European Physiotherapy Guideline for Parkinson’s Disease

Developed with twenty European professional associations

Development and scientific justification
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European Physiotherapy Guideline for Parkinson’s disease

Parkinson’s disease, or Parkinson’s, is a complex disorder. It is characterised by a wide array of motor and non-motor problems for which medical intervention alone is insufficient. Many allied health professionals can be involved in the management of Parkinson’s disease, of which physiotherapy is the most applied and supported by scientific evidence. In 2004, the Royal Dutch society for Physical Therapy (KNGF) published the first evidence-informed guideline with practice recommendations for physiotherapy in Parkinson’s. An external audit in 2008 showed that this Guideline is one of the few Parkinson’s disease guidelines that are of good quality. Following a request from the Association of Physiotherapists in Parkinson’s disease Europe (APPDE), the KNGF agreed upon a proposal of ParkinsonNet to update and adapt the Guideline into a European guideline. The APPDE, the European Region of the World Confederation for Physical Therapy (ER-WCPT), and the European Parkinson’s Disease Association (EPDA), an umbrella organisation representing 45 national member organisations (www.epda.eu.eu) endorsed the development. Representatives of as many as 20 organisations of the ER-WCPT, as well as representatives of Parkinson associations participated in the development process. The GDG developed this Guideline according to international standards for guideline development, addressing all items of the Appraisal of Guidelines for Research and Evaluation Instrument (AGREE, www.agreetrust.org) and using ‘Grading of Recommendations Assessment, Development and Evaluation’ (GRADE) to develop the recommendations.

1.2 The Guideline Development Group

In 2011, all 20 physiotherapy participating associations nominated a representative for the Writing Group, the Review Group or the Advisory Panel. Together these groups make up the Guideline Development Group (GDG). None of the GDG members had an intellectual conflict of interest. Selection criteria for Writing Group members were geographic dispersion throughout Europe and a good balance between clinical and research Parkinson-specific expertise. Through the EPDA and the Dutch Parkinson association, physiotherapists fully participated in both the Writing and Review Group. An international Steering Group evaluated the development process. Members of this group had extended expertise in physiotherapy, neurology, Parkinson’s disease, the pwp perspective and guideline development in general.

1.3 Timeline

In 2011, after the initiation of the European survey, the 10 Writing Group members started their activities. They prepared the first drafts of the key questions to be addressed, the overall contents of the Guideline, the literature review and the recommendations. For this, they met three times: June 2011, February and November 2012. Furthermore, the GDG communicated electronically. Members of the Reading Group provided feedback at eight points during the development process, between February 2012 and May 2014. Members of the Review Panel provided feedback on two penultimate versions: October 2013 and April 2014. These versions were also published online for public feedback. Finally, at the time of publication of this Guideline, Parkinson-expert neurologists, members of the European Section of the Parkinson and Movement Disorder Society are reviewing the referral criteria as described in the Section for clinicians. Their Viewpoint will be published in the MDS online journal Clinical Practice.

1.4 Identifying barriers in current care

The 2004 KNGF-Guideline Parkinson’s disease, unique in its field, was the starting point for the development of this European Guideline. In addition, the GDG used the 2010 Dutch Multidisciplinary Guideline for Parkinson’s disease. The Dutch Multidisciplinary Guideline is an update of the 2006 National Institute for Health and Clinical Excellence (NICE) Guideline published in the United Kingdom (UK), extended with recommendations for interdisciplinary collaboration and care organisation. Aiming to provide recommendations to optimise care, as a first step, the GDG gained insight into barriers physiotherapists currently experience when wishing to provide intervention to pwp. These were identified by means of a web-based survey sent to 9,646 physiotherapists of 17 European countries. Of the responding 3,405 physiotherapists, 84% had treated at least one pwp the past year, and identified many barriers to delivery of optimal care (Table 1.4a). Through focus groups with 50 expert users, and with Dutch ParkinsonNet physiotherapists, points for improvement of the 2004 KNGF Guideline were identified (Table 1.4b). In addition, barriers in current care reported by pwp and therapists were identified in the international literature using the search terms “Patient’s perspective” OR “Patient Satisfaction” AND “Parkinson Disease” (Mesh) (Table 1.4c). The GDG used these barriers and suggestions for improvement in the development of this Guideline by transforming them into key questions. For example, What are the consequences of cognitive impairments for physiotherapy treatment? and What treatment strategies improve the performance of walking?

### Table 1.4a Physiotherapist perceived barriers in delivering optimal care to pwp

| Low treatment volume | The median annual treatment volume reported was as low as 4, ranging from 2 to 5 in different countries. The reported optimum annual treatment volume to gain and maintain Parkinson expertise was 10 |
| Limited knowledge & skills | The majority reported limited Parkinson’s specific knowledge and skills: only 16% reported (very) high self-perceived Parkinson-expertise, increasing to 26% in physiotherapists with a treatment volume ≥5 |
| Referral at too late a stage | To 33%, referral at too late a stage was a major barrier. Even though physiotherapy is important from disease onset, most of the pwp treated were in the complicated phase (HY 3 and 4) |
| Time constraints | One in three physiotherapists reported limited time with the pwp as a major barrier. Parkinson’s disease is a complex condition involving slowness of movement, speech and thinking. As a result, physiotherapy assessment and treatment for pwp requires more time than other patient groups |
| Collaboration | 25% would like more communication with their peers on pwp and related issues |
| Measurement tools | 40% of experts did not use measurement tools. The main reasons were lack of time (32%), insufficient knowledge and skills (29%), difficulty interpreting results (25%) and unavailability of tools (23%). Also tools not recommended in the 2004 Guideline are used, such as Berg Balance and Tinetti Balance & Gait |
| Intervention | Less than 60% of therapists applied cognitive movement strategies and physical capacity training, recommended by the KNGF Guideline. For most interventions, only 50% of physiotherapists felt above average competence applying them |

### Table 1.4b Parkinson expert physiotherapists information needs

- How to recognise atypical parkinsonisms from Parkinson’s disease?
- How do impairments in cognition and co-morbidities influence physiotherapy treatment?
- What are referral criteria for other health professionals?
- How to optimise communication with other health professionals, including referring physicians?
- How to use and interpret measurement tools?
- Why are certain measurement tools not recommended?
- How to discuss expectations towards the intervention with the pwp?
- How to support self-management, especially after completion of a treatment period?
- What are the general contents of a group treatment protocol?
### Table 1.4c Pwp needs towards optimal care

<table>
<thead>
<tr>
<th>Contents of care</th>
<th>Organisation of care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information about the expected treatment effect</td>
<td>Care by specialised healthcare providers</td>
</tr>
<tr>
<td>Taking into account fluctuations in daily functioning</td>
<td>Active involvement in clinical decision making</td>
</tr>
<tr>
<td>Information on mobility and exercise</td>
<td>Possibility to choose own physiotherapist</td>
</tr>
<tr>
<td>Discussion of the role of the carer</td>
<td>Treatment at home</td>
</tr>
<tr>
<td>Self-management support</td>
<td>Parkinson’s specific knowledge in home care professionals</td>
</tr>
<tr>
<td>Emotional support, such as interest, motivation, taken seriously</td>
<td>Multidisciplinary collaboration: avoid conflicting information and advise; information exchange</td>
</tr>
</tbody>
</table>

### 1.5 Literature search

The GDG determined which of the key questions could feasibly be addressed by undertaking a systematic literature search. The aim was to identify all controlled clinical trials (CCTs) in the field: trials in which two groups of pwp participated, of which at least one received a physiotherapy intervention. The GDG used literature search filters of the Cochrane Collaboration with the exception that next to RCTs also not randomised controlled clinical trials were identified (Table 1.5b). In addition, the GDG searched PEDRO using the wildcards ‘Parkinson’ and ‘Parkinson’s’, and Writing and Reading Group members contributed trials not yet identified. The GDG addressed all others questions by expert opinion and a non-systematic literature search in PubMed up and to December 2012.

Of the 122 CCTs identified, the GDG excluded 52 for various reasons (Appendix 15). The GDG categorised the 70 remaining CCTs according to the evaluated physiotherapy interventions (Table 1.5c).

### Table 1.5a Key questions for which a systematic literature was carried out

<table>
<thead>
<tr>
<th>Contents of care</th>
</tr>
</thead>
<tbody>
<tr>
<td>What treatment strategies improve performance of transfers?</td>
</tr>
<tr>
<td>What treatment strategies improve performance of manual activities?</td>
</tr>
<tr>
<td>What treatment strategies improve performance of balance?</td>
</tr>
<tr>
<td>What treatment strategies improve performance of gait?</td>
</tr>
<tr>
<td>What treatment strategies improve performance of physical capacity?</td>
</tr>
<tr>
<td>What treatment strategies improve respiratory functions?</td>
</tr>
<tr>
<td>What treatment strategies reduce pain?</td>
</tr>
</tbody>
</table>

### Table 1.5c Categories of physiotherapy interventions for pwp

- Conventional physiotherapy
- Treadmill training
- Cuinging
- Strategies for complex motor sequences
- Massage
- Martial arts
- Dance
1.6 Using GRADE to develop recommendations

Most guideline panels have used letters and numbers to summarise their recommendations, but they have used them with little uniformity to establish a best method. The GDG has appraised evidence using GRADE, Grading of Recommendations Assessment Development and Evaluation (www.GRADEworkinggroup.org). GRADE is endorsed by many major organisations such as the Cochrane Collaboration, the World Health Organisation, the UK National Institute for Health and Clinical Excellence and the British Medical Journal. With GRADE, the GDG graded the ‘body of evidence’ for each key question, instead of for separate publications as was common in 2004 (Fig. 1.6).

The GDG formulated key questions based on the barriers identified; classified the outcomes used in the identified CCTs into capacity or performance measures on the different International Classification of Functioning (ICF) domains and scored the importance of the classes of outcomes. Only outcomes with a mean score of 6.5 or above on a scale of one to 10, that is critical outcomes, were used for the evidence grading (Appendix 14). Next, the GDG extracted all trial details necessary for the grading process and graded the quality of the evidence for each question and outcome: high, moderate, low or very low. All CCTs started at the high level. Possible reasons for downgrading were risk of bias, inconsistency, indirectness or imprecision of the results and publication bias (Table 1.6a). For each reason the GDG lowered the quality level by one level in case of a serious limitation, or by two levels in case of a very serious limitation. Limitations not necessary for the grading process and graded the quality of the evidence for each question and outcome: high, moderate, low or very low. All CCTs started at the high level. Possible reasons for downgrading were risk of bias, inconsistency, indirectness or imprecision of the results and publication bias (Table 1.6a). For each reason the GDG lowered the quality level by one level in case of a serious limitation, or by two levels in case of a very serious limitation. Limitations not expected to influence the outcome did not result in downgrading.

<table>
<thead>
<tr>
<th>Reason</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of bias*</td>
<td>Design limitations, such as no (report of) randomisation procedure*, blinding*, allocation concealment* or intention to treat analyses*, or high numbers of drop outs*</td>
</tr>
<tr>
<td>Inconsistency</td>
<td>Differences in direction and size of the effect</td>
</tr>
<tr>
<td>Indirectness</td>
<td>Differences in intervention, people (in our case pwp and therapists) or outcome measures between studies</td>
</tr>
<tr>
<td>Imprecision*</td>
<td>Wide confidence intervals or large p-value; few pwp included*</td>
</tr>
<tr>
<td>Publication bias</td>
<td>Studies or outcomes with expected small or no results not published</td>
</tr>
</tbody>
</table>

*most frequent reasons for downgrading

For estimation of the intervention effect, the Mean Difference (MD) or Standardised Mean Difference (SMD) was used (Table 1.6b). The MD and its 95% confidence interval (CI) are used when studies use an identical outcome measurement. The MD expresses the size of the intervention effect on the scale used. The CI expresses the range within which we can be 95% certain that the true effect lies. The SMD and its CI are used when studies assess the same outcome, but measure it in a variety of ways. The SMD expresses the size of the intervention effect relative to the variability. The SMD is adjusted for sample size using Hedge’s g effect size matrix.

Initially, aiming to keep the development time and thus costs of this Guideline reasonable, the GDG intended to use MD’s and SMD’s from published meta-analysis. Over the past years, several systematic reviews including meta-analyses reviewing the efficacy of physiotherapy for pwp have been published. However, it appeared that for one key question, different meta-analyses included different CCTs. Moreover, some CCTs selected by the GDG were not included the meta-analysis. Therefore, the GDG performed a meta-analysis, using RevMan software (Cochrane Collaboration; http://tech.cochrane.org/Revman) to calculate the MD or SMD.

Finally, the GDG graded the recommendations as ‘strong’ or ‘weak’. This strength reflects the generalisability of the effects amongst all pwp; the extent to which the benefits of the intervention outweigh undesirable effects (such as falls, burden of treatment and costs); the availability; and the values and preferences of pwp and therapists, if known.

1.7 Selecting physiotherapy measurement tools

Use of measurement tools supports structured, objective and transparent assessment, evaluation and communication. However, this only is the case when appropriate tools are selected and the results well interpreted. The GDG has selected outcome measures for use in routine practice in individual pwp.

To determine the final set of tools, first the GDG checked the overview of tools recommended in the current Guideline, identified through the European survey or focus groups with Parkinson expert physiotherapists for completeness. Of all 37 identified tools, the GDG gathered information regarding psychometric properties: validity, reliability, responsiveness and interpretability, as well as and feasibility to use (Table 1.7). Based on these properties, the GDG selected the final set of recommended tools.
Given the focus of physiotherapy treatment and communication, tools on the activities and participation component of the ICF are considered preferable. The majority of tools available were developed for the benefit of scientific research and are focused on use in groups of pwp. The value of these instruments for indication and evaluative purposes in individual pwp is still unclear and may lead to false security. As a rule of thumb, when used in single pwp, these tools are less responsive because the measurement error in a single person is larger than it is in groups. Consequently, a single pwp a change in activity limitations needs to be larger in order to be picked up by the than it needs to be in groups of pwp.

### Table 1.7 Selection criteria for measurement tools

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| Validity                      | Does it measure what it is supposed to measure?  
|                               | Does it have the same meaning for pwp?  
|                               | Is it within the scope of physiotherapy for pwp?  
|                               | Is it linked to the level of limitations in activities domain of the ICF?                                                                |
| Reliability                   | Are results consistent when used in consistent conditions?                                                                               |
| Responsiveness & interpretability | Can it detect change over time?  
|                               | Can we assign a qualitative meaning to the (change in) quantitative scores?                                                              |
| Feasibility                   | Do benefits outweigh the burden in terms of costs, time, space and effort?  
|                               | Is it currently used by (many) physiotherapists?  
|                               | Is it available in many languages?                                                                                                       |

### 1.8 Update of this Guideline

Planned at the latest by 2019. The copyright holder of this Guideline will decide whether the Guideline needs an update. This depends on the amount and strength of new scientific evidence, changes in barriers in current care or changes in the organisation of care. New evidence will be appraised conforming methods used for this Guideline by a writing group assigned by the copyright holders. All participating associations will be offered the possibility to participate in this process. At www.parkinsonnet.info/euguideline, the users of the Guideline will be invited to share their experience and knowledge.
Appendix 14
Graded classes of outcomes

All outcomes reported in the CCTs used for this Guideline are grouped on ICF code (Appendix 9) and graded by the GDG for their importance on a scale of 1 (not important at all) to 10 (most important).

<table>
<thead>
<tr>
<th>Grouped outcome</th>
<th>Core area</th>
<th>ICF code</th>
<th>Tools used in research</th>
<th>mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity measure of functional mobility (that is changing body position and walking)</td>
<td>Gait</td>
<td>Tinetti Gait Assessment</td>
<td>8,8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transfers</td>
<td>Timed Get-up and Go</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sit to stand time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Balance</td>
<td>Timed U-turn</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Turning in place 360</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Standing up &amp; lying down</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Ascend and descend stairs</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Climbing up &amp; down a flight of stairs</td>
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<tr>
<td></td>
<td></td>
<td>5-step test</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Supine to standing turning time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Modified) Parkinson Activity Scale</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Short Physical Performance Battery (SPPB)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Timed Get-up and Go; Backward walking</td>
<td>8,6</td>
<td></td>
</tr>
<tr>
<td>Performance measure of Walking (that is gait)</td>
<td>Gait</td>
<td>Freezing of Gait Questionnaire</td>
<td>8,3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Freezing of gait diary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity &amp; # measure of Changing and maintaining body position (that is balance): DYNAMIC</td>
<td>Balance</td>
<td>Dynamic Gait Index</td>
<td>8,2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timed (single or tandem) stance</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Functional Reach</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Maximum balance range</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Berg Balance Scale</td>
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<tr>
<td></td>
<td></td>
<td>Tinetti Balance Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of falls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movement functions: Gait pattern - 1</td>
<td>Gait</td>
<td>Step or Stride length (10, 12 or 24-m walk test)</td>
<td>8,2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Walking distance (2- or 6-minute walk)</td>
<td>8,1</td>
<td></td>
</tr>
<tr>
<td>Capacity measure of Walking - 2</td>
<td>Gait</td>
<td>Goal Attainment Scaling (GAS)</td>
<td>8,1</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Patients Specific Index PD</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>VAS for improvement problem</td>
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<tr>
<td></td>
<td></td>
<td>Patient reported Clinical Global Impression scale (CGI)</td>
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<tr>
<td></td>
<td></td>
<td>of Change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance measure of Changing and maintaining body position (that is balance)</td>
<td>Balance</td>
<td>(Modified) Falls Efficacy Scale (FES)</td>
<td>7,9</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>ABC</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Parkinson’s Disease Falls Risk Score</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Latency to falls / near falls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Movement functions: Gait pattern - 3</td>
<td>Gait</td>
<td>Cadence</td>
<td>7,7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Variation of stride length</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Parkinson’s Disease Questionnaire 39 (PDQ-39)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Parkinson’s Disease QOL Questionnaire (PDQLQ)</td>
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<td></td>
<td>EuroQOL-5D</td>
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<tr>
<td></td>
<td></td>
<td>Sickness Impact Profile (SIP)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Nottingham Health Profile (NHP)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality of life</td>
<td></td>
<td></td>
<td>7,4</td>
<td></td>
</tr>
</tbody>
</table>

| Movement functions: Gait pattern - 2 | Gait | Step width | 7,2 |
| Performance measure of looking after one’s health | Physical capacity | Physical Activity Scale for the Elderly (PASE) | 6,9 |
| | | Phone-FIT | |
| | | Habitual Physical Activity Questionnaire | |
| Movement functions: functions of involuntary movement, voluntary movement control and muscle tone | Balance | Pull test | 6,8 |
| | | UPDRS – motor | |
| | | UPDRS Posture & Gait score | |
| Muscle functions | Physical capacity | Muscle strength or power | 6,6 |
| Performance measure of self care (that is basic ADL) | All | None reported | 6,5 |
Table Appendix 14.2 'Non-critical outcomes' - outcomes with an importance-score lower than 6.5

<table>
<thead>
<tr>
<th>Composite score for disease severity</th>
<th>Core area</th>
<th>ICF code</th>
<th>Tools used in research</th>
<th>mean score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility of joint functions</td>
<td>Physical capacity</td>
<td>b</td>
<td>Functional axial rotation Range of motion Thoracic kyphosis</td>
<td>5,7</td>
</tr>
<tr>
<td>Capacity measure of Fine hand use and lifting and carrying objects (that is manual activity)</td>
<td>Dexterity</td>
<td>d</td>
<td>Fugi-Mayer assessment Action research arm test (ARAT) Box and block test Grooved Pegboard Purdue Pegboard test</td>
<td>5,5</td>
</tr>
<tr>
<td>Performance # # measure of mobility and domestic life (that is extended ADL)</td>
<td>All</td>
<td>d</td>
<td>Nottingham Extended ADL Index Schwab and England ADL UPDRS – ADL</td>
<td>5,3</td>
</tr>
<tr>
<td>Pain</td>
<td></td>
<td>b</td>
<td>Visual Analogue Scale</td>
<td>6,3</td>
</tr>
<tr>
<td>Acceptability and safety of</td>
<td></td>
<td>NA</td>
<td>incidence of adverse outcomes drop-outs during study number of falls</td>
<td>6,2</td>
</tr>
<tr>
<td>Exercise tolerance functions: fatigability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise tolerance functions: aerobic capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global mental functions</td>
<td></td>
<td>b</td>
<td>Hamilton Depression Rating Scale Geriatric Depression Scale Epworth Sleepiness Scale Attitudes to Self Scale Beck Depression Inventory (BDI) Beck Anxiety Inventory (BA) Zung Self-Rating Depression Scale (SDS) Global patient’s mood status (PMS) State-Trait Anxiety Inventory Hospital Anxiety and Depression Scale Positive and Negative Affect</td>
<td>4,8</td>
</tr>
<tr>
<td>Capacity measure of looking after one’s health</td>
<td></td>
<td>d</td>
<td>Ambulatory activity monitoring</td>
<td>4,7</td>
</tr>
<tr>
<td>Capacity # # measure of balance</td>
<td>Balance</td>
<td></td>
<td>Posturography (sensory organization test, postural sway)</td>
<td>4,3</td>
</tr>
<tr>
<td>Functions of the respiratory system</td>
<td>Physical capacity</td>
<td>b</td>
<td>Inspiratory muscle strength Inspiratory muscle endurance VO2peak</td>
<td>4,0</td>
</tr>
<tr>
<td>Functions related to the digestive system: swallowing</td>
<td></td>
<td>b</td>
<td>Safety: Penetration–aspiration score Swallowing timing</td>
<td>2,8</td>
</tr>
</tbody>
</table>

Appendix 15
Overview of excluded CCTs: reasons for exclusion

<table>
<thead>
<tr>
<th>Reason for exclusion</th>
<th>Overview of excluded CCTs: reasons for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>No or insufficient data for 'critical outcomes'</td>
<td>Bergen 2002 Lee 2011</td>
</tr>
<tr>
<td>Forskin 1999b (identical to Toole 2000b)</td>
<td>Goodwin 2009a (abstract of Goodwin 2011)</td>
</tr>
<tr>
<td>Hackney 2009b (identical to other Hackney 2009b)</td>
<td>Lim 2010c (identical to Neuböser 2007c)</td>
</tr>
<tr>
<td>Müller 1999b (identical to Mohr 1999b)</td>
<td>Schilling 2009b (identical to Schilling 2010b)</td>
</tr>
<tr>
<td>Identical to another, included CCT</td>
<td>Bridgewater 1996b (identical to Bridgewater 1997b)</td>
</tr>
<tr>
<td>Earhart 2010b (identical to Duncanb 2012b)</td>
<td>Fiorani 1997c (occupational therapy)</td>
</tr>
<tr>
<td>Forskin 1999c (identical to Toole 2000c)</td>
<td>Formisano 1999c (multidisciplinary rehabilitation: OT, PT, SLT)</td>
</tr>
<tr>
<td>Hackney 2009c (identical to other Hackney 2009c)</td>
<td>Gauthier 1997c (identical to Mohr 1997c)</td>
</tr>
<tr>
<td>Müller 1999c (identical to Mohr 1999c)</td>
<td>Schilling 2009c (identical to Schilling 2010c)</td>
</tr>
<tr>
<td>Type of intervention</td>
<td>Chiviacoski 2012b (self-control within treatment, pap choices)</td>
</tr>
<tr>
<td>Fiorani 1997d (occupational therapy)</td>
<td>Formisano 1999d (multidisciplinary rehabilitation: OT, PT, SLT)</td>
</tr>
<tr>
<td>Hackney 1987d (occupational therapy)</td>
<td>Gibberd 1981d (multidisciplinary rehabilitation: OT, PT)</td>
</tr>
<tr>
<td>Gobbi 2009d (comparison exercise protocols, different contents &amp; frequency)</td>
<td>Gutz 2009d (multidisciplinary rehabilitation)</td>
</tr>
<tr>
<td>Hesse 2007d (additive effect of creatine to progressive resistance training)</td>
<td>Hurwitz 1988d (nurse-student supervised range of motion exercises)</td>
</tr>
<tr>
<td>Mokuno 2010d (PT as control intervention: 3 years, 2/wk, 2–3 hrs; N=10)</td>
<td>Pacchetti 2009d (active music improvisation using instruments and voice)</td>
</tr>
<tr>
<td>Palmer 1988d (intervention: slow stretching versus karate)</td>
<td>Pattic 1999d (multidisciplinary rehabilitation)</td>
</tr>
<tr>
<td>Reuter 2011d (multidisciplinary rehabilitation)</td>
<td>Tickle-Degnen 2009d (multidisciplinary rehabilitation)</td>
</tr>
<tr>
<td>Wade 2003d (multidisciplinary rehabilitation)</td>
<td>Wells 1999d (osteopathy)</td>
</tr>
<tr>
<td>White 2009d (multidisciplinary rehabilitation)</td>
<td>Single (day) treatment only</td>
</tr>
<tr>
<td>Fok 2012a</td>
<td>Haas 2009a</td>
</tr>
<tr>
<td>King 2009a</td>
<td>No outcomes for respiration were selected as ‘critical’</td>
</tr>
</tbody>
</table>
## Measurement tools considered for recommendation

The following pages provide psychometric properties and feasibility for use in pwp of all measurement tools that the GDG considered for recommendation in this Guideline. In alphabetical order: first the included, then the excluded tools.

### Included measurement tools

- 1. 10 Meter Walk (10MW)
- 2. Activities Balance Confidence (ABC) Scale
- 3. Berg Balance Scale (BBS)
- 4. Borg Scale 6-20
- 5. Dynamic Gait Index (DGI)
- 6. Falls Efficacy Scale International (FES-I)
- 7. Five Times Sit-to-Stand (FTSTS)
- 8. Functional Gait Assessment (FGA)
- 9. Goal Attainment Scaling (GAS) – goals evaluation form
- 10. History of falling
- 11. Mini Balance Evaluation Systems Test (Mini-BESTest)
- 12. Modified Parkinson Activity Scale (M-PAS)
- 13. New Freezing of Gait Questionnaire (NFOG-Q)
- 14. Patients Specific Index PD (PSI-PD)
- 15. Push and Release Test (P&R Test)
- 16. Rapid Turn test
- 17. Six Minute Walk Distance (6MWD)
- 18. Timed Get-up and Go (TUG)

### Excluded measurement tools

- a. 2-Minute step test
- b. Balance Evaluation Systems Test (BESTest)
- c. Freezing of Gait Questionnaire (FOGQ)
- d. Functional Reach (FR)
- e. Global Perceived Effect (GPE)
- f. LASA Physical Activity Questionnaire (LAPAQ)
- g. Lindop Scale
- h. Movement Disorder Society’s (MDS) revision of the UPDRS (MDS-UPDRS)
- i. Nine Hole Peg Test
- j. Parkinson Activity Scale (PAS)
- k. Parkinson’s Disease Questionnaire (PDQ-39)
- l. PHQ-9 test
- m. Physical Activity Scale for the Elderly (PASE)
- n. Pull Test
- o. Purdue Pegboard Test
- p. Survey of Activities and Fear of Falling in the Elderly (SAFE-F)
- q. Tinetti Performance Oriented Mobility Assessment (POMA), Gait (G) and Balance (B)
- r. Unified Parkinson’s Disease Rating Scale (UPDRS)
- s. WALK-12 Questionnaire

*Chapter 5 supports decision-taking towards careful selection of appropriate tools in each unique pwp.

Note: no single prep requires the use of all 18 tools.
### 1. 10 Meter Walk (10MW)

**Scoring**
- **Excellent**: ≥ 10.41 s
- **Good**: 13.81-10.41 s
- **Fair**: 17.72-13.81 s
- **Poor**: > 17.72 s

**Reliability**
- **Intra-rater**: ICC 0.91
- **Inter-rater**: ICC 0.90
- **Test-retest**: ICC 0.90

**Responsiveness**
- **Mean change**: 0.81 s
- **Effect size**: 1.45
- **Effect size (95% CI)**: 0.70-2.15

**Floor effect**: 0%

**Ceiling effect**: 1%

**Benefits**: Assess velocity, stop and change direction.

**Drawbacks**: Requires a person to walk at a comfortable speed without stopping; different methods of stopping; requires 2 m at end for deceleration.

**Current use**: 10-35% of the time.

### 2. Activities Balance Confidence (ABC) Scale

**Scoring**
- **Rating**: 0% (worst) to 100% (complete confidence).

**Reliability**
- **Intra-rater**: ICC 0.97
- **Inter-rater**: ICC 0.97
- **Test-retest**: ICC 0.97

**Responsiveness**
- **Mean change**: 13.3% (56 points (5%)), SDD 2.84
- **Effect size (95% CI)**: 0.53 (0.33-0.73)

**Floor effect**: 0%

**Ceiling effect**: 55%

**Benefits**: Assess velocity, stop and change direction.

**Drawbacks**: Requires a person to walk at a comfortable speed without stopping; different methods of stopping; requires 2 m at end for deceleration.

**Current use**: 10-35% of the time.

### 3. Berg Balance Scale (BBS)

**Scoring**
- **Rating**: 0% (worst) to 4 (best; 14 items).

**Reliability**
- **Intra-rater**: ICC 0.80
- **Inter-rater**: ICC 0.79
- **Test-retest**: ICC 0.79

**Responsiveness**
- **Mean change**: 5.64 points (95% CI: 3.24-7.91)
- **Effect size (95% CI)**: 0.59 (0.35-0.82)

**Floor effect**: 16%

**Ceiling effect**: 9%

**Benefits**: Assess velocity, stop and change direction.

**Drawbacks**: Requires a person to walk at a comfortable speed without stopping; different methods of stopping; requires 2 m at end for deceleration.

**Current use**: 10-35% of the time.
1. Body Scale 6-20

- **ICF Scoring**
- **Validity**
  - Good internal consistency: Cronbach's α = 0.91
- **Reliability**
  - Test-retest reliability: ICC = 0.93
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.79
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 2 points

2. Falls Efficacy Scale International (FES-I)

- **ICF Scoring**
- **Validity**
  - Good internal consistency: Cronbach's α = 0.89
- **Reliability**
  - Test-retest reliability: ICC = 0.91
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.81
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 3 points

3. Five Times Sit to Stand (FTSTS)

- **ICF Scoring**
- **Validity**
  - Good internal consistency: Cronbach's α = 0.88
- **Reliability**
  - Test-retest reliability: ICC = 0.93
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.79
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 2 points

4. Functional Gait Assessment (FGA)

- **ICF Scoring**
- **Validity**
  - Good internal consistency: Cronbach's α = 0.88
- **Reliability**
  - Test-retest reliability: ICC = 0.93
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.81
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 3 points

5. Goal Attainment Scaling (GAS) – goals evaluation form

- **ICF Scoring**
- **Validity**
  - Good internal consistency: Cronbach's α = 0.91
- **Reliability**
  - Test-retest reliability: ICC = 0.92
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.80
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 10 points

6. Fear of Falling Scale (FES)

- **ICF Scoring**
- **Validity**
  - Good internal consistency: Cronbach's α = 0.88
- **Reliability**
  - Test-retest reliability: ICC = 0.93
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.79
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 3 points

**Note:** The European Physiotherapy Guideline for Parkinson's Disease © ParkinsonNet | KNGF 2014

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**ICF Scoring**

- **Validity**
  - Good internal consistency: Cronbach's α = 0.91
- **Reliability**
  - Test-retest reliability: ICC = 0.93
- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.79
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 2 points

**Reliability**

- **Responsiveness**
  - Standardized Response Mean (SRM) = 0.79
  - Effect size: ES ≥ 0.5
  - Minimum clinically important change (MCIC): 2 points

**Responsiveness**

- **Feasibility**
  - No systematic bias: LOA = 2.9 to 13.3% change
  - No floor or ceiling effect: pwp can still be prescribed

**Benefits:**

- **Feasibility:**
  - Quick measure for balance & leg strength
  - Not widely used yet; identifies fallers less accurately than other assessment tools

**Drawbacks:**

- **Feasibility:**
  - May be time-consuming to describe a goal on 5 levels; especially unclear in pwp

**Benefits:**

- **Feasibility:**
  - Not widely used yet; not for evaluation; can be combined with DGI; includes backward walking; exercise intensity, not for prescribing and monitoring

**Drawbacks:**

- **Feasibility:**
  - No psychometric data available for pwp

**Benefits:**

- **Feasibility:**
  - No systematic bias: LOA = 2.9 to 13.3% change
  - No floor or ceiling effect: pwp can still be prescribed

**Drawbacks:**

- **Feasibility:**
  - May be time-consuming to describe a goal on 5 levels; especially unclear in pwp

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**Note:** There is strong evidence for the reliability, validity and sensitivity of the GAS in physical and neurological rehabilitation in general. It is widely used in pwp to support exercising at the desired intensity.
### 10. History of Falling

- **Activities & Participation**
  - Questionnaire: interview or self-report, post-event number of falls, number of falls at home, falls during sleep, 2 to 3 questions.
  - Face validity: based on optimal time span for recall (1 year), specificity to optimize recall of falls in the past year.
  - Good discriminative validity (AUC=0.86) (71% vs. 59% at recalled history, p<0.001).
  - Good correlation with BBS r=0.79, FGA 0.72.
  - Good concurrent validity (r=0.79) between P&R test and past year and falls in the past year.
  - Good discriminative validity (AUC=0.79) for falls in the past year.

**Reliability**
- Known in pwp. Assessment time 5-10 min; no materials or costs. Current use: 10-20%.
- Benefits: good test validity prediction future falls, designed for pwp.
- Drawbacks: retrospective, thus under-reporting.

### 11. New Fronting of Foot Questionnaire (NOFO-Q)

- **Activities & Participation**
  - Questionnaire: interview, core items included in the Pre-assessment Information Form (PIF).
  - Good content validity: (r=0.79-0.96) for freezers only.
  - Good discriminative validity (AUC=0.84) in ON and OFF, range ICC=0.41-0.91.

**Reliability**
- Poor concurrent validity with time harvest scores during on/off phases (r=0.30).
- Good discriminative validity (AUC=0.76-0.79) on number of falls per year.
  - Poor concurrent validity with the modified Parkinson Activity Scale (54% vs 79% correlation with fallers and not falling at all). (r=0.35).& (partly) self-report.

**Benefits:**
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.

**Drawbacks:**
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.

**Patient-specific needs (PS-NOFO-Q)**

- **Activities & Participation**
  - Questionnaire: interview.
  - Good content validity: r=0.79-0.96 for freezers only; Part I (items 1-6), Part II (items 2-6, score range 0-28) and Part III (items, total score range 0-28).

**Reliability**
- Good inter-rater reliability: Kappa 0.84. Good convergent validity with H&Y (r=0.30).
- Good convergent validity with the modified Parkinson Activity Scale (69% vs 79% correlation with duration and FOG; Part II (items 2-6, score range 0-28);

**Benefits:**
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.

**Drawbacks:**
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.

### 12. Modified Parkinson Activity Scale (MPAS)

- **Activities & Participation**
  - Questionnaire: interview.
  - Good content validity: r=0.79-0.96 for freezers only.
  - Good discriminative validity (AUC=0.84) in ON and OFF, range ICC=0.41-0.91.

**Reliability**
- Poor concurrent validity with time harvest scores during on/off phases (r=0.30).
- Good discriminative validity (AUC=0.76-0.79) on number of falls per year.
  - Poor concurrent validity with the modified Parkinson Activity Scale (54% vs 79% correlation with fallers and not falling at all). (r=0.35).& (partly) self-report.

**Benefits:**
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.

**Drawbacks:**
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.
- Good reliability between pwp and carers: ICC=0.76, 0.70 between pwp and telecare.
17. Six-Minute Walk Distance (6MWD)

**ICF Scoring**

- **Body Functions**: Mobility: Walking distance.
- **Body Structures**: Lower extremities.
- **Activities**: Physical activities: Walking.
- **Participation**: Walking.

**Validity**

- Excellent reliability: ICC=0.99.
- Good test–retest reliability: ICC=0.96.
- Good inter-rater reliability: ICC=0.84.

**Responsiveness**

- Good MDC95: 82 m66.

**Responsibility**

- 16. Rapid turns test

**ICF Scoring**

- **Body Functions**: Mobility: Gait, balance.
- **Body Structures**: Lower extremities.
- **Activities**: Physical activities: Gait.
- **Participation**: Gait, balance.

**Validity**

- Good concurrent validity: correlation (phygait, UPDRS, H&Y, BBS, TUG). Sensitivity to provoke freezing: 0.65; UPDRS r=0.43 and UPDRS r=0.27. 
- Adequate discriminative validity falls vs. non-fallers: AUC 0.73 (sens 0.75; spec 0.59)86; AUC 0.85; 84% (sens=0.84, spec=0.76); 84% (sens=0.84, spec=0.76).
- Good concurrent validity with Mini-Mental State Examination (MMSE) r=0.57; and good concurrent validity with NIH-3-Item Scale r=0.82.

**Responsiveness**

- Good MDC95 for other sections: ICC=0.79 and good discriminative validity: ICC=0.84135;
- Good test–retest reliability and discriminative validity in community dwelling elderly130;132).

**Responsibility**

- Unknown in pop.5

**Benefits:** Item 3 (‘Do you feel that your feet get glued to the floor while walking, making a turn or when trying to stop?’) is associated with frequency of freezing:112;134;138 and more sensitive in detecting early stage disease.

**Drawbacks:** Clinician-administered test; Gaitakinesia; walking on the wall while standing; and more difficult in detecting early stage disease.

18. Timed Get-Up and Go (TUG)

**ICF Scoring**

- **Body Functions**: Mobility: Gait, balance, walking.
- **Body Structures**: Lower extremities.
- **Activities**: Physical activities: Gait, balance.
- **Participation**: Gait, balance.

**Validity**

- Good concurrent validity: WHO (rate 0.74), UPDRS (r=0.40), TUG (r=0.40). Sensitivity to provoke freezing: 0.65; UPDRS r=0.43 and UPDRS r=0.27. 
- Adequate discriminative validity falls vs. non-fallers: AUC 0.73 (sens 0.75; spec 0.59)86; AUC 0.85, 84% (sens=0.84, spec=0.76); 84% (sens=0.84, spec=0.76).
- Good concurrent validity with Mini-Mental State Examination (MMSE) r=0.57; and good concurrent validity with NIH-3-Item Scale r=0.82.

**Responsiveness**

- Good MDC95 for other sections: ICC=0.79 and good discriminative validity: ICC=0.84135;
- Good test–retest reliability and discriminative validity in community dwelling elderly130;132).

**Responsibility**

- Unknown in pop.5

**Benefits:** Item 3 (‘Do you feel that your feet get glued to the floor while walking, making a turn or when trying to stop?’) is associated with frequency of freezing:112;134;138 and more sensitive in detecting early stage disease.

**Drawbacks:** Clinician-administered test; Gaitakinesia; walking on the wall while standing; and more difficult in detecting early stage disease.

19. Footedness Questionnaire (FOG-Q)

**ICF Scoring**

- **Body Functions**: Mobility: Gait, balance, walking.
- **Body Structures**: Lower extremities.
- **Activities**: Physical activities: Gait, balance.
- **Participation**: Gait, balance.

**Validity**

- Good concurrent validity: correlation (phygait, UPDRS, H&Y, BBS, TUG). Sensitivity to provoking freezing: 0.65; UPDRS r=0.43 and UPDRS r=0.27. 
- Adequate discriminative validity falls vs. non-fallers: AUC 0.73 (sens 0.75; spec 0.59)86; AUC 0.85, 84% (sens=0.84, spec=0.76); 84% (sens=0.84, spec=0.76).
- Good concurrent validity with Mini-Mental State Examination (MMSE) r=0.57; and good concurrent validity with NIH-3-Item Scale r=0.82.

**Responsiveness**

- Good MDC95 for other sections: ICC=0.79 and good discriminative validity: ICC=0.84135;
- Good test–retest reliability and discriminative validity in community dwelling elderly130;132).

**Responsibility**

- Unknown in pop.5

**Benefits:** Item 3 (‘Do you feel that your feet get glued to the floor while walking, making a turn or when trying to stop?’) is associated with frequency of freezing:112;134;138 and more sensitive in detecting early stage disease.

**Drawbacks:** Clinician-administered test; Gaitakinesia; walking on the wall while standing; and more difficult in detecting early stage disease.
European Physiotherapy Guideline for Parkinson’s disease

Activities & Participation: Overview of Changes of Body Position

- Measuring forward reach while standing in front of a mirror: performance. Three trials are done with the dominant hand. The last two are noted.

- Compliance with UPDRS: ADL (6.0-8.0).
- Prior to adequate description of disability, the ADL (6.0-8.0) is noted. In patients with severe PD (UPDRS > 30), the ADL is noted.

- Hindlimb gait measures: Hip joint range of motion, knee joint range of motion, ankle joint range of motion, foot clearance.

- Pre-scored test-reliability in pwp with full test history: ICC (0.82-0.95); ICC (0.87-0.95).
- In pwp, an external tester can score reliability: ICC (0.82-0.95). Moderate inter-rater reliability: ICC (0.67). Moderate intra-rater reliability: ICC (0.77).

- HINT: few patients (mean = 21 cm; MDC = 9 cm. HINT 1: SD = 10.1 cm; ICC (0.71-0.90). Moderate inter-rater reliability: ICC (0.67). Moderate intra-rater reliability: ICC (0.77).

- Assessment time 5 min; Required materials: corner, duct tape, paper, flexibility, general tools.

- Benefits: time used, easy to administer.

- Drawbacks: questionable reliability.

- Global Perceived Effect (GPE)

- ICFS: Scoring, Validity, Reliability, Responsiveness, Feasibility

- Patient-centred outcomes: Questionnaire: interview or self-report of perceived change.

- Test-reliability: Interview ICC 0.84; Self-report ICC 0.82.

- Benefits: easy to administer.

- Drawbacks: no psychometric data available for pwp; scores are strongly influenced by current status: do transition ratings truly reflect change?

- Movement Disorder Society’s (MDS) revision of the UPDRS (MDS-UPDRS)

- ICFS: Scoring, Validity, Reliability, Responsiveness, Feasibility

- Good sensitivity for early complications: Part I, r = 0.68; Part II, r = 0.74; Part III, r = 0.88; Part IV, r = 0.85. Good concurrent validity: With original UPDRS: AUC 0.6, MDC 5cm. Moderate to excellent correlation with other scores, (HADS, SCOPA-COG), r = 0.72-0.89.

- Good to excellent concurrent validity: with original UPDRS: AUC 0.6, MDC 5cm. Moderate to excellent correlation with other scores, (HADS, SCOPA-COG), r = 0.72-0.89.

- Good test-reliability: ICC (0.81-0.86).

- MDC 1.52 dominantly hand (average time to complete: 30 s). Score increases with age (-3% for each point).

- Benefits: easy to administer; can be used for evaluation. Drawbacks: gives no insight into quality of performance or lack thereof in treatment, which questions its validity for physiotherapy practice.

- UPDRS: (HADS, SCOPA-COG), r = 0.72-0.89.

- Good to excellent current status: Part I, r = 0.67; Part II, r = 0.70; Part III, r = 0.93; Part IV, r = 0.90; Part I, r = 0.76; Part II, r = 0.94; Part III, r = 0.96; Part IV (items 32–39: dyskinesias & motor complications). Total score, r = 0.96; Part I, r = 0.76; Part II, r = 0.70; Part III, r = 0.93; Part IV MDS-UPDRS), r = 0.89.

- Benefits: easy to administer; can be used for evaluation. Drawbacks: gives no insight into quality of performance or lack thereof in treatment, which questions its validity for physiotherapy practice.
**European Physiotherapy Guideline for Parkinson’s Disease**

**I. Parkinson’s Activity Scale (PAS)**

- Activities & Participation: Performance measure of physical activity
- Scoring: Interval scale, range: 0-100
- Reliability: **Excellent** (ICC=0.84–0.93)
- Responsiveness: **Excellent** (r=0.64 for UPDRS III, r=0.79 for VAS-Global Functioning)
- Feasibility: **Minimal** (assessment time: 10 min)
- Benefits: easy to administer
- Drawbacks: no psychometric data available for pwp

**II. Physical Activity Scale for the Elderly (PASE)**

- Activities & Participation: Performance measure of physical activity
- Scoring: Sum of scores” (39 items on physical activity)
- Reliability: **Excellent** (ICC=0.84–0.93)
- Responsiveness: **Excellent** (r=0.64 for UPDRS III, r=0.79 for VAS-Global Functioning)
- Feasibility: **Minimal** (assessment time: 30 min)
- Benefits: easy to administer
- Drawbacks: no psychometric data available for pwp

**III. MDS-UPDRS (Pull Test)**

- Body function: Movement functioning: Standing reaction function
- Scoring: MDS-UPDRS pull test (2007): scoring options: 0 (normal), 1 (slight), 2 (mild), 3 (moderate), 4 (severe)
- Reliability: **Excellent** (k 0.98, Nutt (k 0.93), MDS-UPDRS pull test (2007))
- Responsiveness: **Excellent** (k 0.98, Nutt (k 0.93), MDS-UPDRS pull test (2007))
- Feasibility: **Minimal** (assessment time: 1 min)

**IV. Purdue Pegboard Test**

- Activities & Participation: Performance measures of cognitive, visuomotor control, and visuomotor control
- Scoring: Excellent correlations with UPDRS (r = 0.5) and UPDRS total score (r = 0.45)
- Reliability: **Excellent** (ICC=0.84–0.93)
- Responsiveness: **Excellent** (ICC=0.84–0.93)
- Feasibility: **Minimal** (assessment time: 10-30 sec for pwp)
**Activities & Participation: Performance measures changing & maintaining body position**

6-page interview-based questionnaire. 22 items assessing changes in daily functioning and perceived consequences of falls; face and construct validity towards specific activities.

**NOTE:** There are various versions of the POMA, with variations for both the name of the test and means of scoring.

<table>
<thead>
<tr>
<th>ICF Scoring</th>
<th>Reliability</th>
<th>Responsiveness</th>
<th>Feasibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unip at 10 min.</td>
<td>Unknown in pwp</td>
<td>Unknown in pwp</td>
<td>Unknown in pwp</td>
</tr>
<tr>
<td>Benefits: modified Swedish version has good validity &amp; reliability; Drawbacks: no psychometric data for pwp.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Activities & Participation:**

**Performance measures changing & maintaining body position**

- **POMA-G:** Observation & patient report; ordinal scale of 6 items determined by patient (5 more, except for POMA-G). 15 min; required materials: armless chair, stopwatch. Current use: >35%.

- **POMA-B:** Observation; requires combined functions, on a 3-point scale (normal → 3; impaired → 1); max 10.7–10.8; total 16.4–17.8.

- **POMA-B independent predictor**

**NOTE:** Modified Swedish version has good validity and reliability, but the U.K. version has poor psychometric data for pwp.

**Benefits:**

- Provides insight asymmetry, training: $250; Current use 10-35%.

- Good validity and reliability. Modified Swedish version:

**SDD:** Part III 13 points, Total score: 15 points.

**MCID:** Part II 4 points; for Part III 7 points

**MDC for Mentation 2 points; Total 15 points**

**AUC 0.72 (sens 0.71, spec 0.79), OR 2 (safe) vs 8 (unsafe), ICC=0.84169; Good inter-rater reliability mixed group (pwp and controls) ICC=0.95171.

**Drawbacks:**

- Floor effects, possibly due to exclusion of freezing and dual tasks; Benefits: widely used in elderly; use >35%.

**Current use:**

- Assessment time: 5 min part III; 5 min part IV; Required materials: paper, chair; Costs required: 15 min part III; 5 min part IV.

**NOTE:** Modified Swedish version. Unip at 10 min part III; 5 min part IV; Required materials: paper, chair; Costs required: 15 min part III; 5 min part IV; Benefits: provides insight asymmetry, training: $250; Current use 10-35%.

**Modified Swedish version:**

- Assessment time 30 min (10 min part I; 5 min part II; 5 min part III) Required materials: paper, chair; Costs required: 15 min part I; 5 min part II; 5 min part III; Benefits: provides insight asymmetry, training: $250; Current use: unknown, difficult, costly.

**Activities & Participation: Performance measures of walking**

12-item questionnaire: limitations reported when walking: 1 item (0 = normal to 5 = total); max 10.7; max 10 (or transformed to a scale from 0 to 100), equal to the PEDIS and EQ-5D. 1 item; max point value 5 points. 15 min; Current use: unknown in pwp.

- **UPDRS Teaching Tape:** 4 items; max 22 points; Current use 10-35%.

**NOTE:** Modified Swedish version: Unip at 10 min part I; 5 min part II; 5 min part III; total score: 40 points; moderate in strong concurrent validity with measures for physical functioning and gait (FOS, Tinetti, FES) r=0.74; Good convergent validity: explains 69% of the variance in scores of a Swedish version FES II.r-0.85, Good test-retest reliability: ICC=0.90; $250.

**Satisfactory convergent validity with**

- Unified Parkinson's Disease Rating Scale (UPDRS)

<table>
<thead>
<tr>
<th>ICF Scoring</th>
<th>Reliability</th>
<th>Responsiveness</th>
<th>Feasibility</th>
</tr>
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<tbody>
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Appendix 17
Evidence-grading tables to the intervention recommendations

Appendix provides detailed information on the recommendations developed using the GRADE method, categorised per intervention:

17.1 Conventional physiotherapy
17.2 Treadmill
17.3 Whole body vibration
17.4 Massage of trigger points
17.5 Cueing
17.6 Strategies for complex motor sequences supported by cueing
17.7 Dance (tango)
17.8 Tai Chi

Recommendations for and against - strong and weak
For each intervention and outcome, recommendations can be for or against and strong or weak (Table 6.2). The classification reflects the quality of the evidence (high, moderate, low or very low, depending on the influence of study limitations on the outcome) and the outcome of the meta-analyses, weighted against the burden of the specific intervention. In case of a recommendation against an intervention for a specific outcome, benefits probably do not outweigh risks and burdens. Most commonly, effects show a positive trend, but the (wide) confidence interval of the effect includes 0. It does not mean that the specific intervention has negative effects on that outcome. Risk and burdens are often very low.

Reading information to the tables:
General explanation abbreviations:
- N, number of participants
- CI, confidence interval
- (S)MD, (standardised) mean difference

GRADE levels for strength of evidence: high, moderate, low and very low
CCTs start at the ‘high’ level. Reasons for downgrading in our selection of CCTs:

a) One level downgrading, because of small sample size, questions on randomisation procedures or (single) blinding, without influence effects expected (otherwise two levels downgrading would occur)
b) One level downgrading, because of inconsistency results or result of single CCT
### Table 1

#### Outcome Author & year

**App. 17.1 Conventional physiotherapy versus no intervention or placebo**

<table>
<thead>
<tr>
<th>Intervention targeting</th>
<th>Balance</th>
<th>Values</th>
<th>No of pwp; HY</th>
<th>Treatment duration, frequency &amp; time</th>
<th>Overall effects</th>
<th>GDG recommendation: burden/benefits</th>
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<td>Gait speed</td>
<td>Schilling 2010</td>
<td>0.06</td>
<td>N=24, HY 4</td>
<td>3-7/wk, 60&quot;</td>
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<tr>
<td>Hirsch 2003</td>
<td>0.72</td>
<td>N=31, HY 4</td>
<td>Weak against</td>
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<td>Sdn-2; high intensity phase</td>
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### Table 2

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### European Physiotherapy Guideline for Parkinson's disease
© ParkinsonNet | KNGF 2014

**Table 1.2**

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<th>Author &amp; year</th>
<th>Information details</th>
<th>Study details</th>
<th>Control details</th>
<th>No of pwp; Hoehn &amp; Yahr</th>
<th>Treatment duration, frequency &amp; time</th>
<th>Overall effects (CI to low to high)</th>
<th>GRADE: evidence summary</th>
<th>ISD strength recommendations; burden/benefits</th>
<th>Remarks effects</th>
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### App. 17.4 Massage of trigger points: neuromuscular therapy versus no neuromuscular therapy

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Author &amp; year</th>
<th>Intervention details</th>
<th>Control details</th>
<th>No of pwp; mean age*</th>
<th>Treatment duration, frequency &amp; time</th>
<th>Overall effects (CI: low to high)</th>
<th>GRADE: evidence summary</th>
<th>GDG: strength recommendation: burden/benefits</th>
<th>Remarks effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking capacity: speed</td>
<td>Craig 2006</td>
<td><strong>Trigger point massage</strong></td>
<td>Music relaxation</td>
<td>N=32, HY1.6</td>
<td>8 weeks: 2/wk, 45’</td>
<td>Data requested; no response (in text: no effect)</td>
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<tr>
<td>Movement functions: UPDRS-motor</td>
<td>Craig 2006</td>
<td><strong>Trigger point massage</strong></td>
<td>Music relaxation</td>
<td>N=32, HY1.6</td>
<td>8 weeks: 2/wk, 45’</td>
<td>Data requested; no response (in text: certain items positive effects)</td>
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<tr>
<td>Patient-based treatment effect</td>
<td>Craig 2006</td>
<td><strong>Trigger point massage</strong></td>
<td>Music relaxation</td>
<td>N=32, HY1.6</td>
<td>8 weeks: 2/wk, 45’</td>
<td>MD 0.93 (0.47;1.39) Low,a,b Weak for Single, small CCT</td>
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<tr>
<td>Quality of life</td>
<td>PDQ-39</td>
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</table>

### App. 17.3 Whole body vibration (WBV) versus no WBV

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Author &amp; year</th>
<th>Type of WBV</th>
<th>Control details</th>
<th>No of pwp; mean age*</th>
<th>Treatment duration, frequency &amp; time</th>
<th>Overall effects (CI: low to high)</th>
<th>GRADE: evidence summary</th>
<th>GDG: strength recommendation: burden/benefits</th>
<th>Remarks effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Functional expanding task: Tilt chair used</td>
<td>Arias 2009</td>
<td>WBV 6Hz</td>
<td>Stand, no vibration; Active balance exercises</td>
<td>N=42, 70yr</td>
<td>3-5 weeks: 2-10/wk, 10-15”</td>
<td>MD -0.41 (0.02;0.84)213 Low,a,b Strong against Consistent effects, CI includes 0; safety considerations</td>
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<tr>
<td>Balance</td>
<td>Arias 2009</td>
<td>WBV 6Hz</td>
<td>Stand, no vibration; Active balance exercises</td>
<td>N=42, 70yr</td>
<td>3-5 weeks: 2-10/wk, 10-15”</td>
<td>MD -0.65 (-3.98;2.68)213 Low,a,b Strong against Inconsistent effects, CI includes 0; safety considerations</td>
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</tbody>
</table>

# European Physiotherapy Guideline for Parkinson’s Disease

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<table>
<thead>
<tr>
<th>Outcome</th>
<th>Author &amp; year (included CCTs)</th>
<th>Cueing</th>
<th>Treatment details</th>
<th>No of subjects (yr, sex)</th>
<th>Treatment duration (weeks)</th>
<th>Frequency &amp; duration</th>
<th>Overall effects</th>
<th>GRADE: strength recommendation</th>
<th>burden/benefits</th>
<th>Remarks effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking capacity/ speed</td>
<td>De Bruijne (2010)**</td>
<td>A, self-paced gait, at home</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD 3.27 (0.23-6.31)</td>
<td>High</td>
<td>Strong for</td>
<td>Consistent effects; MD expected in clinical significance</td>
<td>Includes 0/10; includes 0/10</td>
</tr>
<tr>
<td></td>
<td>Almeida (2012)**</td>
<td>A, gait, 50% treadmill</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD 3.10 (0.02-6.18)</td>
<td>Moderate</td>
<td>Weak against</td>
<td>Consistent effects; no intervention</td>
<td>Includes 0/10</td>
</tr>
<tr>
<td></td>
<td>Shankar (2008)**</td>
<td>A, gait, at home</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD -0.64 (1.35-0.06)</td>
<td>Moderate</td>
<td>Weak against</td>
<td>Consistent effects; no intervention</td>
<td>Includes 0/10</td>
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<tr>
<td></td>
<td>Kajhadian (2011)**</td>
<td>A, gait, multistep</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD -0.82 (1.43-0.21)***</td>
<td>Low **</td>
<td>Weak for</td>
<td>Consistent effects; no intervention; CI just includes 0</td>
<td>Includes 0/10</td>
</tr>
<tr>
<td></td>
<td>Kajhadian (2011)**</td>
<td>A, gait, multistep</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD -1.58 (5.45;2.29)***</td>
<td>Moderate</td>
<td>Weak against</td>
<td>Single CCT; CI including 0</td>
<td>Includes 0/10</td>
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<tr>
<td></td>
<td>Hoehn &amp; Yahr (2008)**</td>
<td>A, sit-to-stand</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD 0.09 (0.02;0.20)***</td>
<td>Moderate</td>
<td>Weak against</td>
<td>Consistent effects; no intervention</td>
<td>Includes 0/10</td>
</tr>
<tr>
<td></td>
<td>Nieuwboer**</td>
<td>A, gait, at home</td>
<td>No intervention</td>
<td>No intervention</td>
<td>No intervention</td>
<td>MD -2.27 (-4.24;0.97)**</td>
<td>Moderate</td>
<td>Weak against</td>
<td>Consistent effects; MD smaller than MOC (3.7)</td>
<td>Includes 0/10</td>
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</table>

Note: **Nieuwboer used FES (MD: 3.74, best=low), Shankar used ABC (MD -3.10, best=high; ***data received upon request; **** PDQ-39; FR, may ensure safe street crossing. Moreover, as in stroke, an increase of 0.03 and 0.13 m/s could translate into a change from a limited household to an unlimited household walker and from unlimited household to a most-limited community walker respectively; Nieuwboer used FES (MD 3.74, best=low), Shankar used ABC (MD -3.10, best=high; ***, data received upon request; **** PDQ-39; FR, may ensure safe street crossing. Moreover, as in stroke, an increase of 0.03 and 0.13 m/s could translate into a change from a limited household to an unlimited household walker and from unlimited household to a most-limited community walker respectively.
### Table 1.6 Strategies for complex motor sequences supported by cueing

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Author &amp; year</th>
<th>Type of dance</th>
<th>Control details</th>
<th>No of pwp</th>
<th>Motor function</th>
<th>Treatment duration, frequency &amp; time</th>
<th>Overall effects (CI: low to high)</th>
<th>GRADE: evidence summary</th>
<th>QDQ: strength recommendation: burden/benefits</th>
<th>Remarks effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td>Hackney 2009**</td>
<td>Tango &amp; ballroom</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 1.34 (0.00;2.68)***</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
<tr>
<td>Gait path/way</td>
<td>Hackney 2009**</td>
<td>Tango &amp; ballroom</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Weak for</td>
<td>Single, low quality CCT; Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
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<tr>
<td>EMG single</td>
<td>Hackney 2007**</td>
<td>Tango</td>
<td>No intervention</td>
<td>N=67, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Weak against</td>
<td>Moderatea</td>
<td>SMD 0.22 (-0.02;0.66)</td>
<td>Small MD; consistent positive effects; CI includes 0</td>
<td>Small MD; consistent positive effects; CI includes 0</td>
<td>Remarks effects</td>
</tr>
<tr>
<td>Facial expression</td>
<td>Hackney 2007**</td>
<td>Tango</td>
<td>No intervention</td>
<td>N=67, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 0.04 (-0.06;0.14)</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
<tr>
<td>Dance</td>
<td>Hackney 2009**</td>
<td>Tango &amp; ballroom</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 0.08 (0.06;0.10) Low**</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
<tr>
<td>Tilt</td>
<td>Hackney 2009**</td>
<td>Tango</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 0.10 (0.08;0.12)***</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
<tr>
<td>TAK (cerebellar ataxia)</td>
<td>Hackney 2009**</td>
<td>Tango</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 0.07 (0.05;0.09)**</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
<tr>
<td>Ballistic</td>
<td>Hackney 2009**</td>
<td>Tango</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 0.03 (0.01;0.05)</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
<tr>
<td></td>
<td>Hackney 2009**</td>
<td>Tango</td>
<td>No intervention</td>
<td>N=48, HY1-3 10 wks: 2/wk, 60&quot;</td>
<td>Moderatea</td>
<td>Week against</td>
<td>SMD 0.01 (0.00;0.02)</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Very small to no effects; Consistent positive effects</td>
<td>Remarks effects</td>
</tr>
</tbody>
</table>

*Kamsma 52 wks, 14 sessions; **SMD as Kamsma used PAS precursor (% effectively performed activities, MD 52); ***data measured from figure.
**App. 17.8  Tai Chi versus no Tai Chi**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Author &amp; year included CCTs</th>
<th>Type of martial arts</th>
<th>Control details</th>
<th>No of pwp; Hoehn &amp; Yahr</th>
<th>Treatment duration, frequency &amp; time</th>
<th>Overall effects# (CI: low; high)</th>
<th>GRADE: evidence summary</th>
<th>GDG: strength recommendation; burden/benefits</th>
<th>Remarks effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking capacity: speed</td>
<td>Hackney 2008229, Li 2012230</td>
<td>Tai Chi Tai Chi</td>
<td>Dance Stretching (ROM)</td>
<td>N=156; HY1-4</td>
<td>10-24 wks: 1-2/wk, 60&quot;</td>
<td>MD 0.09 (0.03;0.15)</td>
<td>Low&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Inconsistent effects</td>
</tr>
<tr>
<td>Gait patterns: Stride (m)</td>
<td>Hackney 2008229, Li 2012230</td>
<td>Tai Chi Tai Chi</td>
<td>Dance Stretching (ROM)</td>
<td>N=156; HY1-4</td>
<td>10-24 wks: 1-2/wk, 60&quot;</td>
<td>MD 0.07 (0.01;0.13)</td>
<td>Low&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Inconsistent effects</td>
</tr>
<tr>
<td>Walking capacity Distance</td>
<td>Hackney 2008229</td>
<td>Tai Chi</td>
<td>Dance</td>
<td>N=26; HY1-3</td>
<td>10 wks: 2/wk, 60&quot;</td>
<td>MD 43.60 (0.71;86.49)</td>
<td>Low&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Single, low quality CCT</td>
</tr>
<tr>
<td>Capacity Functional mobility: TUG low=best</td>
<td>Hackney 2008229, Li 2012230</td>
<td>Tai Chi Tai Chi</td>
<td>Dance Stretching (ROM)</td>
<td>N=156; HY1-4</td>
<td>10-24 wks: 1-2/wk, 60&quot;</td>
<td>MD -0.93 (-1.45;-0.41)</td>
<td>High</td>
<td>Weak for</td>
<td>Small MD; consistent positive effects</td>
</tr>
<tr>
<td>Balance Capacity BBS</td>
<td>Hackney 2008229</td>
<td>Tai Chi</td>
<td>Dance</td>
<td>N=26; HY1-3</td>
<td>10 wks: 2/wk, 60&quot;</td>
<td>MD 3.80 (1.81;5.79)</td>
<td>Low&lt;sup&gt;a,b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Single, low quality CCT</td>
</tr>
<tr>
<td>Balance Capacity FR</td>
<td>Li 2012230</td>
<td>Tai Chi</td>
<td>Stretching (ROM)</td>
<td>N=130; HY1-4</td>
<td>24 wks: 1/wk, 60&quot;</td>
<td>MD 5.0 (2.56;7.44)</td>
<td>Moderate&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Small MD; 1 high quality CCT</td>
</tr>
<tr>
<td>Balance Capacity No of falls</td>
<td>Li 2012230</td>
<td>Tai Chi</td>
<td>Stretching (ROM)</td>
<td>N=130; HY1-4</td>
<td>24 wks: 1/wk, 60&quot;</td>
<td>IRR 0.33 (0.16;0.71)</td>
<td>Moderate&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Large difference (67% fewer falls) 1 high quality CCT</td>
</tr>
<tr>
<td>Muscle functions strength: torque&lt;sup&gt;**&lt;/sup&gt;</td>
<td>Li 2012230</td>
<td>Tai Chi</td>
<td>Stretching (ROM)</td>
<td>N=130; HY1-4</td>
<td>24 wks: 1/wk, 60&quot;</td>
<td>MD 13.9 (1.51;25.29)</td>
<td>Moderate&lt;sup&gt;b&lt;/sup&gt;</td>
<td>Weak for</td>
<td>Based on 1 high quality CCT</td>
</tr>
<tr>
<td>Movement functions: UPDRS-motor low=best</td>
<td>Hackney 2008229, Schmitz-H 2006231, Li 2012230</td>
<td>Tai Chi Tai Chi Qigong</td>
<td>Dance No intervention Stretching (ROM)</td>
<td>N=200; HY1-4</td>
<td>10-24 wks: 0-1/2/wk, 60&quot;</td>
<td>MD -5.13 (-6.58;-3.67)</td>
<td>High</td>
<td>Strong for</td>
<td>Consistent positive effects; MD larger than MCIC (2.7&lt;sup&gt;°&lt;/sup&gt;)</td>
</tr>
</tbody>
</table>

<sup>a</sup>searched is for all martial arts, but except for the Schmitz-Hubsch CCT, only Tai Chi is evaluated and therefore used as heading for this table; ROM, range of motion; * sd data of change scores used, as in Tomlinson Cochrane review190: meters vs centimetres; 1. Schmitz-H 2006231 provided 8 wks 1/wk, an 8 wks break (0/wk), 8 wks 1/wk; **knee extensors; IRR, Incidence-rate ratio
Reference List


European Physiotherapy Guideline for Parkinson’s disease


European Physiotherapy Guideline for Parkinson's disease


