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Enhancing the reporting quality of rehabilitation interventions through an extension of the Template for Intervention Description and Replication (TIDieR): the TIDieR-Rehab checklist and supplementary manual

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ABSTRACT

Background Rehabilitation is a complex biopsychosocial process in which multidisciplinary professionals work in collaboration with a person and their family, with the shared objective of enhancing the person's participation in valued life roles. Hence, rehabilitation is integral to the management of numerous health conditions. However, poor descriptions of rehabilitation interventions, including their essential elements and dosage parameters, pose a significant barrier to their replication in clinical practice. This further limits the synthesis of rehabilitation research and the consequent advancement of the field. The original Template for Intervention Description and Replication (TIDieR) checklist and guide provides a valuable foundation for reporting but is not specific to rehabilitation. The TIDieR-Rehab checklist, an extension of the original TIDieR, was developed to enhance the reporting of rehabilitation interventions.

Objective This paper presents the TIDieR-Rehab checklist and supplementary manual.

Methods In accordance with the Enhancing the Quality and Transparency of Health Research (EQUATOR) Network and other relevant guidelines, the TIDieR-Rehab checklist and supplementary manual were developed through a modified Delphi process with individuals with rehabilitation expertise and was guided by an interdisciplinary Steering Committee.

Results The TIDieR-Rehab checklist and supplementary manual present seven original, three adapted and 12 new items to enhance the reporting of rehabilitation interventions. New items promote full descriptions of critical aspects of rehabilitation interventions, including the intended study population *(Who)* and timing of the intervention *(When)*, the planned intervention dosage *(How much, How challenging and Regression/Progression)*, person-centred care *(Personalisation)* and negative undesired effects *(Harms)*. Explanations and examples of good reporting, provided within the TIDieR-Rehab supplementary manual, provide comprehensive guidance to support users of the checklist.

Conclusions The TIDieR-Rehab checklist and supplementary manual present a systematic approach to the comprehensive reporting of rehabilitation interventions. The checklist is intended to support replication, evaluation and optimisation of rehabilitation interventions through improved reporting quality.

INTRODUCTION

Rehabilitation plays a pivotal role in managing a range of health conditions and minimising disability.[1] The effectiveness of rehabilitation interventions often hinges on their 'essential elements' or 'active ingredients'.[2 3] Furthermore, rehabilitation dosage parameters, encompassing the amount and challenge of the intervention, are key determinants of outcomes.[3 4] Yet, our current understanding of the essential elements of rehabilitation interventions and their dosage parameters remains incomplete, hindering the replication, synthesis and advancement of rehabilitation research and the translation of findings to clinical practice. This knowledge gap is exacerbated by inadequate reporting of rehabilitation interventions in the literature—an obstacle that has persisted for decades.[4–9]

To address this problem and advance the field of rehabilitation, explicit and comprehensive intervention descriptions are required. Various tools have been proposed to improve reporting.[10–12] The Template for Intervention Description and Replication (TIDieR)[12], in particular, has been valued for its guidance and utility, but lacks specificity to rehabilitation interventions.[5 13–15] This paper presents the TIDieR-Rehab checklist and supplementary manual, an extension of the original TIDieR, which aims to enhance the reporting of rehabilitation interventions. The TIDieR-Rehab checklist contains seven original TIDieR items,[12] three adapted items

and 12 new items unique to rehabilitation intervention reporting. The development of the TIDieR-Rehab checklist has been described in detail elsewhere.[16] The aim of this paper is to present the new items that were included in the TIDieR-Rehab checklist, along with their supplemental explanations and multidisciplinary examples of good reporting.

OVERVIEW OF THE METHODS USED TO DEVELOP THE TIDIER-REHAB CHECKLIST AND SUPPLEMENTARY MANUAL

The TIDieR-Rehab checklist was developed using a modified Delphi process and was overseen by an interdisciplinary Steering Committee, following the Enhancing the Quality and Transparency of Health Research (EQUATOR) Network and other relevant guidelines.[17–19] A full description of the TIDieR-Rehab checklist and supplementary manual development process can be found in a corresponding paper.[16] In brief, the researchers evaluated existing checklists, such as the TIDieR[12] and Consensus on Exercise Reporting Template,[11] against relevant rehabilitation literature to identify limitations in current reporting practices. They then developed and piloted a rehabilitation-specific extension of the original TIDieR, resulting in an initial draft of the TIDieR-Rehab checklist. In round 1 of the modified Delphi process, 35 participants with expertise in rehabilitation, including clinicians, researchers and journal editors, reviewed the initial draft of the TIDieR-Rehab checklist via an online survey. Participants were asked to indicate their quantitative agreement with the statement 'This item should be included in the TIDieR-Rehab checklist' on a five-point Likert scale and optionally provide qualitative written feedback through a free comments box for each checklist item.[20] Analysis and triangulation of round 1 data informed the revision of the checklist and the development of a supplementary manual. Twenty-three of the participants engaged in round 2 of the modified Delphi process, which presented the new and adapted items of the TIDieR-Rehab checklist and their related supplementary manual information. Data revealed high levels of quantitative agreement and largely positive qualitative feedback, indicating consensus.

The final TIDieR-Rehab checklist presents a total of 22 items under 15 sections that are supported by the TIDieR-Rehab supplementary manual. The TIDieR-Rehab checklist retains seven original and three adapted TIDieR items, and introduces 12 new items unique to the TIDieR-Rehab. The key differences between the original TIDieR and the TIDieR-Rehab extension are the explicit focus on reporting related to rehabilitation dosage parameters, person-centred care and negative, undesired effects.

THE TIDIER-REHAB CHECKLIST: NEW ITEMS AND SUPPLEMENTARY MANUAL

The TIDieR-Rehab checklist is provided in table 1 and the full TIDieR-Rehab supplementary manual is provided in the online supplemental file. The following results present the new items unique to the TIDieR-Rehab with their abbreviated supplementary explanations and examples. The examples show relevant text that has been extracted from rehabilitation intervention articles to demonstrate the type of information that may relate to the respective TIDieR-Rehab item. References for the examples can be found in table 2.

Item 3. Who: Describe who the intervention is intended for

Explanation: Provide relevant demographic and clinical information for participants included in the study, such as age (examples 3.1, 3.2), condition (examples 3.1, 3.2), symptom severity, geographical area, socioeconomic status, ethnicity, gender identity, sexual orientation (example 3.2) or ethnic and cultural background as appropriate. If the participants in the study (study population) differ from the people or group(s) that the intervention is intended for (intended population), describe how and why (example 3.1). Where appropriate, describe any anticipated interaction or influence that the key demographic and clinical characteristics may have on essential elements, intervention delivery (example 3.2), anticipated outcome(s) or clinical recommendations for the population the intervention is intended for (examples 3.1, 3.2).

Examples:

- **3.1** '… training was evaluated in healthy, recreationally active young adults to establish the expected exercise-response changes in common clinical metrics and help build the foundation for future research on athletes with [sport-related concussion]. As return-to-play decisions may be based, in part, on the return of clinical concussion assessments to preinjury (baseline) levels … studying healthy participants can minimize confounding factors and identify potential changes in clinical concussion assessments resulting from aerobic exercise alone that have previously been ignored in the scientific literature'.
- **3.2** 'Eligible intervention participants meet the following criteria: (1) aged 18–35, (2) identify as a gay or bisexual man, (3) HIV-negative status confirmed through in-office testing, (4) diagnosis of any DSM depressive, anxiety or trauma-related and stressor related disorder; (5) HIV sexual risk … (6) and not currently adherent to PrEP [pre-exposure prophylaxis] … we adapted the Unified Protocol to enhance young gay and bisexual men's stigma coping by reducing minority stress processes … For example, modules were adapted to help young gay and bisexual men … track unhealthy reactions to minority stress; … attribute distress to minority stress rather than personal failure …'

Table 1 The TIDieR-Rehab checklist

SECTION 1. BRIEF NAME	
Item 1.	Provide the name or a phrase that describes the intervention.
SECTION 2. WHY	
# Item 2.	Describe any rationale, theory or goal of the elements essential to the intervention. *Essential elements, also known as 'active ingredients', are the core components of the intervention that are expected to be linked to effects or outcomes of interest.*
SECTION 3. WHO	
* Item 3.	Describe who the intervention is intended for.
SECTION 4. WHEN	
* Item 4.	Describe when the intervention commenced in relation to the onset or stage of the condition and/or other relevant events.
SECTION 5. WHAT	
Item 5A.	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (for example, online appendix, URL).
Item 5B.	Procedures: Describe each of the procedures, activities and/or processes used in the intervention, including any enabling or support activities.
SECTION 6. WHO PROVIDED	
Item 6.	For each category of intervention provider (for example, psychologist, nursing assistant), describe their expertise, background and any specific training given.
SECTION 7. HOW	
Item 7.	Describe the modes of delivery (such as face to face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.
SECTION 8. WHERE	
# Item 8.	Describe the type(s) of environment(s) where the intervention occurred, including any necessary infrastructure or relevant features. *Environments and their features may include the relevant physical, social, cultural, economic, political and/or systemic context(s) of the intervention.*
SECTION 9. HOW MUCH	
* Item 9A.	Session(s) duration: Specify the planned session(s) duration of the intervention.
* Item 9B.	Essential elements amount: Specify the planned session(s) duration and/or repetitions of the essential elements of the intervention. *Essential elements amount refers to the time and/or repetitions, within the total duration of a single session, that is spent 'actively' participating in the core components of the intervention.*
* Item 9C.	Frequency: Specify the planned frequency of the intervention.
* Item 9D.	Intervention length: Specify the planned overall length of the intervention.
SECTION 10. HOW CHALLENGING	
* Item 10.	Describe the approach(es) used to set and monitor the intervention/task challenge level. *Challenge may include the nominal, functional or perceived level of difficulty, effort, physiological intensity or cognitive load of an intervention/task at a given time and may be evaluated using subjective or objective measures.*
SECTION 11. REGRESSION/PROGRESSION	
* Item 11.	Describe the planned regression and/or progression of dosage parameter(s), including when and how. *Dosage parameters refer to the amount (Section 9. How much) and challenge (Section 10. How challenging) of the intervention.*
SECTION 12. PERSONALISATION	
* Item 12A.	Needs: If supplementary strategies were planned to enable the delivery of the essential elements of the intervention in response to specific individual or group needs, then describe what, why, when and how. *Supplementary strategies refer to intervention adjuncts (for example, physical assistance, verbal cueing, props) that must be used by some individuals or groups to facilitate effective participation in the essential elements.*
* Item 12B.	Preferences: If the intervention was planned to be adapted for personal preferences, then describe what, why, when and how.

Continued

Table 1 Continued

SECTION 13. PROTOCOL DEVIATIONS	
# Item 13.	If there were deviations in the intervention protocol during the course of the study, describe the changes (what, why, when and how).
SECTION 14. HOW WELL	
Item 14A.	Plan: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.
Item 14B.	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.
SECTION 15. HARMS	
* Item 15A.	Plan: Describe the monitoring of adverse consequences. *Adverse consequences include any negative, undesired effects related to the intervention, including physical, mental, social and/or spiritual effects.*
* Item 15B.	Actual: Describe any adverse consequences, including the number, seriousness and relatedness to the intervention.

*, new item unique to the TIDieR-Rehab checklist.
#, adapted original TIDieR item for the TIDieR-Rehab checklist.
TIDieR, Template for Intervention Description and Replication.

Item 4. When: Describe when the intervention commenced in relation to the onset or stage of the condition and/or other relevant events

Explanation: The implementation or effects of an intervention may be influenced by its commencement or timing in relation to the onset or stage of the condition (example 4.1) or other relevant events. In some cases, early or delayed treatment may influence intervention efficacy (example 4.1) or potential harm. Intervention commencement may also relate to minimising confounding variables (example 4.2) or responding to ethical considerations. Where appropriate, the rationale should also be described (examples 4.1, 4.2).

Examples:

- **4.1** 'Subjects assigned to either FES-CE [functional electrical stimulation cycle ergometry] or FES-IC [isometric functional electrical stimulation contractions] began their training programme as soon as their medical condition was stable and/or they were no longer in spinal shock (60.5±22.5 days after injury) … There has been far greater success in counteracting disuse atrophy when therapeutic interventions are employed during the course of rapid atrophy rather than after atrophy has occurred … During spinal shock, the musculature is unresponsive to stimulus parameters used by conventional FES equipment, preventing any treatment'.
- **4.2** 'Instead of requiring the patients to stop taking their prescribed drugs for PTSD [post-traumatic stress disorder] we demanded that they had been on a steady state for 5 months, and that they kept their dosage constant throughout the time of the study [reference]. In this way, it is possible to evaluate the effects of the psychological treatment over and above the effect of the drugs. Demanding the patients to be drug-free before entering the study … could possibly … increase … PTSD symptoms, which would coincide with the baseline and inflate the initial frequency and intensity of PTSD symptoms'.

Item 9A. How much – Session(s) duration: Specify the planned session(s) duration of the intervention

Explanation: The information needed to report on the 'how much' (also known as the amount or dose) of the intervention will differ according to the type of intervention. Session(s) duration is defined as the prescribed total length of time, usually measured in minutes or hours, of which a single session of the intervention is delivered. Therefore, the session(s) duration includes the time spent engaging in essential and, where applicable, non-essential elements of the intervention in one session (examples 9A.1, 9A.2). This may also be thought of as the sum of individual active/on-task and inactive/off-task time or episodes within one session.

Examples:

- **9A.1** 'The interventions … consisted of one 40 min assessment and treatment session and up to six subsequent 20 min treatment sessions'.
- **9A.2** 'The intervention consisted of six 60-minute group sessions … The LKM [loving-kindness meditation] periods were between 15 and 20 min duration … During the final minutes of the meditation, patients were asked to rest with attention to any feeling of love that remained from the practice … Each session also included a 20-minute discussion to examine participants' progress and answer questions, and 20 min for a didactic presentation about features of the meditation and how to integrate concepts from the workshop in one's daily life'.

Table 2 List of references for the TIDieR-Rehab supplementary manual examples

Example	Reference
3.1	Teel EF, Register-Mihalik JK, Appelbaum LG, Battaglini CL, Carneiro KA, Guskiewicz KM, *et al*. Randomized controlled trial evaluating aerobic training and common sport-related concussion outcomes in healthy participants. *J Athl Train*. 2018;53:1156–1165. doi:10.4085/1062-6050-7-18
3.2	Pachankis JE, McConocha EM, Reynolds JS, Winston R, Adeyinka O, Harkness A, *et al*. Project ESTEEM protocol: a randomized controlled trial of an LGBTQ-affirmative treatment for young adult sexual minority men's mental and sexual health. *BMC Public Health*. 2019;19:1086. doi:10.1186/s12889-019-7346-4
4.1	Baldi JC, Jackson RD, Moraille R, Mysiw WJ. Muscle atrophy is prevented in patients with acute spinal cord injury using functional electrical stimulation. *Spinal Cord*. 1998;36:463–469. doi:10.1038/sj.sc.3100679
4.2	Paunovic N, Öst L. Cognitive-behavior therapy vs exposure therapy in the treatment of PTSD in refugees. *Behav Res Ther*. 2001;39:1183–1197. doi:10.1016/s0005-7967(00)00093–0
9A.1	Macfarlane GJ, Jones GT, Hannaford PC. Managing low back pain presenting to primary care: where do we go from here? *Pain*. 2006;122:219–222. doi:10.1016/j.pain.2006.03.013
9A.2	Hofmann SG, Grossman P, Hinton DE. Loving-kindness and compassion meditation: potential for psychological interventions. *Clin Psychol Rev*. 2011;31:1126–1132. doi:10.1016/j.cpr.2011.07.003
9B.1	Schuster R, Leitner I, Carlbring P, Laireiter A. Exploring blended group interventions for depression: randomised controlled feasibility study of a blended computer- and multimedia-supported psychoeducational group intervention for adults with depressive symptoms. *Internet Interventions*. 2017;8:63–71. doi:10.1016/j.invent.2017.04.001
9B.2	Sharma S, Ghrouz AK, Hussain ME, Sharma S, Aldabbas M, Ansari S. Progressive resistance exercises plus manual therapy is effective in improving isometric strength in overhead athletes with shoulder impingement syndrome: a randomized controlled trial. *BioMed Res Int*. 2021:9945775. doi:10.1155/2021/9945775
9C.1	Britton WB, Davis JH, Loucks EB, Peterson B, Cullen BH, Reuter L, *et al*. Dismantling mindfulness-based cognitive therapy: creation and validation of 8-week focused attention and open monitoring interventions within a 3-armed randomized controlled trial. *Behav Res Ther*. 2018;101:92–107. doi:10.1016/j.brat.2017.09.010
9C.2	Andelin L, Reynolds S, Schoen S. Effectiveness of occupational therapy using a sensory integration approach: a multiple-baseline design study. *Am J Occup Ther*. 2021;75. doi:10.5014/ajot.2021.044917
9D.1	Kemp J, Moore K, Fransen M, Russell T, Freke M, Crossley KM. A pilot randomised clinical trial of physiotherapy (manual therapy, exercise, and education) for early-onset hip osteoarthritis post-hip arthroscopy. *Pilot Feasibility Stud*. 2017;4:1–9. doi:10.1186/s40814-017-0157-4
9D.3	Packman A, Onslow M. Investigating optimal intervention intensity with the Lidcombe Program of early stuttering intervention. *Int J Speech Lang Pathol*. 2012;14:467–470. doi:10.3109/17549507.2012.689861
10.2	McLay RN, Wood DP, Webb-Murphy JA, Spira JL, Wiederhold MD, Pyne JM, *et al*. A randomized, controlled trial of virtual reality-graded exposure therapy for post-traumatic stress disorder in active duty service members with combat-related post-traumatic stress disorder. *Cyberpsychol, Behav Soc Netw*. 2011;14:223–229. doi:10.1089/cyber.2011.0003
10.4	McAllister T, Hitchcock ER, Ortiz JA. Computer-assisted challenge point intervention for residual speech errors. *Perspect ASHA Spec Interest Groups*. 2021;6:214–229. doi:10.1044/2020_persp-20–00191
11.1	George SZ, Wittmer VT, Fillingim RB, Robinson ME. Comparison of graded exercise and graded exposure clinical outcomes for patients with chronic low back pain. *J Orthop Sports Phys Ther*. 2010;40:694–704. doi:10.2519/jospt.2010.3396
11.2	Ashburn A, Pickering R, McIntosh E, Hulbert S, Rochester L, Roberts HC, *et al*. Exercise- and strategy-based physiotherapy-delivered intervention for preventing repeat falls in people with Parkinson's: the PDSAFE RCT. *Health Technol Assess*. 2019;23:1–150. doi:10.3310/hta23360
12A.1	Dwyer TJ, Daviskas E, Zainuldin R, Verschuer J, Eberl S, Bye PT, *et al*. Effects of exercise and airway clearance (positive expiratory pressure) on mucus clearance in cystic fibrosis: a randomised crossover trial. Eur Respir J. 2019;53:1 801 793. doi:10.1183/13993003.01793–2018
12A.2	Schmid AA, Spangler-Morris C, Beauchamp RC, Wellington MC, Hayden WM, Porterfield HS, *et al*. The home-based occupational therapy intervention in the Alzheimer's disease multiple intervention trial (ADMIT). *Occup Ther Ment Health*. 2015;31:19–34. doi:10.1080/0164212X.2014.1002963
12B.1	Brady B, Veljanova I, Schabrun S, Chipchase L. Integrating culturally informed approaches into physiotherapy assessment and treatment of chronic pain: a pilot randomised controlled trial. *BMJ Open*. 2018;8:e021999. doi:10.1136/bmjopen-2018–0 21 999
12B.2	Davidson KW, Rieckmann N, Clemow L, Schwartz JE, Shimbo D, Medina V, *et al*. Enhanced depression care for patients with acute coronary syndrome and persistent depressive symptoms: coronary psychosocial evaluation studies randomized controlled trial. *Arch Intern Med. 2010;170*:600–608. doi:10.1001/archinternmed.2010.29
15A.1	Register-Mihalik JK, Guskiewicz KM, Marshall SW, McCulloch KL, Mihalik JP, Mrazik M, *et al*. Methodology and implementation of a randomized controlled trial (RCT) for early post-concussion rehabilitation: the active rehab study. *Font Neurol*. 2019;10:1176. doi:10.3389/fneur.2019.01176
15A.2	Godecke E, Armstrong E, Rai T, Ciccone N, Rose ML, Middleton S, *et al*. A randomized control trial of intensive aphasia therapy after acute stroke: the very early rehabilitation for speech (VERSE) study. *Int J Stroke*. 2021;16:556–572. doi:10.1177/1747493020961926

Continued

Table 2 Continued

Example	Reference
15B.1	Barker K, Holland AE, Lee AL, Ritchie K, Boote C, Lowe S, *et al*. A rehabilitation programme for people with multimorbidity vs usual care: a pilot randomized controlled trial. *J Comorb*. 2018;8:2235042X18783918. doi:10.1177/2235042X18783918
15B.2	Frost J, Robinson HF, Hibberd J. A comparison of neuromuscular electrical stimulation and traditional therapy, vs traditional therapy in patients with longstanding dysphagia. *Curr Opin Otolaryngol Head Neck Surg*. 2018;*26*:167–173. doi:10.1097/MOO.0000000000000454

Item 9B. How much – Essential elements amount: Specify the planned session(s) duration and/or repetitions of the essential elements of the intervention

Essential elements amount refers to the time and/or repetitions, within the total duration of a single session, that is spent 'actively' participating in the core components of the intervention

Explanation: The essential elements duration may be thought of as 'active' episode lengths, where numerous active/on-task episodes may occur for discrete periods of time (examples 9B.1, 9B.2) and may be interspersed with inactive/off-task episodes (example 9B.1) within the total session duration (item 9A). The sum of each active episode, usually reported in minutes or hours, within a single session, represents the essential elements amount (example 9B.1). In exercise interventions, this may be thought of as the 'work duration' (i.e., the session duration minus rest time (example 9B.1)). The essential elements amount may also be represented by the planned number of repetitions of a component (example 9B.2). Where appropriate, both the essential elements duration and repetitions should be reported (example 9B.2).

Examples:

- **9B.1** 'Applied the intervention in a single training session (90 min) … Each session started with a 20-minute discussion sharing their thoughts …. A 50-minute midsession followed containing psychoeducation … the midsession was interrupted by a 10-min break … The closing procedure was a 20-minute reflection on the session …'
- **9B.2** 'Stretching exercise … 5 repetitions daily withhold of 30 seconds for each repetition were performed by the athletes'.

Item 9C. How much – Frequency: Specify the planned frequency of the intervention

Explanation: Frequency is defined as the number of intervention sessions per day and/or week, over the overall intervention length (examples 9C.1, 9C.2).

Examples:

- **9C.1** 'Classes met for three hours once a week for eight weeks with a daylong (10am-4pm) silent retreat during either the sixth or seventh week. Homework consisted of 45 min/day of formal meditation practice, six days/week'.
- **9C.2** 'The intervention sessions were scheduled for 3 times per week for 10 [weeks] (30 sessions total), with each session lasting ~60 min'.

Item 9D. How much – Intervention length: Specify the planned overall length of the intervention

Explanation: Intervention length is defined as the total period of time, usually reported in weeks or months, a rehabilitation intervention is delivered (example 9D.1). Where appropriate, specify the total number of sessions across the overall intervention length and the schedule of sessions, particularly if they vary over the course of the intervention length (example 9D.1). In some cases, the overall intervention length may relate to a target number of sessions or goal (example 9D.3). Where the overall intervention length may vary, any decision points or rules should also be described (example 9D.3).

Examples:

- **9D.1** 'The intervention was a face-to-face physiotherapy intervention and was delivered in eight sessions over 12 weeks (once per week for 4 weeks, then once per fortnight for 8 weeks)'.
- **9D.3** '… the intervention goal in this programme is no or minimal stuttering and we know that the total intervention duration depends primarily on the severity of stuttering, with children with milder stuttering needing fewer clinic visits to complete Stage 1 … each child only receives the minimum dose needed to achieve the programme goal. … The total intervention duration varies across children, depending on how long they take to reach the criteria'.

Item 10. How challenging: Describe the approach(es) used to set and monitor the intervention/task challenge level

Challenge may include the nominal, functional or perceived level of difficulty, effort, physiological intensity or cognitive load of an intervention/task at a given time and may be evaluated using subjective or objective measures

Explanation: Challenge may be understood as the level of difficulty of an intervention or task. This may include the absolute/nominal challenge (difficulty based on the characteristics of the intervention/task), relative/functional challenge (difficulty based on the characteristics of the intervention/task relative to the participant's ability) (examples 10.2, 10.4) or perceived challenge (the person's self-assessment or subjective experience of difficulty associated with an

intervention/task) (example 10.2). A standardised approach(es) may be used to set and monitor the challenge; this may be particularly important for standardising the functional or perceived challenge across all participants while still being optimised for the individual. Challenge may be measured using a range of subjective measures such as patient-reported scales (example 10.2) and objective measures such as proxies of physical load, cognitive load, stress or performance (example 10.4). Where appropriate, provide information on the reliability and validity of the measures used to set and monitor challenge, and any accompanying rationale, materials, equipment or expertise required to replicate the approach.

Examples:

- **10.2** '… the participant was exposed to a VR [virtual reality] simulation of Iraq or Afghanistan that approximated the participant's most salient traumatic experience … In each session, the participant was monitored for the ability to face fear and anxiety, and their ability to regain attentional control to more fully tolerate the scenario. No specific cut-off was used for either Subjective Units of Distress or physiological reactivity'.
- **10.4** 'All participants started at the most basic level of the … hierarchy, independent of baseline [word] accuracy. At the beginning of all subsequent sessions, the participant's starting point … was based on performance in the previous session. If the participant's accuracy in the most recent block of 10 trials fell between 50% and 80%, it is judged that the task represents roughly the correct level of difficulty for their current ability, and no adjustments are made'.

Item 11. Regression/Progression: Describe the planned regression and/or progression of dosage parameter(s), including when and how

Dosage parameters refer to the amount (Section 9. How much) and challenge (Section 10. How challenging) of the intervention

Explanation: By altering any of these parameters, which may include influencing supplementary strategies (item 12A. Personalisation – Needs), the intervention may be regressed or progressed, often for participants to achieve an optimal dosage. Describe when (the planned timing of change) and how (the planned method of change) the parameter(s) are planned to be regressed/progressed and provide a brief rationale (examples 11.1, 11.2). If any rules or decisional materials are used to inform regression/progression, such as other research, predefined criteria, assessments, equipment, flow charts or algorithms, these should be included or referenced (examples 11.1, 11.2). Where appropriate, also provide information on the reliability and validity of any decisional materials (example 11.1).

Examples:

- **11.1** 'First, exercise and activity that were fearful to the patient were determined using the Fear of Daily Activities Questionnaire (FDAQ) [reference]. The FDAQ is a validated questionnaire that listed 10 activities that patients with chronic low back pain were commonly fearful of, for example, lifting, carrying, twisting, and bending [reference]. … The physical therapist selected two items that were ranked as most fearful for implementation in the daily exercise and activity programme. … Patients' exercise and physical activity levels were progressed based on whether they reported decreased fear of the exercise and activity. Those reporting decreased fear received positive reinforcement and the level of the exercise and activity were increased'.
- **11.2** 'Frequency of intervention sessions is faded over time, 1 hour twice a week for 1 month, then once a week for a further 2 months, then once a month for another 3 months. … As a result of its unique structure and delivery, the PDSAFE intervention … facilitates onward … independent self-management of the condition [falls prevention in Parkinson's] by the individual'.

Item 12A. Personalisation – Needs: If supplementary strategies were planned to enable the delivery of the essential elements of the intervention in response to specific individual or group needs, then describe what, why, when and how

Supplementary strategies refer to intervention adjuncts (for example, physical assistance, verbal cueing, props) that must be used by some individuals or groups to facilitate effective participation in the essential elements

Explanation: The provision of supplementary strategies may enable the delivery of essential elements of the intervention by responding to individual or group needs (example 12A.1). This may also include other intervention elements provided in response to a specific individual or group need (example 12A.2). Accordingly, this item reflects the highly individualised nature of rehabilitation which may use supplementary strategies as and when needed (examples 12A.1, 12A.2) but may also highlight the additional expertise or resources required for adequate delivery of the intervention (example 12A.1). Where appropriate, provide a broad protocolisation, summary or list of strategies that are planned to be used to enable intervention delivery (example 12A.2).

Examples:

- **12A.1** 'Participants were taught to use the … PEP (positive expiratory pressure) device by a senior physiotherapist. If participants used PEP on a regular basis, corrections to their technique were made as necessary'.
- **12A.2** 'For example, Week 4 included medication management and a focus on toileting as needed; however, if the individual had fallen since the last visit, fall prevention, transfer training, home modification

and strength training exercises could become the focus of Week 4'.

Item 12B. Personalisation – Preferences: If the intervention was planned to be adapted for personal preferences, then describe what, why, when and how

Explanation: In some rehabilitation interventions, not all participants receive an identical intervention. The intervention may be adapted to be person-centred, enhance the participant's experience or foster participant engagement, adherence or acceptability by responding to personal preferences. This may include choosing a task that is meaningful or specific to the person's goals (example 12B.1), the person's feedback or treatment choice (example 12B.2) or sociocultural context (example 12B.1). Although personalisation may occur on a case-by-case basis, this item intends to capture a broad protocolisation, summary or list of preplanned ways the intervention may be personalised (examples 12B.1, 12B.2). Personalisation can occur at several stages and authors should describe any variables/constructs and decision points or rules used at each stage, alongside a brief rationale (example 12B.1) and explanation of who decides the adaptation (example 12B.2). If any decisional or instructional materials are used, such as other research, predefined criteria, assessments (example 12B.2), equipment, flow charts or algorithms, these should be included (example 12B.1), referenced (example 12B.2) or their location provided.

Examples:

- **12B.1** 'Traditional Am–Duong Medicine construct underpins the adaptation of the [physiotherapy pain management] programme content and its delivery to [Vietnamese] participants, according to the focus group findings. Goals … focused on fulfilment of traditional cultural roles and expectations. For example, goals for men will focus on setting an example for the children, building self-management strategies in order to avoid burdening the family or displaying pain'.
- **12B.2** 'Stepped-care decisions for patients … were guided by responses to the nine item Patient Health Questionnaire [reference] … Patients who did not show prespecified improvement were offered the choice of switching treatments (for example, from [problem-solving therapy] to medication), adding the other treatment, or intensifying the original treatment choice, based on the treatment team's recommendation (for details, see [reference]) …'

Item 15A. Harms – Plan: Describe the monitoring of adverse consequences

Adverse consequences include any negative, undesired effects related to the intervention, including physical, mental, social and/or spiritual effects

Explanation: Where appropriate, define what and how an adverse consequence is classified (example 15A.1), and how the severity and relatedness would be determined. Any materials, such as other research or guidelines, predefined criterion or assessments used to monitor or report adverse consequences should be included or referenced (example 15A.2). If monitoring and reporting of adverse consequences extends to events that occur after the intervention ends, for example, negative, undesired effects discovered during the follow-up period of the study, this should also be described.

Examples:

- **15A.1** 'The symptom scale utilized is the SCAT [Sport Concussion Assessment Tool] 22-item (each item scored 0–6) postconcussion symptom scale. A symptom-based adverse event was determined to be … if an individual's symptoms increased by a reliable change of 10 or more points and remained elevated at that change in the subsequent session'.
- **15A.2** 'Safety (adverse and serious adverse events) was assessed at 12 and 26 weeks poststroke. Adverse event reporting followed a protocol [reference], an independent medical officer adjudicated events, and reported to the Data Safety and Monitoring Board'.

Item 15B. Harms – Actual: Describe any adverse consequences, including the number, seriousness and relatedness to the intervention

Explanation: The number, severity and relatedness of any adverse consequences that may be linked to the intervention should be described (examples 15B.1, 15B.2). Patterns of negative, undesired effects should be described, alongside any potentially associated essential elements (examples 15B.1, 15B.2) or dosage parameters, or participant demographic or clinical characteristics (example 15B.1). Where appropriate, recommendations to mitigate or prevent adverse consequences should also be described (example 15B.2).

Examples:

- **15B.1** 'One adverse event occurred during the intervention. A participant fell while performing the walking component of the rehabilitation programme. The participant tripped while walking, and this occurred as they were no longer wearing an ankle–foot orthosis (AFO) previously prescribed (due to poor fit). No injuries were sustained, and the participant resumed the programme at the following session, with follow-up organized to have the AFO refitted'.
- **15B.2** 'In four placement pairs, on four different subjects, minor adverse reactions to the NMES [neuromuscular electrical stimulation] were reported. This gives an incidence of adverse reactions of 1.3%. One subject had both skin irritation/soreness and a burning sensation beneath the electrodes; two subjects had skin irritation or soreness beneath the electrodes; and one subject had neck or jaw pain. … The finding that all these adverse reactions were resolved by changing the placement of the electrodes

emphasizes the importance of skin preparation and electrode placement in minimizing adverse events. … One clear recommendation from the current study for the use of NMES in clinical practice is that these issues need to be recognized and managed by appropriate electrode placement and monitoring of the sensation experienced by the patient by the speech and language therapist'.

DISCUSSION

The TIDieR-Rehab is an extension of the original TIDieR intended to support the reporting of rehabilitation interventions. The TIDieR-Rehab checklist and its supplementary manual were developed based on the feedback and consensus of international rehabilitation experts. The TIDieR-Rehab checklist emphasises the systematic reporting of dosage parameters, person-centred care practices and negative, undesired effects to ensure careful replicability and enable comprehensive synthesis of rehabilitation research. This paper has comprehensively described the 12 new items that were developed for the TIDieR-Rehab checklist and provided examples from relevant rehabilitation literature to further demonstrate the potential content of each item.

Comprehensive guidance regarding the use of all items within the TIDieR-Rehab checklist is provided in the TIDieR-Rehab supplementary manual. In summary, the TIDieR-Rehab checklist provides a minimum standard of reporting for rehabilitation interventions. The TIDieR-Rehab requires the identification of the essential elements of the intervention and the anticipated mechanism of action.[13] Furthermore, by requiring explication of parameters related to both amount and challenge, the TIDieR-Rehab provides the basis for the monitoring and evaluation of dosage.[4 13] The TIDieR-Rehab checklist acknowledges the personalisation of rehabilitation interventions with respect to both the person's needs and preferences and encourages summary-based reporting of the key information relevant to understanding and implementing the intervention.

Implications for research and clinical practice

The TIDieR-Rehab checklist offers a systematic approach to describing and evaluating rehabilitation interventions and may serve as a useful tool for editors, reviewers, researchers and clinicians. We encourage rehabilitation researchers to draw on the TIDieR-Rehab checklist to support intervention development and clinical trial reporting. Researchers may use tables, appendices or supplementary materials to enable full reporting of interventions in accordance with the TIDieR-Rehab checklist. Alternatively, the TIDieR-Rehab checklist may provide the basis for publications which fully explicate an intervention. For clinicians, the TIDieR-Rehab checklist could be used to guide the extraction of essential elements and intervention dosage parameters required for the accurate replication of interventions in clinical practice. Furthermore, the TIDieR-Rehab supplementary manual provides additional guidance to aid the usability of the checklist and clarity of items as needed. We anticipate that as the rehabilitation field evolves and conceptual understandings and measurement tools advance, the TIDieR-Rehab checklist and supplementary manual will require refinement.

As with the original TIDieR, it is recommended that the TIDieR-Rehab checklist is used alongside the Consolidated Standards of Reporting Trials (CONSORT)[10 21] and Standard Protocol Items: Recommendations for Interventional Trials statements (SPIRIT),[22] and when appropriate, methodological critiquing tools (eg, risk of bias, Joanne Briggs Institute (JBI) checklists, Critical Appraisal Skills Programme (CASP) checklists). The TIDieR-Rehab may offer valuable insights into the synthesis of rehabilitation research evidence, supporting the identification of knowledge gaps. Such improvements are critical to enhancing the translation of research findings into clinical practice.

CONCLUSION

This paper introduces the TIDieR-Rehab and offers practical guidance for its use in improving rehabilitation intervention reporting. The TIDieR-Rehab may assist researchers in the design and replication of rehabilitation research, critique of the reporting quality of existing literature, and the synthesis and meta-analysis of research evidence to inform the development of clinical guidelines. Ultimately, better reporting should support the interpretation and translation of research into clinical practice.

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terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

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