p < 0.001$), (2) Disease activity ($\beta = -0.425$, $p < 0.001$) and (3) average hand pain over the last week ($\beta = -0.353$ $p < 0.001$). Twelve therapists were categorised as consistent prescribers. This group relied on fewer clinical cues (three vs. seven) when judging what intensity of exercise to prescribe.

Conclusion: This study provides insights into how therapists prescribe hand exercises. Intensity of hand strengthening exercise was influenced by three key clinical cues, including pain intensity and disease activity.

KEYWORDS
decision making, dose, hand exercise, judgement analysis, rheumatoid arthritis

1 | INTRODUCTION

United Kingdom (UK) clinical practice guidelines recommend strengthening exercise as part of a tailored hand exercise programme for patients with pain and dysfunction of the hands and wrists caused by rheumatoid arthritis (RA; NICE, 2018). The guideline offers no specific information about how to tailor its prescription. Two UK healthcare professionals that commonly prescribe hand strengthening exercise in RA are occupational therapists and physiotherapists (BAHT, 2020; IFSHT, 2010). For both, standards of proficiency encourage an evidence-based approach to clinical practice (HCPC, 2023a, 2023b). However, this is difficult to implement for those wishing to prescribe strength-based exercise treatments for their patients with RA. In clinical trials evaluating strength-based exercise treatments in RA, dose parameters (e.g., sets, repetitions, load, intensity) and the evidence on which they are based are often incomplete (Boniface et al., 2020). In the absence of clear clinical guidance for prescribing hand strengthening exercise, investigating how occupational therapists and physiotherapists (referred to from this point as "therapists") decide what intensity of hand strengthening exercise to prescribe is valuable for understanding how these judgements are made in the clinical setting.

One theoretical approach capable of exploring this is judgement analysis (JA). JA is based on social judgement theory, a derivative of Brunswik's (1952) original lens model (Brunswik, 1952; Cooksey, 1996; Denig et al., 2002; Hammond, 1996). In the context of a therapist deciding what intensity of hand strengthening exercise to prescribe a patient (Figure 1), JA allows the researcher to link the judgement process (i.e. how the therapist uses the clinical information collected during the patient-therapist consultation) to the outcome (i.e. what intensity of hand strengthening exercise to prescribe the patient). This is done by asking a therapist to assess a series of hypothetical patient case scenarios in which a number of clinical cues (e.g., pain) with varying levels of severity (e.g., no pain, mild pain, moderate pain, severe pain) are presented. This process allows the association between the cues and the therapist's judgement to be statistically modelled. The relative importance given to each cue by the therapist is referred to as the therapist's judgement policy. We sought to explore how therapists judge the intensity of hand strengthening exercise to prescribe in clinical practice.

2 | OBJECTIVES

The objectives of this study were:

1. To explore how therapists judge the intensity of hand strengthening exercise to prescribe a patient with RA based on the clinical information gathered during the patient-therapist consultation.
2. To identify those therapists who are more consistent in their prescribing judgements and compare their policy to those therapists identified as less consistent.

3 | ETHICAL APPROVAL

Ethical approval was granted by Brunel University London Research Ethics Committee (Phase I: 36607-LR-May/2022-39386-2 and 36607-A-Jun/2022-40324-1; Phase II: 37041-LR-Jul/2022-40789-1 and 37041-A-Feb/2023-43653-1).

4 | METHODS

4.1 | Study design

The study was conducted in the UK and is reported in accordance with the STrengthening the Reporting of Observational studies in

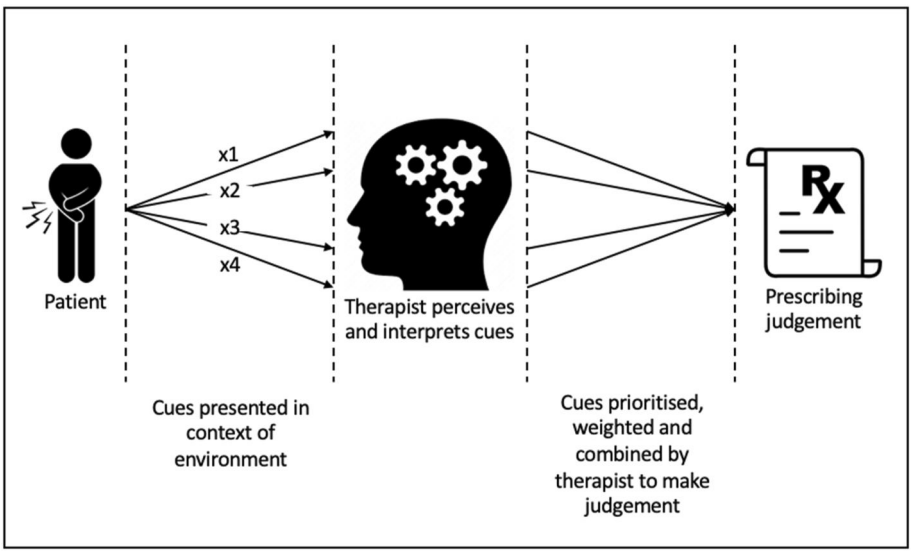

FIGURE 1 Adaptation of the Brunswick lens model (Brunswik, 1952; Waghorn et al., 2021).

Epidemiology checklist (Von Elm et al., 2007). There were two phases to the study. Phase 1: a modified Delphi process with two rounds and a final consensus meeting. Phase II: an online experiment.

4.1.1 | Participants

UK-based occupational therapists and physiotherapists.

4.1.2 | Eligibility criteria

Table 1 describes the inclusion criteria for both phases of the study. If participants did not meet these criteria, they were excluded.

4.1.3 | Recruitment

Phase I

Participants were recruited between 17/05/2022 and 03/08/2022 using known contacts of the research team, advertising in the British Association of Hand Therapists (BAHT) July 2022 ebulletin and using social media (Twitter).

Phase II

Participants were recruited between 15/01/2023 and 31/05/2023 using known contacts of the research team, advertising in the BAHT March 2023 ebulletin and using social media (Twitter).

4.1.4 | Participant sample size

Phase I

In keeping with nominal group technique (NGT), a consensus gathering approach (McMillan et al., 2016; Potter et al., 2004), we aimed to recruit up to 12 participants.

Phase II

In previous JA studies involving healthcare professionals (e.g., community nurses, pharmacists, doctors), sample sizes ranged between four and 109 participants (Adderley and Thompson, 2015; Dwyer et al., 2018; Hancock et al., 2012; Jenkins et al., 2007; Waghorn et al., 2021; Wigton, 1996; Wigton et al., 2008). Owing to the range of sample sizes previously used, we aimed to recruit a minimum of 40 participants.

4.1.5 | Phase II—Number of cues presented

In keeping with the methodological approach for JA, each cue used in a case scenario requires between five and ten scenarios to determine the judgement policy of the individual (Cooksey, 1996). Therefore, if ten cues were investigated, 50 to 100 hypothetical patient case scenarios would be required in the JA task. To reduce the burden on participants (and thereby minimise risk of withdrawal from the study), the total number of clinical cues was limited to seven.

4.1.6 | Phase II—Number of case scenarios presented

Including all possible combinations was not feasible (n = 15,360), therefore fractional factorial design (using IBM SPSS V.26.0 orthogonal design function) was used to create a representative subset that could be assessed whilst at the same time, reduce burden on therapists (and thereby minimise risk of withdrawal from the study). This resulted in 54 original case scenarios. For judging inconsistency (Cooksey, 1996), 15 duplicate case scenarios were included, resulting in a total of 69 case scenarios. An example hypothetical case scenario and the web page set-up can be seen in Figure 2.

4.1.7 | Procedures

Phase I

NGT has previously been used in healthcare research (Foster et al., 2009; Gallagher et al., 1993; Harvey and Holmes, 2012; Jones and Hunter, 1995; Mallett et al., 2020; Potter et al., 2004; Rankin et al., 2020; Ven de Ven and Delbecq, 1972) and was selected for phase I, both for its time-efficient process in gathering the consensus of opinion (Gallagher et al., 1993; Harvey and Holmes, 2012) and facilitating involvement from all participants (Gallagher et al., 1993).

Initially, participants were asked via email to identify all the cues they subjectively considered when prescribing hand strengthening

TABLE 1 Inclusion criteria for phase I and II.

Phase I	Phase II
Health and Care Professions Council (HCPC) registered	HCPC registered
≥5 years post-registration experience	≥2 years post-registration experience
Treat >5 patients with pain and dysfunction of the hands and wrists caused by rheumatoid arthritis per month	Current or recent experience in treating patients with pain and dysfunction of the hands and wrists caused by RA
Possess either postgraduate level training (e.g., Master's/PhD) and/or specialist hand therapy training (e.g., British Association of Hand Therapy accreditation)	-

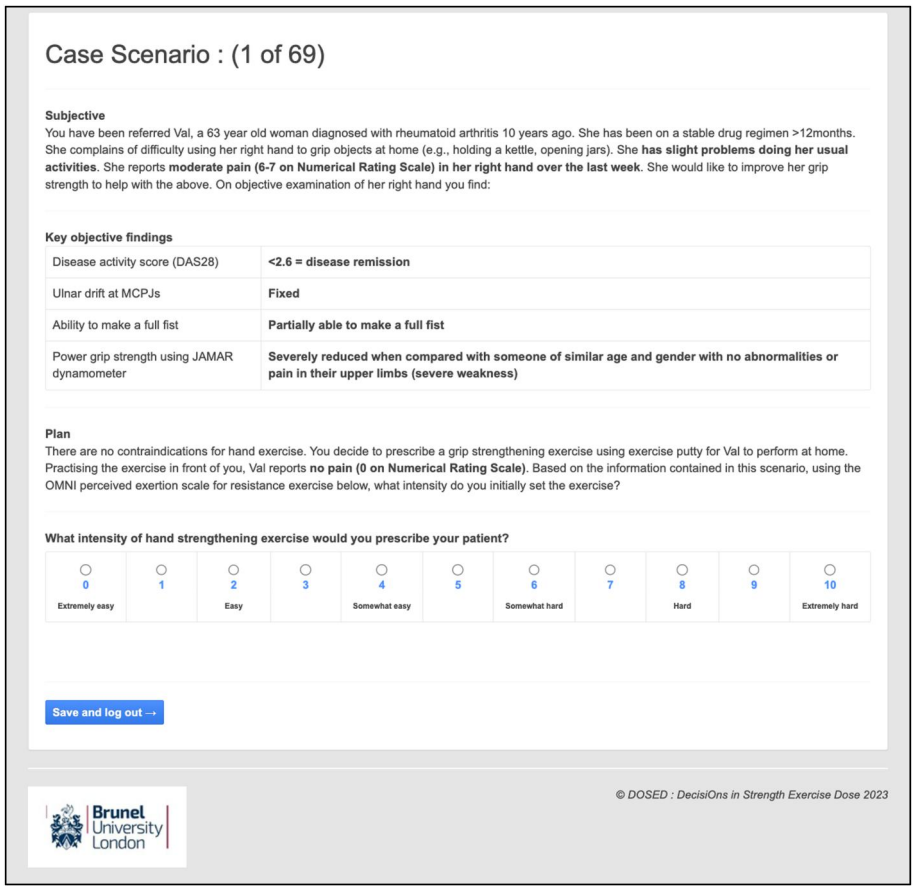

FIGURE 2 An example of a case scenario.

exercise for a patient with pain and dysfunction of the hands caused by RA. These lists were returned by email. The responses were compiled and summarised using a short descriptor (e.g., pain, joint deformity). The cues were ranked by the number of times they were reported across participants. They were then combined with a list of cues identified from a previous study that explored participant characteristics associated with the prescribed dose of hand strengthening exercise used in the strengthening and stretching for RA of the hand (SARAH) trial (Boniface et al., 2022). Participants reviewed this updated list of cues by email and had the opportunity to (1) add more cues and (2) comment on the short descriptions for each cue. Finally, a virtual consensus meeting was held with all participants to agree the final cues and to discuss the presentation of the information in Phase II. The final list of cues was reviewed by the authors (GB, PS).

Phase II

Participants interested in taking part were directed to the study website (www.dosed.brunel.ac.uk) where they answered questions to check if they met the inclusion criteria. Those eligible could view and download the participant information sheet about the study. Participants completed the online consent form and provided demographic (Age and gender) and clinical career and training information (Profession, UK location, working environment, agenda for change job band (NHS Health Careers, 2023), graduation date, highest professional qualification and approximate number of RA patients treated per month). On-screen instructions for completing the study were provided and participants were able to complete two practice case scenarios before completing the main set. For each case scenario, participants were asked to review the information and provide a response to the intensity of exercise they would prescribe for this patient (the primary outcome). The case scenarios were randomised to prevent order effects. Participants were able to log out and return to the same place if they needed to. Email reminders to complete the study were sent when a participant logged out and did not return to the website after 1 week.

4.2 | Primary outcome of phase II

Intensity (i.e. how hard) is one of the key exercise dose parameters therapists should consider when prescribing hand exercise (Hammond and Prior, 2016). The intensity of hand exercise prescribed by participants was measured using the OMNI-Resistance Exercise Scale (OMNI-RES) of perceived exertion (Robertson et al., 2003). This scale rates intensity from 0 (Extremely easy) up to 10 (Extremely hard).

5 | PHASE II DATA MANAGEMENT AND STATISTICAL ANALYSIS

Participant characteristics were presented in table format using descriptive statistics (mean, standard deviations, counts/percentages as appropriate). Participants who did not complete all case scenarios were removed from the analysis as they would not have completed the 15 repeat case scenarios required to assess consistency. Data were analysed using IBM SPSS Statistics for Windows, version 29.0 (IBM Corp.). The analysis comprised four steps.

5.1 | Step 1

To assess the level of agreement between the therapists for each scenario, a two-way mixed effects intraclass correlation coefficient (ICC) was calculated.

5.2 | Step 2

Using the repeat case scenarios, the Cochran-Weiss-Shanteau (CWS) index of expertise was calculated to identify participants who were more consistent in their scores (Rassafiani et al., 2009; Weiss et al., 2006; Weiss & Shanteau, 2003, 2014). The index assumes that an expert should meet two necessary criteria. The first is the expert's ability to discriminate between different stimuli (i.e. clinical cues) within the domain in which they operate. The second is demonstrating internal consistency with their judgements.

We used a software programme (CWS calculator V1.0.4) to calculate the CWS index score for each participant (Shanteau, 2023). Discrimination was determined by calculating the average response for each repeated case scenario (resulting in 15 average responses for the 15 case scenarios) and then calculating the variance of the values. Inconsistency was determined according to the mean of variances of the responses to the same case scenario (resulting in 15 variances for the 15 case scenarios). A larger CWS index score suggests better performance in discrimination and consistency. We reviewed the index scores for participants in the form of a bar chart (see Supplementary File S1) to identify a relevant cut point. For the purposes of analysis, a CWS index score ≥5 would be used to classify participants more consistent in their prescribing judgements. Those with a CWS index score <5 were deemed inconsistent for the purposes of the analysis in step 3.

5.3 | Step 3

To determine the overall group judgement policy of the included cues, the mean OMNI-RES score was calculated for each case scenario. This method has been used previously in JA studies to understand the influence of the cues at a group level (Weiss et al., 2006; Williams et al., 2008). A linear regression analysis was conducted using the mean-OMNI score as the outcome and the clinical cues as the predictors.

5.4 | Step 4

A sub-analysis using linear regression was completed for participants identified as consistent (e.g., CWS index score = ≥5) versus those participants identified as inconsistent (e.g., CWS index score <5).

6 | RESULTS

6.1 | Phase I

Eleven therapists were recruited (Table 2). Six (54.5%) therapists attended the group online meeting (27/09/2022).

6.1.1 | Cue identification

During the email stages from phase I, 124 responses were generated by the 11 therapists. Summarising these responses, 33 clinical cues were identified. These were ranked by the number of times the clinical cue was reported. The clinical cues including the top-10 are described in the Supplementary File S1. During the group online meeting, no further cues were generated and therapists in attendance agreed that the top-10 clinical cues were the most important for judging what intensity of hand strengthening exercise to prescribe. The finalised seven clinical cues (independent variables) with differing severity levels used in the case scenarios are presented in Table 3. Clinical cues were coded so that higher scores indicated greater severity (e.g., 1 = no pain, 2 = mild pain, 3 = moderate pain, 4 = severe pain).

6.1.2 | Case scenario presentation

After a discussion in the group meeting, the group agreed that the best way to present the clinical information in phase II was in the Subjective, Objective, Analysis, Plan note format. This format is commonly used by therapists in clinical practice to record patient consultations (Petty and Moore, 2001).

6.2 | Phase II

6.2.1 | Characteristics of therapists taking part in phase II

A total of 53 UK-based therapists were recruited, 30 (56.6%) of which completed all 69 hypothetical case scenarios. The other 23

TABLE 2 Phase I therapist characteristics (Mean (Standard Deviation) or *n* (%)).

Variables	Overall (*n* = 11)
Participant profession	
Occupational therapist	9 (81.8%)
Physiotherapist	2 (18.2%)
Age (years) on consent to study	46.4 (10.6)
Gender	
Female	11 (100%)
UK location	
England	9 (81.8%)
Scotland	2 (18.2%)
Work environment	
NHS	6 (54.5%)
NHS and private sector	4 (36.4%)
Other[a]	1 (9.1%)
Job grade (agenda for change)	
Band 6	5 (45.5%)
Band 7	4 (36.4%)
Band 8a	1 (9.1%)
Other	1 (9.1%)
Years qualified (since graduation)	23 (9.6)
Highest level of qualification	
Diploma in Occupational Therapy (DIPCOT)	1 (10%)
Undergraduate degree plus postgraduate hand therapy training (BAHT course, PG cert in hand therapy, SARAH training programme)	5 (45%)
Postgraduate degree (Masters module, Masters, MPhil, PGDip)	5 (45%)
Approximate number of RA patients treated per month	
5–10	4 (36.4%)
11–15	3 (27.3%)
More than 15	3 (27.3%)
Other[b]	1 (9.1%)

[a]Academia.

[b]Non-clinical, but possessed significant research experience involving hand exercise in RA.

therapists did not 100% complete the study and were excluded from the analysis (Table 4). Based on CWS score ≥5, 12 (40%) therapists were categorised as the most consistent prescribers. The remaining 18 (60%) therapists (CWS score <5) were considered less consistent in their prescribing judgements (Table 4). The mean (SD) completion time per case scenario was 31 (154) seconds.

6.2.2 | Level of agreement between therapists

There was a high level of agreement between therapists overall about the intensity of hand strengthening exercise prescribed in the 54 hypothetical patient case scenarios (ICC = 0.891, 95% CI 0.837–0.931).

6.2.3 | Level of consistency

The CWS index score was calculated for therapists who completed 100% of the case scenarios using 15 repeated cases (Supplementary File S1). The CWS index scores ranged between 0.70 and 22.48. The mean (SD) of all therapists' scores was 5.65 (5.20).

6.2.4 | Clinical cues influencing the prescribed intensity of exercise across all therapists

For all therapists, six out of the seven cues influenced judgements about what intensity of hand strengthening exercise to prescribe (Table 5). All cues had an inverse relationship, meaning that as the cue severity level increased, the intensity of hand exercise prescribed decreased. The most influential cue was patient-reported pain when practising the exercise ($\beta = -0.804$, $p < 0.001$). To put this result into context, a patient reporting severe pain when performing the exercise in front of the therapist was prescribed approximately 1/3rd (2.4 points less on the OMNI-RES scale) less intensive hand strengthening exercise compared to a patient reporting no pain. The second most influential cue was disease activity ($\beta = -0.439$, $p < 0.001$). A patient scoring >5.1 (i.e., high disease activity) using the DAS-28 was prescribed 1.317 points less intensive exercise on the OMNI-RES scale compared to a patient whose disease activity was judged to be in remission. This was followed by average hand pain reported during the previous week ($\beta = -0.420$, $p < 0.001$), hand range of movement ($\beta = -0.149$, $p < 0.001$), ulnar drift ($\beta = -0.090$, $p < 0.05$) and patient grip strength ($\beta = -0.083$, $p < 0.05$). Only one cue ('patient current functional level') was identified as not significantly influential.

6.2.5 | Comparing therapists (CWS index score ≥5 vs. <5)

Twelve (40%) therapists were identified as consistent prescribers, meaning they had a CWS index score ≥5. Across the consistent prescribers, three cues were identified as influential (Table 5). These were patient-reported pain when practising the exercise in the front of the therapist ($\beta = -1.150$, $p < 0.001$), disease activity ($\beta = -0.425$, $p < 0.001$) and average hand pain reported during the previous week ($\beta = -0.353$, $p < 0.001$). For the 18 (60%) therapists with a CWS index score <5, all cues influenced the intensity of hand

TABLE 3 The final list of agreed cues with their corresponding levels.

Clinical cue	Coding of clinical cue levels
Average pain in right hand over the last week	1 = no pain (0 on NRS) in her right hand over the last week 2 = mild pain (≤5 on NRS) in her right hand over the last week 3 = moderate pain (6–7 on NRS) in her right hand over the last week 4 = severe pain (≥8 on NRS) in her right hand over the last week
Current functional level	1 = has no problems doing her usual activities 2 = has slight problems doing her usual activities 3 = has moderate problems doing her usual activities 4 = has severe problems doing her usual activities 5 = is unable to do her usual activities
Disease activity score (DAS-28)	1 = <2.6 = disease remission 2 = 2.6 – <3.2 = low disease activity 3 = 3.2–5.1 = moderate disease activity 4 = >5.1 = high disease activity
Ulnar drift at metacarpophalangeal joints	1 = no drift noted 2 = actively correctable 3 = passively correctable 4 = fixed
Hand range of movement	1 = able to make a full fist 2 = partially able to make full fist 3 = not able to make a full fist
Power grip strength using JAMAR	1 = grip strength is comparable to someone of similar age and gender with no abnormalities or pain in upper limb (no weakness) 2 = grip strength is slightly reduced compared to someone of similar age and gender with no abnormalities or pain in upper limb (mild weakness) 3 = grip strength is moderately reduced compared to someone of similar age and gender with no abnormalities or pain in upper limb (moderate weakness) 4 = grip strength is severely reduced compared to someone of similar age and gender with no abnormalities or pain in upper limb (severe weakness)
Hand pain while performing the exercise	1 = no pain (0 on NRS) 2 = mild pain (≤5 on NRS) 3 = moderate pain (6–7 on NRS) 4 = severe pain (≥8 on NRS)

Abbreviation: NRS, numerical rating scale.

strengthening exercise prescribed to varying degrees (Table 4). For both groups, patient-reported pain when practising the exercise, disease activity and average hand pain reported during the previous week were identified as the most influential. Consistent therapists (i.e. CWS index score ≥5) prescribed lower intensities of hand exercise when the patient reported greater pain practising the exercise. For the cues 'disease activity' and 'patient's average hand pain for the week', inconsistent therapists prescribed less intense exercise as the severity of the cue changes increased.

7 | DISCUSSION

This study identified six clinical cues that influenced therapists when prescribing intensity of hand strengthening exercise. In order of magnitude (i.e. greatest effect on the intensity of exercise prescribed), these were (1) Patient-reported hand pain when practising the exercise in front of the therapist, (2) Disease activity, (3) Average hand pain reported by the patient during the previous week, (4) Ability to make a fist, (5) Ulnar drift at the metacarpophalangeal joints, and (6) Grip strength. The current functional level was not significantly associated. Therapists categorised as consistent prescribers (i.e. CWS index score ≥5) used fewer clinical cues (three vs. seven) when compared to therapists categorised as less consistent (CWS index score <5). Again, in order of magnitude, these were (1) Patient-reported hand pain when practising the exercise in front of the therapist, (2) Disease activity and average (3) Hand pain reported by the patient during the previous week.

Comparing the above results to our earlier study, where we investigated the what patient factors were associated with the overall dose of hand strengthening exercise prescribed in the SARAH trial, a UK-based multi-centre clinical trial that evaluated tailored hand exercise in addition to usual care in RA (Boniface et al., 2022; Lamb et al., 2015). A key difference centred on the patient reported pain. In our post-hoc analysis of the SARAH trial, both pain frequency and severity were not identified to be associated with the dose prescribed. However, in the current study, pain whilst practising the exercise in front of the therapist and average hand pain reported by

TABLE 4 Phase II therapist characteristics ($n = 30$) (mean (standard deviation) or n (%)).

Variables	Total number of completing therapists ($n = 30$)	Therapists with CWS index score ≥5 ($n = 12$)	Therapists with CWS index score <5 ($n = 18$)	Therapists not completing study ($n = 23$)
Participant profession				
Occupational therapist	19 (63.3%)	7 (58.3%)	12 (66.7%)	14 (60.9%)
Physiotherapist	11 (36.7%)	5 (41.7%)	6 (33.3%)	9 (39.1%)
Age (years) on consent to study	44.4 (9.3)	41.1 (8.9)	46.6 (9.1)	41.4 (11.6)
Gender				
Female	26 (86.7%)	9 (75.0%)	17 (94.4%)	19 (82.6%)
Male	4 (13.3%)	3 (25.0%)	1 (5.6%)	3 (13.0%)
Prefer not to say	0 (0.0%)	0.0 (0.0%)	0 (0.0%)	1 (4.3%)
Therapist location				
England	27 (90.0%)	11 (91.7%)	16 (88.9%)	19 (82.6%)
Northern Ireland	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.7%)
Scotland	1 (3.3%)	1 (8.3%)	0 (0.0%)	2 (8.7%)
Wales	2 (6.7%)	0 (0.0%)	2 (11.1%)	0 (0.0%)
Therapist work environment				
NHS	25 (83.3.%)	10 (83.3%)	15 (83.3%)	20 (87.0%)
NHS and private sector	5 (16.7%)	2 (16.7%)	3 (16.7%)	3 (13.0%)
Other	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Therapist grade (agenda for change)				
Band 5	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (17.4%)
Band 6	12 (40.0%)	3 (25.0%)	9 (50.0%)	6 (26.1%)
Band 7	13 (43.3%)	8 (66.7%)	5 (27.8%)	7 (30.4%)
Band 8a	4 (13.3%)	0 (0.0%)	4 (22.2%)	6 (26.1%)
Band 8b	1 (3.3%)	1 (8.3%)	0 (0.0%)	0 (0.0%)
Years qualified (since graduation)	21.0 (11.2)	17.6 (8.2)	23.2 (12.6)	18.5 (10.3)
Highest level of qualification				
Undergraduate degree (e.g., BSc)	16 (53.3%)	7 (58.3%)	9 (50.0%)	16 (69.6%)
Postgraduate degree (e.g., Masters)	12 (40.0%)	5 (41.7%)	7 (38.9%)	7 (30.4%)
Other	2 (6.7%)[a]	0 (0.0%)	2 (11.1%)[a]	0 (0.0%)
Approximate number of RA patients treated per month				
Less than 5	5 (16.7%)	4 (33.3%)	1 (5.6%)	5 (21.7%)
5–10	6 (20.0%)	3 (25.0%)	3 (16.7%)	5 (21.7%)
11–15	8 (26.7%)	0 (0.0%)	8 (44.4%)	4 (17.4%)
More than 15	11 (36.7%)	5 (41.7%)	6 (33.3%)	9 (39.1%)

[a]Undergraduate degree + Masters module and Diploma College of Occupational Therapy.

the patient during the previous week both significantly influenced therapists to prescribe lower intensity hand strengthening exercise. One possible reason for this difference may be related to when the participants from the SARAH trial had their outcome measures taken. In our current study, the patient in the case scenario is reporting their pain during the patient-therapist consultation (i.e. at the point of the exercise being prescribed). In the SARAH trial, pain was rated on the participant joining the trial, which could have been several weeks before the hand exercise programme commenced. A second reason may have been that the therapists from the SARAH trial were following a study protocol for prescribing the hand exercise programme, thus influencing their judgements.

TABLE 5 Judgement policy by the therapist group (overall, CWS≥5 and CWS<5).

Analysis	R^2	Adj. R^2	AvPain	DAS	ExPain	Function	GripStr	ROM	UlnarDr	Constant
Overall group (n = 30)	0.964	0.959	−0.420**	−0.439**	−0.804**	−0.076	−0.083*	−0.149**	−0.090*	8.646
Group CWS ≥5 (n = 12)	0.957	0.951	−0.353**	−0.425**	−1.150**	−0.036	−0.080	−0.078	−0.062	8.890
Group CWS <5 (n = 18)	0.915	0.903	−0.483**	−0.456**	−0.601**	−0.102*	−0.096*	−0.224**	−0.122*	8.646

Abbreviations: AvPain, average pain in hand over last week; DAS, disease activity score; ExPain, hand pain practising exercise; Function, current functional level; GripStr, Grip strength; ROM, ability to make a fist; UlnarDr, Ulnar drift at metacarpophalangeal joints.
*$p < 0.05$ **p <0 .005.

Whilst our two studies differed regarding pain, there were also similarities. In our earlier study, we identified that the presence of metacarpophalangeal joint deformity and swollen joint count were associated with the prescribed overall dose of strengthening exercise. In the current study, both ulnar drift at the metacarpophalangeal joints and disease activity influenced judgements about the intensity of hand strengthening exercise to prescribe. The greater the severity, the lower the intensity of exercise prescribed. Whilst swollen joint count was not identified as a stand-alone clinical cue in the current study, swollen joint count is an integral part of calculating the disease activity score (DAS-28) (Van Riel, 2014).

Our study also identified those therapists who were categorised as being more consistent in their prescribing judgements that relied on fewer cues (e.g., pain and disease activity). This finding indicates this group may have possessed a better sense of what is relevant and irrelevant and prioritised what to pay attention to during the patient-therapist consultation. Pattern recognition is a recognised trait that has been associated with expertise previously (Jensen et al., 2019).

In terms of using the CWS index score to compare therapist prescribing performance, 18 (60%) therapists were categorised as being less consistent in their prescribing judgements. As previously stated, a lower CWS index score demonstrates inconsistency. To put this in context, two identical patients could be prescribed different exercise intensities when seen by the same therapist. It is unknown if such variation has potential consequences for patient outcomes. In a study unrelated to healthcare, the performance of air traffic controllers managing their airspace was assessed. Researchers identified that a larger CWS index score was associated with better air traffic control performance and outcomes (Thomas et al., 2001). Whilst different professions and markedly different contexts for making judgements, greater discrimination between clinical cues and better internal consistency with prescribing decisions may be important factors for generating better patient outcomes.

8 | STUDY STRENGTHS AND LIMITATIONS

This is the first study to investigate the judgement policies of UK-based therapists related to hand strengthening exercise prescription in RA. A comprehensive approach was used to identify the cues and construct the hypothetical case scenarios used in phase II of the study. We recognise that our study has some important limitations. Firstly, these are modelled policies and not necessarily used in clinical practice. However, there is no clear standard for prescribing hand exercise in RA and guidance is needed. The statistical approach used in ths study has been shown to be more predictive of decision making than other research approaches. For example, policies calculated using linear regression analysis were more successful in predicting rheumatologists' judgements for measuring disease severity in RA compared to detailed interview (Kirwan et al., 1986). Secondly, our approach, hypothetical case scenarios cannot include all of the variables that influence decision making. Nevertheless, this study utilised a structured consensus technique to systematically identify and select the most important cues used in phase II. Thirdly, using hypothetical case scenarios may have lacked ecological validity (i.e. non-real world) and therapists would prefer making judgements on what intensity to prescribe face-to-face. This limitation we believe is somewhat compensated by the ability to compare numerous therapists' judgements on the same set of hypothetical case scenarios. Fourth, therapists were asked to judge what intensity of hand strengthening exercise they would prescribe a hypothetical patient. Intensity is just one parameter making up dose and therapist judgement policy may differ for other parameters.

9 | CONCLUSION

The results of this study illustrate that patient-reported pain and disease activity influence therapists the most when judging the intensity of hand strengthening exercise to prescribe a patient with pain and dysfunction of the hand associated with RA. Focusing on these cues may streamline hand exercise prescription and improve patient outcome, but needs further evaluation.

AUTHOR CONTRIBUTIONS

Graham Boniface devised and led the design of the study, collected the data, performed the analysis and wrote the manuscript. Christopher Tomlinson developed and supported the online data collection approach. Nicola White, Priscilla Harries, Neil O'Connell, Esther Williams and Meriel Norris supported and advised on the design and delivery of the study, the interpretation of the results and writing of the manuscript.

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CONFLICT OF INTEREST STATEMENT

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DATA AVAILABILITY STATEMENT

The data that support the findings for phase 2 of this study are openly available in figshare at https://doi.org/10.6084/m9.figshare.24681309.

ETHICS STATEMENT

Ethical approval for the current project was granted by the Brunel University London Research Ethics Committee (Phase I: 36607-LR_May/2022-39386-2 and amendment 36607-A-Jun/2022-40324-1. Phase II: 37041-LR-Jul/2022-40789-1 and amendment 37041-A-Feb/2023-43653-1).

ORCID

Graham Boniface https://orcid.org/0000-0003-1253-0060
Nicola White https://orcid.org/0000-0002-7438-0072
Christopher Tomlinson https://orcid.org/0000-0002-8634-6111
Meriel Norris https://orcid.org/0000-0001-7779-5612
Neil O'Connell https://orcid.org/0000-0003-1989-4537
Esther Williamson https://orcid.org/0000-0003-0638-0406
Priscilla Harries https://orcid.org/0000-0003-3123-6799

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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