Linguistic validation, validity and reliability of the British English versions of the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire and QuickDASH in people with rheumatoid arthritis

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| Title                                                                 | Linguistic validation, validity and reliability of the British English versions of the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire and QuickDASH in people with rheumatoid arthritis |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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Table S1: Linking between Brief ICF Core Set for Rheumatoid Arthritis (RA) and the DASH.

| Brief Core Set for RA ICF Components, Codes, Categories and Titles | DASH Item (and ICF sub-codes if applicable) |
|-------------------------------------------------------------------|---------------------------------------------|
| **1 BODY FUNCTIONS:**                                             |                                             |
| b130 Energy and drive functions                                   |                                             |
| b134 Sleep functions                                              | 29. During the past week, how much difficulty have you had in sleeping because of the pain in your arm, shoulder or hand |
| b152 Emotional functions                                          |                                             |
| b180 Experience of self and time functions                        |                                             |
| b1801 Body image                                                  |                                             |
| b2800 Generalized pain                                            |                                             |
| b2801 Pain in body part                                           |                                             |
| b28010 Pain in head and neck                                      |                                             |
| b28013 Pain in back                                               |                                             |
| b28014 Pain in upper limb                                         | 24 Arm, shoulder or hand pain              |
|                                                                 | 25 Arm, shoulder or hand pain when performing specific activities |
| b28015 Pain in lower limb                                         |                                             |
| b28016 Pain in joints                                             | 24 Arm, shoulder or hand pain              |
|                                                                 | 25 Arm, shoulder or hand pain when performing specific activities. |
| b430 Haematological system functions                              |                                             |
| b510 Ingestion functions                                          |                                             |
| b640 Sexual functions                                             |                                             |
| b7102 Mobility of joints generalized                              | 19 Recreational activities in which you move your arm freely (e.g. playing Frisbee, badminton etc) |
| b715 Stability of joint functions                                 |                                             |
| b740 Muscle endurance functions                                   |                                             |
| b770 Gait pattern functions                                       |                                             |
b7800 Sensation of muscle stiffness

28. Stiffness in your arm, shoulder or hand.

2 BODY STRUCTURES:

s73001 Elbow joint
s73011 Wrist joint
s7302 Structure of hand
s73021 Joints of hand and fingers
s73022 Muscles of hand
s75001 Hip joint
s75011 Knee joint
s7502 Structure of ankle and foot
s760 Structure of trunk
s7600 Structure of vertebral column
s76000 Cervical vertebral column
s770 Additional musculoskeletal structures related to movement
s810 Structure of areas of skin

3 ACTIVITIES AND PARTICIPATION:

d170 Writing 2 Write

d360 Using communication devices and techniques

d415 Maintaining a body position

d430 Lifting and carrying objects

10 Carry a shopping bag or briefcase (4301 Carrying in the hands)
11 Carry a heavy object (over 10lbs/5 kgs). (d4301)

449 Carrying, moving and handling objects, other specified and unspecified

1 Open a tight or new jar (d4453 turn or twist hands or arms)
3 Turn a key (d4453)
5 Push open a heavy door (d4451 Pushing)
6 Place an object on a shelf above your head (d4452 Reaching)
12 Change a light bulb overhead (d4453)
| Code   | Activity Description                                                                 |
|--------|-------------------------------------------------------------------------------------|
| d455   | Moving around                                                                       |
| d460   | Moving around in different locations                                                |
| d465   | Moving around using equipment                                                       |
| d470   | Using transportation                                                                 |
| d475   | Driving                                                                             |
| d510   | Washing oneself                                                                     |
| d520   | Caring for body parts                                                               |
| d530   | Toileting                                                                           |
| d540   | Dressing                                                                            |
| d550   | Eating                                                                              |
| d560   | Drinking                                                                            |
| d570   | Looking after one's health                                                          |
| d620   | Acquisition of goods and services                                                   |
| d630   | Preparing meals                                                                     |
| d640   | Doing housework                                                                     |
| d660   | Assisting others                                                                    |
| d760   | Family relationships                                                                |
| d770   | Intimate relationships                                                              |
| d859   | Work and employment, other specified and unspecified                                |

**17** Recreational activities which require little effort (e.g. card playing, knitting etc.) (d4400 picking up; d4401 grasping; d4402 manipulating; d4403 releasing)

**18** Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g. golf, hammering, tennis etc.) (d4454 Throwing)

20 Manage transport needs (getting from one place to another)

20 Manage transport needs (getting from one place to another) (d4751 driving motorized vehicles)

14 Wash your back (d5100 Washing body parts)

13 Wash or blow dry your hair (d5202 Caring for hair)

15 Put on a jumper (d5400 Putting on clothes)

16 Use a knife to cut food

22 During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family (d760), friends, neighbours or groups?

21 Sexual activities (d7702 sexual relationships)

23 During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem?
d910 Community life

**d920 Recreation and leisure**

17 Recreational activities which require little effort (e.g. card playing, knitting etc.) (d920: cards (d9200 Play); knitting (d9203 Crafts)).

18 Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g. golf, hammering, tennis etc) (d9201 Sports; d9204 Hobbies)

19 Recreational activities in which you move your arm freely (e.g. playing Frisbee, badminton etc) (d9201 Sports)

### 4. ENVIRONMENTAL FACTORS:

- e115 Products and technology for personal use in daily living
- e310 Immediate family
- e355 Health Professionals
- e570 Social security services, systems and policies
- e580 Health services, systems and policies

**DASH items not included in the Brief ICF Core Set for RA:**

| ICF Code, Category and Title | DASH Item |
|------------------------------|-----------|
| b265 Touch function          | 26 Tingling (pins and needles) in your arm, shoulder or hand. |
| b730 Muscle power functions* | 27 Weakness in your arm, shoulder or hand. |
| d650 Caring for household objects | 8 Garden or outdoor property work (d6505 Taking care of plants, indoors and outdoors) |
| d750 Informal social relationships | 22 During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family, friends (d7500 informal relationships with friends), neighbours (d7501 informal relationships with neighbours), or groups (d7504 informal relationships with peers)? |
| personal factor (pf)        | 30 I feel less capable, less confident or less useful because of my arm, shoulder or hand problem. |

Key: * item is included in Comprehensive ICF Core Set for RA.
Table S2: Test retest reliability for the DASH (n=170), WORKDASH (n=53) and SPAMDASH (n=19) items (linear weighted kappas).

| Item                        | Weighted Kappa | Standard error | 95% CI       |
|-----------------------------|----------------|----------------|--------------|
| **DASH1: Open jar**         | 0.652          | 0.0307         | 0.592 to 0.712 |
| **DASH2: Write**            | 0.717          | 0.0326         | 0.654 to 0.781 |
| **DASH3: Turn a key**       | 0.679          | 0.0320         | 0.616 to 0.742 |
| **DASH4: Prepare meal**     | 0.732          | 0.0310         | 0.671 to 0.793 |
| **DASH5: Open heavy door**  | 0.682          | 0.0296         | 0.624 to 0.74  |

| Item                        | Weighted Kappa | Standard error | 95% CI       |
|-----------------------------|----------------|----------------|--------------|
| **DASH6: Place object on shelf** | 0.690   | 0.0257         | 0.64 to 0.74  |
| **DASH7: Heavy household jobs** | 0.712   | 0.0265         | 0.66 to 0.764 |
| **DASH8: Garden/ property work** | 0.722   | 0.0261         | 0.671 to 0.773 |
| **DASH9: Make bed**         | 0.648          | 0.0307         | 0.588 to 0.708 |
| **DASH10: Carrying shopping bag** | 0.611   | 0.0320         | 0.548 to 0.673 |

| Item                        | Weighted Kappa | Standard error | 95% CI       |
|-----------------------------|----------------|----------------|--------------|
| **DASH11: Carry heavy object** | 0.699   | 0.0288         | 0.642 to 0.755 |
| **DASH12: Change a light bulb** | 0.728   | 0.0252         | 0.678 to 0.777 |
| **DASH13: Wash/ blow hair** | 0.723          | 0.0285         | 0.667 to 0.779 |
| **DASH14: Wash back**       | 0.693          | 0.0283         | 0.637 to 0.748 |
| **DASH15: Put on jumper**   | 0.653          | 0.0321         | 0.59 to 0.716  |
| DASH   | Description                                    | Weighted Kappa | Standard error | 95% CI       |
|--------|------------------------------------------------|----------------|----------------|--------------|
| DASH16 | Use knife to cut food                          | 0.609          | 0.0324         | 0.546 to 0.673 |
| DASH17 | Recreational activities – little effort         | 0.579          | 0.0376         | 0.505 to 0.653 |
| DASH18 | Recreational activities – force or impact       | 0.693          | 0.0275         | 0.639 to 0.747 |
| DASH19 | Recreational activities move arm freely         | 0.641          | 0.0322         | 0.578 to 0.704 |
| DASH20 | Manage transport needs                         | 0.663          | 0.0334         | 0.597 to 0.728 |
| DASH21 | Sexual activities                               | 0.769          | 0.0317         | 0.707 to 0.831 |
| DASH22 | Past week – norm social act                     | 0.577          | 0.0307         | 0.517 to 0.637 |
| DASH23 | Past week – limited in work/ daily act          | 0.656          | 0.0299         | 0.598 to 0.715 |
| DASH24 | Arm, shoulder, hand pain                        | 0.596          | 0.0342         | 0.529 to 0.663 |
| DASH25 | Arm, shoulder, hand pain – specific activity    | 0.540          | 0.0368         | 0.467 to 0.612 |
| DASH26 | Tingling in arm, shoulder, hand                 | 0.543          | 0.0385         | 0.467 to 0.618 |
| DASH27 | Weakness in arm, shoulder, hand                 | 0.565          | 0.0351         | 0.496 to 0.634 |
| DASH28 | Stiffness in arm, shoulder, hand                | 0.495          | 0.0362         | 0.424 to 0.566 |
| DASH29 | Sleeping difficulty due to arm, shoulder, hand  | 0.572          | 0.0349         | 0.503 to 0.64  |
| DASH30 | Capability/ confidence due to arm, shoulder, hand| 0.564          | 0.0344         | 0.497 to 0.632 |
|                   | Weighted Kappa | Standard error | 95% CI        |
|-------------------|---------------|----------------|---------------|
| **WM1: Work usual way** | 0.618         | 0.0627         | 0.495 to 0.74 |
|                   |               |                |               |
| **WM2: Arm shoulder hand pain** | 0.579         | 0.0607         | 0.46 to 0.698 |
|                   |               |                |               |
| **WM3: Working as well as I would like** | 0.587         | 0.0605         | 0.469 to 0.706 |
|                   |               |                |               |
| **WM4: Working usual amount of time** | 0.490         | 0.0705         | 0.352 to 0.629 |
|                   |               |                |               |
| **SPAM1: Play usual way** | 0.694         | 0.102          | 0.493 to 0.894 |
|                   |               |                |               |
| **SPAM2: Arm shoulder hand pain** | 0.716         | 0.0807         | 0.558 to 0.874 |
|                   |               |                |               |
| **SPAM3: Play as well as I would like** | 0.770         | 0.0669         | 0.639 to 0.901 |
|                   |               |                |               |
| **SPAM4: Playing usual amount of time** | 0.773         | 0.0600         | 0.655 to 0.89  |
