Outcome Measure	**Modified Fatigue Impact Scale (MFIS)**
Sensitivity to Change	Unknown
Population	Adult
Domain	TBI-Related Symptoms
Type of Measure	Self-report
ICF-Code/s	b4
Description	Originally developed for people with MS, the MFIS is a modified form of the Fatigue Impact Scale (Fisk et al, 1994). The questionnaire specifically measures how fatigue impacts the lives of those affected by fatigue-like symptoms. There are 21 items in the scale measuring three domains of fatigue including physical, cognitive, and psychosocial functioning. Participants rate on a 5-point Likert scale, with 0 = 'Never' to 4 = 'Almost always' their agreement with 21 statements. Total score (0-84) and subscales for physical (0-36), cognitive (0-40) and psychosocial functioning (0-8). A 5-item version is available and is scored out of 20. Higher numbers indicate greater fatigue. Administration time is approximately 5-10 minutes (5-item version is 2 minutes). The measure forms part of the Multiple Sclerosis Quality of Life Inventory (MSQLI) and is used very frequently in an MS population.
Properties	Most of the information on the psychometric properties of the scale relates to MS samples, although more information about the scales properties in a TBI are becoming available. <u>Construct validity</u>: In a mild TBI sample, two factors were derived from a PCA – "Cognitive" (11 items) and "Physical/Activities" (10 items) (Schiehser, 2014). Similar findings were found using an MS sample, Rasch analysis indicated the scale contained a "physical" and a "cognitive" dimension (the original 2 social items were found to be part of the physical dimension) (Mills et al, 2010; *n*=415). Given the Rasch analysis, Mills et al. suggested that the physical and cognitive subscales should be used separately eliminating questions 4, 14, 17 from the physical and questions 1-3, 5, and 11. In addition, the authors suggest the total score not be used. <u>Sensitivity and Specificity</u>: Using a dichotomized BDI-II fatigue item as the criterion, optimal MFIS Total, Cognitive, and Physical/Activities cutoff scores of 29.0, 18.5, and 14.5,were created. Sensitivity and specificity for MFIS Total were.85 and .80, respectively; for MFIS Cognitive were .83 and .68, respectively; and for MFIS Physical/Activities .82 and .92, respectively.

	Test-retest reliability: ICC =0.85 in people with MS (Rietberg, 2010) Internal consistency: In a mild TBI sample and based on the results of a PCA with new subscales (Schiehser, 2014), Cronbach α of 0.97 for all 21 items, 0.95 for the 11 items (including items 1 and 12) of the Cognitive subscale, and 0.96 for the 10 items of the Physical/Activities subscale. In MS, there is good internal consistency for the overall scale (Cronbach's alpha = .80). Cronbach's alphas from the cognitive, physical, and psychsocial subscales are .95, .91, and .81, respectively. (Ritvo et al., 1997). Convergent validity: In multiple sclerosis, the correlation between the MFIS and Fatigue Severity Scale in MS is r = 0.66 (Rietberg, 2010). Similar results are also found in an alternative MS study (Tellez et al., 2005) with this study also showing that FSS is correlated .75 with MFIS-Physical, .44 with MFIS-cognitive, and .62 with MFIS-psychosocial. Divergent validity: The tool does not diverge from the Beck Depression Inventory (Spearman r =.7) (Tellez et al., 2005) Normative data: TBI normative data is available (Sendroy-Terrill et al., 2010, n=243, 73% men, less than 5% of participants unconsciousness of < 1 day, 41 % showed LOC 1 day to 1 week, 31 % LOC from 1 week to 1 month, 24% had LOCs from 1 month to 1 year. Received treatment in a comprehensive inpatient rehabilitation hospital. Cohorts based on years postinjury (1 to >30 years)
Advantages	• The scale is freely available. • It is relatively quick to complete with only 21-items. • It has high face-validity for patients because it asks about how their fatigue affects their everyday life. • IRT analyses indicate that the FSS is less precise in measuring both low and high levels of fatigue, compared with the MFIS (Amtmann et al., 2012). • For those interested in measuring both physical and cognitive aspects of fatigue, and whose sample is expected to have higher levels of fatigue, the MFIS is a better choice even though it is longer
Disadvantages	• It is argued that the MFIS cannot be used to generate a single overall score of fatigue. The conceptual interaction between the two dimensions remains unclear, which poses problems when interpreting change scores in these individual scales. Studies in which a global MFIS score was used as either an outcome measure or selection tool may need to be re-evaluated (Mills et al., 2010). • The three scales correlate highly with one another.
Additional Information	The MFIS is recommended as a measure under the Domain of Activities of Daily Living/Performance in the NINDS Common Data Elements for MS.
Reviewers	Jennie Ponsford

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