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REVIEW ARTICLE

Measurement properties of instruments to assess mental function during activity and participation in individuals surviving traumatic brain injury: A systematic review protocol

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ABSTRACT

Background: Most studies assessing mental function in individuals with traumatic brain injury (TBI) assess the impairments through pen and paper tests. However, weak correlation has been found between the results from pen and paper tests and the results from performance-based tests during activity and participation.
Objective: To investigate measurement properties of performance-based instruments that are used to assess mental function during activity and participation in individuals with a TBI.
Material and methods: PubMed, EMBASE, CINAHL, PsycINFO, and OTseeker will be searched for relevant studies reporting on measurement properties of performance-based instruments to assess mental function in individuals with a TBI. The COnsensus-based Standards for selection of Health Measurement Instruments (COSMIN) checklist will be used to evaluate the methodological quality of the included studies. The Terwee quality criteria will be applied to evaluate the study findings for each measurement property. To summarize all the evidence, a best evidence synthesis will be performed.
Results: Results will be presented in text and tables.
Conclusions: Conclusion will be drawn up-on the overall evidence
Significance: It is expected that the findings of the review will provide evidence to guide clinicians in the selection of instruments to use in occupational therapy practice and research.

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Brain injury; cognitive impairment; psychometric properties; ecological validity; validity; reliability; rehabilitation

Introduction

Traumatic brain injury (TBI) is a significant cause of death and disability worldwide, and thus a global health problem [1–4]. The worldwide incidence is not known, but the literature reports that more than 10 million individuals worldwide are annually affected by the consequences of TBI, such as impaired physical and mental function [4–6].

Impaired mental function is frequently reported and experienced as one of the most important factors for determining subjective well-being and quality of life [7–11]. Although mental function may improve over time as a result of both restorative mechanisms in the brain and rehabilitation, one out of three individuals with TBI experience impaired mental function three years post-injury [10–12]. The International Classification of Functioning, Disability and Health (ICF) define mental function in the following subdomains: attention, memory, psychomotor function, emotion, perception, thought, higher-level cognitive function including executive function, mental function of language, calculation function, mental function of sequencing complex movements, and experience of self and time function [13].

International guidelines emphasize the importance of assessing mental function after TBI by the use of instruments with adequate psychometric measurement properties [14–17]. To date, there is a lack of consensus on which outcome measures are the most adequate to use when assessing impairment of mental function in individuals with TBI. The majority of studies assessing mental function describes the impairments through

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pen and paper tests [12,18–21]. However, studies have shown a weak correlation between the results from the pen and paper tests and the results from performance-based tests during activity and participation [22–25]. Likewise, self-reported instruments are prone to error from several sources, e.g. the severity of mental function impairment, which questions the ecological validity [23,26,27]

ICF defines activity and participation as the execution of tasks and involvement in life situation [13]. It is well known, that impaired mental functions affect the possibility to be independent in activity and participation, e.g. when performing activities of daily living (ADL), undertaking family roles, socializing, and maintaining employment [12,28,29]. By assessing mental function in TBI individuals using performance-based instruments during activity and participation, the impact of impaired mental function on ADL is highlighted [23]. Valid, reliable and responsive instruments are needed to establish an evidence-based practice to ensure the quality of the assessment results. Instruments with inadequate measurement properties may result in an insufficient interpretation of impairments and needs, leading to unsatisfactory interventions [30].

With the intention of identifying the most adequate instrument to measure the construct of interest, the objective of this systematic review is to investigate measurement properties of performance-based instruments that are used to assess mental function during activity and participation in individuals with a TBI.

Methods and analysis

Study design and registration

This systematic review is registered with the PROSPERO International Prospective Register of systematic reviews with registration number CRD42017053881. The protocol is prepared according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 checklist [31].

Search strategy

The following databases will be searched from their date of inception up to the present date; PubMed, EMBASE, CINAHL, PsycINFO, and OTseeker. The literature search blocks are 'acquired brain injury', 'mental function' and 'method of assessment', combined with a published methodological search filter to identify studies on psychometric properties in PubMed, CINAHL and EMBASE [32]. A translation of the published search filter will be applied in PsychINFO and OTseeker [33]. Because of the risk of missing studies including activity and participation, this aspect will not be included in the search strategy but will be assessed manually during the selection procedure.

The search strategy will use Medical Subjects Headings (MeSH), and other controlled vocabularies (i.e. EMTREE, Cinahl headings and Thesaurus), in addition to relevant free-text terms. Citation search will be used, and reference lists of relevant studies will be searched for additional studies in order to identify studies which do not appear by the search strategy, including gray literature.

The search is used for a series of systematic reviews on measurement properties, hence including the umbrella term 'acquired brain injury'. The current review includes studies in TBI. In order for a study to be included, there needs to be a separate analysis of the TBI population, which will be identified during the selection procedure.

The online bibliographic program RefWorks (https://www.refworks.com) will be used to gather all identified studies. The full search strategy can be obtained from the first author upon request.

Selection of studies

Inclusion criteria

Only original studies reporting on methods to assess mental function during activity and participation will be included. The ICF definition of the constructs; mental function and activity and participation will be used [34]. Activity and participation relate to broader aspects of functioning, including communication, mobility, interpersonal interactions, self-care, learning, and applying knowledge [34].

Furthermore, the studies need to report on at least one measurement property according to the COnsensus-based Standards for selection of Health Measurement Instruments (COSMIN) checklist. The COSMIN checklist is a standardized method to evaluate the methodological quality of studies reporting on measurement properties within nine domains: Internal consistency, reliability, measurement error, content validity, structural validity, hypotheses testing, cross-cultural validity, criterion validity, and responsiveness [35,36]. All categories of traumatic brain injury, i.e. mild, moderate and severe will be included, regardless of time since injury or comorbidity. No language restrictions will be used.

Exclusion criteria

A study will be excluded from the systematic review, if it there is no separate analysis of an adult population. Likewise, a study will be excluded if it includes a mixed population with acquired brain injury with no separate analysis of the TBI population.

Selection procedure

The literature search will be performed in collaboration with a health science librarian. Two authors will independently screen all titles and abstracts for relevance after duplicates are removed. Both authors will apply the eligibility criteria to the included studies in full-text. If a disagreement occurs, a third author will be consulted for consensus. The authors are clinical and research content area experts. Studies in other languages than the authors master will be translated by the authors' network.

Data extraction

Data from the included studies will be extracted independently by two authors, using a standardized data collection form based on the COSMIN checklist, but also including study characteristics i.e. author, publication year, country, language, sample size, TBI severity, age of study population, time post TBI onset, COSMIN domain(s), mental function domain(s) and dimension of activity and/or participation.

Disagreements between authors will be resolved through consensus with a third author. A flowchart will illustrate the process of the selection procedure. The following information will be extracted from the studies and presented in tables:

- General characteristics of the studies
- Results of measurement properties

Appraisal of the methodological quality of included studies

Two authors will independently perform the quality evaluation of the included studies and continuously meet for consensus. Disagreements will be resolved through consensus with at third author. The COSMIN checklist will be used to evaluate the methodological quality of the included studies. This includes the risk of bias in each study [35]. The checklist consists of nine boxes with methodological standards for how each measurement property should be assessed. A four-point scale will be used, and each property will be rated as excellent, good, fair or poor following predefined criteria from the COSMIN checklist. The lowest rating on any item on the checklist will determine the overall rating for each measurement property (i.e. worst score counts) [32].

Data synthesis of included outcome measures

The Terwee quality criteria will be applied to give an overall rating of the study findings for each measurement property as positive, intermediate or negative [37]. A best evidence synthesis will be performed using a 'levels of evidence' rating in order to summarize all the evidence on the measurement properties of the included outcome measures [38]. The possible levels of evidence for a measurement property are: strong, moderate, limited, conflicting, or unknown. The levels of evidence rating are based on the number and methodological quality of the studies (i.e. COSMIN rating), and the rating and consistency of the measurement properties (i.e. Terwee criteria).

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Ethics and dissemination

Ethical approval is not required for this systematic review. Findings will be disseminated through publication in a peer-reviewed journal and presented at conferences.

Disclosure statement

The authors of this review have no conflicts of interests.

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References

[1] Mar J, Arrospide A, Begiristain JM, et al. The impact of acquired brain damage in terms of epidemiology, economics and loss in quality of life. BMC Neurol. 2011;11:46.
[2] Ghajar J. Traumatic brain injury. Lancet. 2000;356: 923–929.

[3] Corrigan JD, Selassie AW, Orman JA. The epidemiology of traumatic brain injury. J Head Trauma Rehabil. 2010;25:72–80.
[4] Frost RB, Farrer TJ, Primosch M, et al. Prevalence of traumatic brain injury in the general adult population: a meta-analysis. Neuroepidemiology 2013;40: 154–159.
[5] Cassidy JD, Carroll LJ, Peloso PM, et al. Incidence, risk factors and prevention of mild traumatic brain injury: results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. J Rehabil Med. 2004;36:28–60.
[6] Hyder AA, Wunderlich CA, Puvanachandra P, et al. The impact of traumatic brain injuries: a global perspective. NeuroRehabilitation 2007;22:341–353.
[7] Abreu BC, Toglia JP. Cognitive rehabilitation: a model for occupational therapy. Am J Occup Ther. 1987;41:439–448.
[8] Hanson CS, Shechtman O, Jackson FJ, et al. Occupational therapy: current practice and training issues in the treatment of cognitive dysfunction. NeuroRehabilitation. 1997;8:31–41.
[9] Poole J, Dunn W, Schell B, et al. Statement: occupational therapy services management of persons with cognitive impairments. Am J Occup Ther. 1991;45: 1067–1068.
[10] Cicerone KD, Langenbahn DM, Braden C, et al. Evidence-based cognitive rehabilitation: updated review of the literature from 2003 through 2008. Arch Phys Med Rehabil. 2011;92:519–530.
[11] Himanen L, Portin R, Isoniemi H, et al. Longitudinal cognitive changes in traumatic brain injury: a 30-year follow-up study. Neurology 2006; 66:187–192.
[12] Chung CS, Pollock A, Campbell T, et al. Cognitive rehabilitation for executive dysfunction in adults with stroke or other adult non-progressive acquired brain damage. Cochrane Database Syst Rev. 2013;4: CD008391.
[13] World Health Organization. Collaborating centres for classification of diseases. In: ICD-10: International Statistical Classification of Diseases and Related Health Problems. 10. revision ed. Geneva: WHO; 1992.
[14] Hachinski V, Iadecola C, Petersen RC, et al. National Institute of Neurological Disorders and Stroke-Canadian Stroke Network vascular cognitive impairment harmonization standards. Stroke 2006; 37:2220–2241.
[15] The Royal College of Physicians. National Clinical Guideline for Stroke. London: Royal College of Physicians; 2012 [4th Edition]. p. 1–209.
[16] Bayley MT, Tate R, Douglas JM, et al. INCOG guidelines for cognitive rehabilitation following traumatic brain injury: methods and overview. J Head Trauma Rehabil. 2014;29:290–306.
[17] Laxe S, Tschiesner U, Zasler N, et al. What domains of the international classification of functioning, disability and health are covered by the most commonly used measurement instruments in traumatic brain injury research? Clin Neurol Neurosurg. 2012; 114:645–650.
[18] WHO. ICF: International Classification of Functioning, disability and Health. Geneva: WHO; 2001.
[19] Mohammed Alotaibi N, Reed K, Shaban Nadar M. Assessments used in occupational therapy practice: an exploratory study. Occup Ther Health Care. 2009;23:302–318.
[20] Douglas A, Liu L, Warren S, et al. Cognitive assessments for older adults: which ones are used by Canadian therapists and why. Can J Occup Ther. 2007;74:370–381.
[21] Koh CL, Hoffmann T, Bennett S, et al. Management of patients with cognitive impairment after stroke: a survey of Australian occupational therapists. Aust Occup Ther J. 2009;56:324–331.
[22] Mok VC, Wong A, Lam WW, et al. Cognitive impairment and functional outcome after stroke associated with small vessel disease. J Neurol Neurosurg Psychiatry. 2004;75:560–566.
[23] Sansonetti D, Hoffmann T. Cognitive assessment across the continuum of care: the importance of occupational performance-based assessment for individuals post-stroke and traumatic brain injury. Aust Occup Ther J. 2013;60:334–342.
[24] Hollocks MJ, Brookes R, Morris RG, et al. Associations between the Brief Memory and Executive Test [BMET], activities of daily living, and quality of life in patients with cerebral small vessel disease. J Int Neuropsychol Soc. 2016;22:561–569.
[25] Árnadóttir G, Löfgren B, Fisher A. Difference in impact of neurobehavioural dysfunction on Activities of daily living performance between right and left hemispheric stroke. J Rehabil Med 2010;42: 903–907.
[26] Ready RE, Ott BR, Grace J. Validity of informant reports about AD and MCI patients' memory. Alzheimer Dis Assoc Disord. 2004;18:11–16.
[27] Sadek JR, Stricker N, Adair JC, et al. Performance-based everyday functioning after stroke: relationship with IADL questionnaire and neurocognitive performance. J Int Neuropsychol Soc. 2011;17:832–840.
[28] Hoffmann T, Bennett S, Koh CL, et al. A systematic review of cognitive interventions to improve functional ability in people who have cognitive impairment following stroke. Top Stroke Rehabil. 2010;17: 99–107.
[29] Werff KR. The application of the international classification of functioning, disability and health to functional auditory consequences of mild traumatic brain injury. Semin Hear. 2016;37:216–232.
[30] McCluskey A. Occupational therapists report on low level of knowledge, skill and involvement in evidence-based practice. Aust Occ Ther J. 2003;50:3–12.
[31] Shamseer L, Moher D, Clarke M, et al. Preferred reporting items for systematic review and meta-analysis protocols [PRISMA-P] 2015: elaboration and explanation. BMJ 2015;349:g7647.
[32] Terwee CB, Mokkink LB, Knol DL, et al. Rating the methodological quality in systematic reviews of studies on the measurement properties: a scoring system for the COSMIN checklist. Qual Life Res. 2012;21: 651.

[33] Terwee CB, Jansma EP, Riphagen II, et al. Development of a methodological PubMed search filter for finding studies on measurement properties of measurement instruments. Qual Life Res. 2009;18: 1115–1123.
[34] Bickenbach J, Cieza A, Rauch A, Stucki G. editors. ICF Core Sets: Manual for Clinical Practice. Göttingen: Hogrefe; 2012.
[35] Mokkink LB, Terwee CB, Patrick DL, et al. The COSMIN study reached international consensus on taxonomy, terminology, and definitions of measurement properties for health-related patient-reported outcomes. J Clin Epidemiol. 2010;63:737–745.
[36] Mokkink LB, Terwee CB, Knol DL, et al. The COSMIN checklist for evaluating the methodological quality of studies on measurement properties: a clarification of its content. BMC Med Res Methodol. 2010;10:22.
[37] Terwee CB, Bot SD, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. 2007; 60:34–42.
[38] Furlan AD, Malmivaara A, Chou R, et al. 2015 Updated method guideline for systematic reviews in the cochrane back and neck group. Spine [Phila Pa 1976]. 2015;40:1660–1673.