Background: Originally developed in Norway, the Measure of Activity Performance in the Hand (Map-Hand) is a self-reported questionnaire including 18 items to assess using hands when doing everyday activities and is reported to be unidimensional. Our aim was to identify if the Map-Hand fits the Rasch model in a UK population of people with rheumatoid arthritis (RA).

Method: Participants were recruited from 17 Rheumatology clinics in the NHS. The internal construct validity (unidimensionality) was assessed using (i) Confirmatory Factor Analysis (CFA) (ii) Mokken scaling and (iii) Rasch model (including the stochastic ordering of items, unidimensionality and local independence). The RUMM2030 software was used, utilising the partial credit parameterisation of the Rasch model.

Results: 340 patients with RA responded to the study (mean age: 62 years (SD 12.1) disease duration14.4 years (SD 11.7)). Of these, 73.8% were women and a third (32.3%) were employed. Just over half (55.9%) were on combination therapy, and 7.4% were on biologic drugs. A CFA failed to support the unidimensional structure of the 18 item set of the MAP-Hand (Chi-Square 236.0 (df 120; p <0.001) indicating widespread local dependency. However, Mokken scaling suggested that all 18 items showed a probabilistic ordering with a moderate scaling level of 0.61 defined by Loevingers coefficient. Differential Item Functioning (DIF) was largely absent across all contextual factors, but was present for gender for the items ' tying shoelaces' , 'opening screw top bottles' and 'carrying heavy objects'. At any level of hand function, men were more likely to score higher (worse) than women for tying shoelaces, and women were more likely to score higher than men with opening screw top bottles. Reliability was high, but possibly inflated by local dependency. Consequently, four testlets were formed from the item set, resulting in much improved fit and unidimensionality. Nevertheless, some gender DIF persisted. Some items favoured men, and others women, the testlets were further merged in pairs where opposite bias existed. This resulted in perfect fit to the model, and no DIF. A significant gradient of the transformed metric is seen across groups of functional limitation as defined by the HAQ (ANOVA F=217.1; p<0.001). Women also showed more limitations in hand function than men (t-test; t=3.1; p=0.002). There was no significant difference by age group (ANOVA F=0.254; p 0.851). The Map-Hand showed a high Person Separation Index reliability (PSI), even after adjustment for local dependency (PSI range: 0.94 – 0.92).

Conclusions: Analysis of the Map-Hand questionnaire in a UK population of adults with RA satisfies Rasch model requirements after adjustment for local dependency. Thus the raw score is a sufficient statistic for hand function, and an interval scale metric is available when required. Item bias cancels at the test level.