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Validity of a smartphone app to objectively monitor performance outcomes in degenerative cervical myelopathy: an observational study

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Background: Developing new clinical measures for degenerative cervical myelopathy (DCM) is an AO Spine RECODE-DCM Research priority.

Research question: To assess the validity of a battery of performance outcome measures, performed using a mobile phone application, in the measurement of DCM.

Design: Prospective observational study in decentralised secondary care.

Methods: Performance outcomes were correlated to patient-reported comparators, and a priori hypotheses of convergence/divergence were tested against consensus thresholds (>=0.3/<0.3) from the COSMIN manual. The comparators were the patient-derived modified Japanese Orthopaedic Association (P-mJOA) score and the World Health Organization Quality of Life Brief Version (WHOQOL-Bref) questionnaire.

Results: 27 adults aged 60 (SD: 11) who live with DCM and possess an approved smartphone enrolled. As expected, performance tests of neuromuscular function correlated most with questionnaires of neuromuscular function (>=0.3) and least with questionnaires of quality of life (<0.3). Over 70% of unidimensional correlations were in accordance with hypotheses, as were 50% of multidimensional correlations. No risk of bias factors from the COSMIN Risk of Bias checklist were recorded. Overall, this was equivalent to "very good" quality evidence of sufficient construct validity in DCM, as per COSMIN guidance.

Discussion: Difficulties detecting DCM, and change in DCM, cause diagnostic and treatment delays and heightened costs in trials. Digital outcome measures can tackle these challenges due to their ability to measure disease remotely, repeatedly, and more economically. COSMIN criteria provide "very good" quality evidence of the validity of the digital performance tests in an adult population living with DCM. These could have a transformative impact in the measurement of DCM.