

# Dizziness Handicap Inventory (DHI)

## Description

The Dizziness Handicap Inventory (DHI) was developed to measure the self-perceived level of handicap associated with the symptom of dizziness (Jacobson and Newman 1990). The DHI has 25 items with 3 response levels, sub-grouped into three domains: functional, emotional, and physical. A shortened version, the Dizziness Handicap Inventory short form (DHISf), reduced to 13 items with 2 response levels, has been shown to compare favourably to the original version (Tesio et al 1999).

**Instructions to the client and scoring:** The questionnaires take only 5–10 minutes to complete and score, and require no special training to administer. For the DHI, respondents choose one of three statements that most applies to them in each section. The first statement is scored 0, the second is scored 2, and the third is scored 4. The sum of the scores is the total score. Possible score ranges are 0–100; a higher score indicates worse handicap. Subscores for each of the three domains can also be calculated. Whitney et al (2004)

propose that a total score of 0–30 indicates mild, 31–60 moderate, and 61–100 severe handicap, and that scores relate well to levels of functional balance impairment.

In contrast to the DHI, the DHISf (Tesio et al 1999) is scored in the opposite direction. Respondents choose between 2 statements, the first is scored 1 and the second is scored 0, with a possible maximum score of 13, where 13 indicates no dizziness handicap and 0 maximum handicap.

**Reliability, validity and sensitivity to change:** Test-retest reliability ( $r = 0.92$  to  $0.97$ ) and internal consistency ( $\alpha = 0.72$  to  $0.89$ ) has been demonstrated to be high with both the DHI and DHISf. There is evidence to support the construct validity of the DHI and DHISf and the instrument has been able to detect statistically significant change over time in group data. The DHI also has minimal floor and ceiling effects (Enloe and Shields 1997).

## Commentary

The dizziness handicap inventory provides a useful, reliable and valid measure of self-perceived handicap associated with dizziness. It has been used predominantly in patients with peripheral and central vestibular pathology, but has also been used to evaluate subjective dizziness impairment in subjects with traumatic brain injury (Kaufman et al 2005) persistent whiplash-associated disorders (Treleaven et al 2005), and major anxiety disorders (Stabb et al 2004), and in the elderly (Whitney et al 1999). The DHI has been demonstrated to be sensitive to change with interventions (Enloe and Shields 1997, Badke et al 2005) and correlates well with selected functional measures of gait (Whitney et al 2004). Significant correlations between specific objective measures of balance and DHI scores have also been demonstrated (Kaufman et al 2005, Whitney et al 2004, Treleaven et al 2005).

The DHI may be suitable to predict postoperative dizziness in patients with acoustic neuroma (Perex et al 2001). Recently it has also been suggested that a 5-point subscale identified from existing items of the DHI may be useful in identifying patients with benign paroxysmal positional vertigo (Whitney et al 2005).

In summary, the DHI is a reliable, comprehensively validated and clinically useful tool to measure self-perceived handicap associated with the symptom of dizziness from a variety of causes. Clinicians may use the DHI or DHISf to evaluate dizziness handicap as well as to demonstrate functional outcomes in patients with dizziness following interventions. A change of at least 10% in the score would be clinically relevant.

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# Movement Assessment Battery for Children (Movement ABC)

## Description

The Movement ABC (Henderson and Sugden 1992) is the most commonly reported norm-ranked assessment used to determine the presence of Developmental Co-ordination Disorder (DCD) in school-aged children. The assessment provides quantitative and qualitative data about a child's performance of age-appropriate tasks within 3 subsections: Manual Dexterity, Ball Skills, and Static and Dynamic Balance. Performance is compared with established USA norms for children aged 4 to 12 years. The Movement ABC is a minimal task set designed to screen for motor impairment rather than provide a profile of a child's motor performance. It takes approximately 30 minutes to administer and requires no special training.

**Instructions to the client and scoring:** The test is administered according to 4 age bands, each with 8 age-appropriate physical test items. Quantitative performance of each item (e.g. time of completion) is scored from 0 (best) to 5 (worst) and qualitative aspects of performance (e.g. body posture) are recorded using standard cues. Item scores are summed producing subsection scores, which are compared to normative tables to determine whether

subsection performance is typical, suspect, or definitely impaired. Subsection scores are summed creating a total impairment score, to determine overall performance using the same scales.

**Reliability, validity and sensitivity to change:** The Movement ABC has been evaluated and found useful for identifying children with DCD in Australia (Mon-Williams et al 1994), Japan (Miyahara et al 1998), Singapore (Wright and Sugden 1996), Sweden (Kadesjo and Gillberg 1999) and The Netherlands (Smits-Engelsman et al 1998). Test-retest reliability is good (Henderson and Sugden 1992). Moderate concurrent validity has been demonstrated with the commonly-used Bruininks-Oseretsky Test of Motor Proficiency (BOMPT, Bruininks 1978) (Crawford et al 2001). However, as the Movement ABC aims to screen for motor impairment and the BOMPT aims to characterise motor performance, complete agreement is not necessarily expected (Henderson and Sugden 1992).

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## Commentary

The Movement ABC can be used by many professionals including therapists, teachers and nurses. Its testing procedures are straight forward and do not require interpretation. It provides some guidelines as to how to use the findings as a basis for intervention, which may, for example, suggest the therapist targets 'static and dynamic balance' or 'ball skills'. If a cognitive operations approach is used in isolation (i.e. targeting only the actual problem activity) then such limited information may be of use for treatment planning.

Unfortunately the Movement ABC only reveals that a child cannot perform, without indicating why this is so. This represents a limitation in view of current clinical practice, so a full neurodevelopmental assessment is still necessary in order to identify underlying deficits and prioritise the intervention plan, if using the eclectic approach to management of motor disorders common in Australia (Williams and Unwin 1997). While useful for its intended purpose of screening populations for motor impairment, the Movement ABC may under-identify children already identified with motor problems (Rodger et al 2003, Smits-Engelsman et al 1998). Further, it (i) is unable to identify children with specific

motor co-ordination difficulties such as poor handwriting (Geuze et al 2001) and poor kinaesthetic abilities (Smyth and Mason 1998) and (ii) does not provide information on motor planning, bilateral integration, or sequencing (High et al 2000). Leemrijse et al (2000) found this tool limited because the subtest scores were not sensitive to change (and should not be used to measure change), even though the total score may reflect change. Pless et al (2002) reported that children scoring  $\leq 15^{\text{th}}$  percentile on Movement ABC at 5–6 years of age were likely to change group when retested at 7–8 years. Further, the Movement ABC may be less discriminating for 4–8 year old children (Rodger et al 2003), due to issues such as the high variability of performance in these age groups. Clinicians will find it interesting that children are not required to produce sustained or consistent performances during the Movement ABC (unlike typical neurodevelopmental assessment) and thus may score well with a 'one off' satisfactory performance. Crawford et al (2001) consider that the Movement ABC does not yet represent the gold standard for measurement.

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