Determination of the minimal clinically important difference on the Australian Therapy Outcome Measures for Occupational Therapy (AusTOMs – OT)

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Abstract

Purpose: Outcome measures must be responsive to change (able to show statistically significant change) and must also produce information on the degree of change that is clinically significant, or the minimal clinically important difference (MCID). This research sought to establish the MCID for four domains of the Australian Therapy Outcome Measures for Occupational Therapy (AusTOMs – OT). Methods: Using a criterion approach, 30 international clinicians were surveyed about their perceptions of the MCID for AusTOMs – OT. Second, using a distribution-based approach, the MCID was calculated as half of the standard deviation (SD) of the AusTOMs – OT raw scores for a sample of 787 clients. Results: Just over half the clinicians surveyed indicated that a one-point change represented the MCID for AusTOMs – OT for three domains, and 0.5-point change showed MCID for the final domain. The data analysed for the distribution-based calculation indicated that the half SD ranged from 0.51 to 0.61. Conclusion: Using both criterion and distribution-based approaches, this research empirically demonstrated that a change on the four domains of the AusTOMs – OT of between 0.51 and 1 point shows MCID. Considering these findings, and for ease of clinical interpretation, it is recommended that a one-point shift be adopted as the MCID across all domains.

Keywords
Australian Therapy Outcome Measures for Occupational Therapy, clinically meaningful difference, evidence-based practice, outcomes research

History
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Implications for Rehabilitation

- The AusTOMs – OT have been previously shown to be valid and reliable outcome measures for use with all client groups across all settings including rehabilitation.
- So that rehabilitation professionals can interpret outcomes data from AusTOMs – OT, information must be available on the degree of change that is clinically significant (also referred to as the minimal clinically important difference or MCID).
- Using empirical calculations as well as clinician opinion, it is recommended that a one-point shift be used as the minimal clinically important difference for the AusTOMs – OT.

Background

The routine collection of outcome data using a standardised measure (or set of measures) is a goal set by many healthcare services. While it is relatively straightforward to document mortality and morbidity, it is the determination of the client’s functional status and how the individual feels that is both more meaningful to the health service and has long proved more difficult to capture [1]. A number of global outcome measures have gained popularity over the past two decades including EuroQol-5D (EQ-5D) [2], Medical Outcomes Study, Short Form Health Survey (SF-36) [3] and Nottingham Health Profile [4]. More recently, outcome measures such as the Australian Therapy Outcome Measures (AusTOMs) [5] have been developed. These were designed for clinicians to rate clients’ global health outcomes as they progressed through the allied health therapies. The AusTOMs were developed drawing on the Therapy Outcome Measures from the UK [6] and were organised around, and drew upon the common language of, the International Classification of Function (ICF) [7].

The Australian Therapy Outcome Measures are standardised, can be used internationally, and include sets of scales developed specifically for occupational therapists (AusTOMs – OT) [8,9], physiotherapists (AusTOMs – PT) [10,11] and speech pathologists (AusTOMs – SP) [12,13]. Although these sets were developed for specific professional groups, many professionals can score their clients from across the 12 OT, 9 PT and 6 SP scales. The AusTOMs can be used in any practice setting with...
clients of all ages and diagnoses, with improving or deteriorating conditions, and takes approximately five minutes to complete once all usual evaluations are complete. Specialist training is not required as each OT, PT and SP kit comes with a manual that provides detailed instructions. The kits also contain a set of wire-bound scales, and the OT kit also comes with an instructional DVD. Over 15 publications support the reliability, validity and responsiveness of the AusTOMs scales (see for example [14–18]), and the AusTOMs – OT scales have been translated into Swedish [19,20] and Arabic [21]. The AusTOMs draws on the concepts of the ICF [22] to organize the scoring and adopts the common language of the ICF to aid communication of AusTOMs scores among team members.

The AusTOMs – OT consists of 12 scales representing major areas listed on the ICF, such as Self Care, Domestic Life, Functional Walking and Mobility, Transfers, Community Life, Education and Work and Recreation and Play. To score a client using the AusTOMs – OT, the therapist evaluates the client and sets goals with the client as per usual practice. The therapist then selects AusTOMs – OT scale(s) to match the goals and rates the client on each scale according to four domains (Impairment, Activity/Limitation, Participation/Restriction and Distress/Well-Being). Each domain is scored on an 11-point ordinal scale, in which there are six defined scores from 0 (complete problem) to 5 (no problem); half points can be used. Technically, this produces an ordinal scale, but typically, scales of this nature are treated as producing continuous data [23], and recent papers have successfully analysed AusTOMs – OT data using parametric techniques [24,25].

Several studies have documented that the AusTOMs – OT scales are responsive to detect change over time [24–26], by demonstrating statistically significant differences between clients’ admission and discharge scores. While it is important to demonstrate the responsiveness (a component of construct validity) of any outcome measure, it is equally important to establish that the change measured is also of clinical value or significance. In other words, when reporting change over time using an outcome measure, researchers need to report both statistical significance (standardised mean differences and effect sizes) as well as whether the change actually makes a difference to the client’s level of impairment or functional abilities, that is detectable in day-to-day practice (the smallest difference that clients and clinicians experience as meaningful) [23,27]. This has led to the concept of the minimal clinically important difference (MCID). When presented in reference to client-administered outcome measures such as EQ-5D or SF-36, the MCID typically refers to the smallest difference in score that the patient perceives as beneficial [28]. For the AusTOMs – OT, which are therapist administered measures, the smallest worthwhile difference is recorded from the therapist’s viewpoint.

The distinction between a statistically significant difference and a clinically significant difference has been widely discussed, as have methods that can be used to quantify this construct [29]. Multiple client and clinician-focussed approaches can be used to establish MCID [30], and no single method has been agreed as best. Some authors propose that an appropriate means has not yet been developed [31,32]. Norman et al. [29] systematically reviewed the literature and examined 33 studies where a MCID for health-related quality of life scales had been calculated and that had included information on either a patient-perceived difference or a clinically important change. The studies examined various diseases, including chronic obstructive pulmonary disease, asthma and cancer, and used different measures of health-related quality of life. Norman et al. [29] calculated the effect size of the patient-perceived or clinically important change for each study, finding that the mean effect size for all measures was 0.495 (moderate effect size) or close to one half a standard deviation (SD). Furthermore, Norman et al. argued that since our ability as humans to make discriminations is generally for a maximum of seven categories, which equates to a SD of 0.46, the rounded value of 0.5 SD should be used as defining important patient or clinician-perceived change. The authors went on to argue that while an MCID of half a SD was ubiquitous across health-related quality of life scales, in order for this to be clinically useful, this 0.5 SD value should be converted back into the values of the original scale. This view is widely supported as it is more comprehensible for clinicians and clients [23]. Hence, for AusTOMs-OT, if the SD was calculated as 2.9 for a given domain, then the MCID would be recorded as a 1.5 (0.5 x 2.9) point shift on the 11-point scale.

To determine the MCID, several methods can be used. For example, the MCID can be determined by comparing patient ratings on a scale over time, together with their ratings of when a perceptible change occurs [33,34], or a 0.5 SD can be calculated from a data set of scores for an outcome measure [35,36] or, researchers can ask clinicians their expert opinion regarding the MCID value [30,36]. Combinations of these approaches can be used by researchers, thus triangulating, and strengthening findings [37]. This research adopted a triangulated approach to establish the MCID of the AusTOMs – OT scales. The aim of this study was to determine the MCID for the four domains of the AusTOMs – OT scales using two approaches; the first approach was based on clinicians’ opinion of the MCID (herein referred to as criterion determined MCID) and the second was based on a mathematical calculation using a large set of client data (herein referred to as distribution determined MCID).

Methods

Criterion determined MCID

Participants

We sought the opinions of clinicians who had used AusTOMs – OT to evaluate at least 10 clients. Participants could be from any discipline. Using a snowball approach, clinicians who received the survey were asked to forward it to anyone else in their network who used AusTOMs – OT.

Instruments

An anonymous, on-line survey (administered using SurveyMonkey) with 15 items was developed. Four items, one for each of the four domains, obtained participants’ opinions regarding the MCID from admission to discharge from their experiences of using AusTOMs – OT across all client groups. Participants were asked to nominate, from their experience of using AusTOMs – OT, whether a 0.5 point, 1 point, 1.5 point or other point change was the minimum point-change needed from a given domain, then the MCID would be recorded as a 1.5 (0.5 x 2.9) point shift on the 11-point scale.

Procedure

Ethical permission for the study was sought and obtained from the university ethics committee. An invitation to complete the survey, including a direct link to the survey, was e-mailed to clinicians across the authors’ professional networks in Canada, the United Kingdom, Sweden and Australia. E-mails were sent to 155 clinicians/clinical facilities, and 130 were believed to be received (25 bounce-back e-mails indicated staff were on extended leave or the mail was undeliverable).
Statistical analysis

The data were exported from SurveyMonkey directly into IBM SPSS Statistics 21. Exploratory data analysis techniques were used to report the frequencies and percentages of respondents who received a 0.5, 1 or 1.5 point change on the AusTOMs – OT scales as clinically important. Using a criterion approach, and given the absence of values set by other researchers [36], it was arbitrarily determined that 50% of the sample needed to agree on the minimum amount of change on each AusTOMs – OT domain that was clinically important for it to guide judgement of an MCID value.

Distribution determined MCID

Participants

A large data set was analysed that contained participants who were out-patients of three hospital sites in the state of New South Wales (population 7.3 million), Australia, who received occupational therapy through a Home-Based Therapy (HBT) service over a four-year period. The occupational therapy services were provided for clients who lived within the geographical boundaries of the three hospital sites, in their own home, a private rental or in publically funded housing. To be eligible for the HBT service, clients were adults with a moderate to severe physical disability or were frail and elderly, had a primary diagnosis of any condition other than a mental health condition or intellectual disability (clients with these primary diagnoses were managed by other departments) and their medical condition was stable.

Instruments

The standard referral and assessment forms used by the three hospital sites were used to collect participants’ demographic information, and details regarding their admission and discharge from the HBT service. AusTOMs – OT, as described earlier, was used routinely by clinicians to assess all clients’ global functional health outcomes on admission and discharge from the service.

Procedure

Ethical permission for the study was sought and obtained from the university and clinical Ethics Committees. After being referred to the HBT service, clients participated in a comprehensive initial assessment and client-centred goals were set. Interventions to target identified goals were undertaken and frequently included equipment prescription, home modifications, assessment for wheelchair and motorised mobility devices, client education and training (e.g. falls prevention training, pressure care management and education) and referrals to other services. Therapists rated each client on the impairment and activity limitation domains for the AusTOMs – OT scale/s most appropriate for the client’s therapy goals and also on the participation and distress/wellbeing domains (generic across all selected scales) before commencing therapy and again on the completion of therapy.

Statistical analysis

The data were entered by the clinicians directly into Microsoft Excel and then imported into IBM SPSS Statistics 21 (Armonk, NY). Initially, participant data were grouped according to primary diagnosis using the ICD-10 World Health Organisation disorder codes. Responsiveness of the AusTOMs – OT scales to detect change from admission to discharge was initially confirmed for each diagnostic group using paired t tests. This was performed for each group where a sample size of 11 was attained, for both the scale rated (from 1 to 12), and for the diagnostic groups. To estimate the minimal group sizes for 90% power, nQuery Advisor was used on the basis of paired t-tests. On the notion that an increase in the mean AusTOMs – OT scale scores of 1.0 would be clinically important, samples sizes of 11 conferred 90% power in rejecting the two-sided null hypothesis at a significance level of $p = 0.05$. Next, to determine the MCID, the distribution-based method proposed by Norman et al. [29] was adopted. The MCID for each of the four AusTOMs domains was calculated as half of total of all SDs of the raw scores for the sample at both admission and discharge. This method has been used successfully by other researchers [38,39]. For the purpose of the data analysis, it was appropriate to combine the scores from each AusTOMs – OT scale within each domain rather than analyse them separately, as it is the overall half SD score that is of interest, not the score for the individual scales.

Results

Criterion determined MCID

Data were collected from 30 clinicians, most of whom were occupational therapists (83.3%, $n = 25$), with the remaining participants working as PT (10%, $n = 3$), speech therapists (3.3%, $n = 1$) and social workers (3.3%, $n = 1$). An accurate response rate was not possible to calculate, since it is neither clear how many of the surveys reached a destination where a suitable respondent worked nor how many invitations were sent to individual OTs from one contact email at a facility. Most participants were female (90%, $n = 27$) and aged 31–40 years (50%, $n = 15$) with 26.7% ($n = 8$) aged 45–50 years. Almost half the participants lived in the United Kingdom (46.7%, $n = 14$) with a further 26.7% ($n = 8$) from Canada. Participants most commonly had between 11 and 20 years’ experience in their respective disciplines (43.3%, $n = 13$), with 30% ($n = 9$) with 10 years experience or less and 20% ($n = 6$) with 21–30 years experience. Participants reported using AusTOMs – OT frequently, with the most common responses being at least once a week (43.3%, $n = 13$), least once a day (13.3%, $n = 9$) and at least once a month (10%, $n = 3$). A further 30% ($n = 9$) respondents have varied usage and reported using AusTOMs – OT daily during audit periods only or were trialling the AusTOMs – OT. Further details about the participants’ work place and characteristics of clients seen are included in Table 1.

For the activity limitation, participation restriction and distress/wellbeing domains, at least half of the participants nominated that a one-point change represented the MCID for AusTOMs – OT. However, a similar proportion of participants selected that a half-point change and a one-point change represented the MCID for the impairment domain. Table 2 lists participants’ responses to the four items regarding the MCID for AusTOMs – OT. Two of the 30 participants (6.7%) thought that AusTOMs – OT were too global to detect small changes on any of the domains, which might none-the-less be of great value (and thus clinically significant) to the individual.

Distribution determined MCID

Over the four-year data collection period, 787 clients received occupational therapy through the HBT service. Mean client age at admission was 71.52 years (SD = 14.71, range = 18–101 years), and the majority of clients were female (61.6%, $n = 485$). The mean length of therapy (time from admission to the service to discharge) was 168.64 d (SD = 166.07, range = 1–1567 d). Most participants had a primary diagnosis from one of the following five ICD-10 World Health Organisation disorder codes: Disease of the Musculoskeletal System (ICD-10 code M), Disease of the Circulatory System (ICD-10 code I), Disease of the Nervous System (ICD-10 code G), Disease of the Respiratory System or...
Table 1. Details of participants’ workplace and characteristics of clients seen.

<table>
<thead>
<tr>
<th>Age groups of clients</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants and children</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Adolescents</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Adults of working age</td>
<td>24</td>
<td>80.0</td>
</tr>
<tr>
<td>Retired adults (60 years+)</td>
<td>28</td>
<td>93.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clients’ diagnoses</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory or cardiovascular disease</td>
<td>16</td>
<td>53.3</td>
</tr>
<tr>
<td>Spinal disorders</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>9</td>
<td>30.0</td>
</tr>
<tr>
<td>Amputations</td>
<td>5</td>
<td>16.7</td>
</tr>
<tr>
<td>Mental illness</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Acquired neurological/neurosurgery</td>
<td>27</td>
<td>90.0</td>
</tr>
<tr>
<td>Peri-urban neuropathy</td>
<td>15</td>
<td>46.7</td>
</tr>
<tr>
<td>Congenital or progressive neurological</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Burns/plastic surgery</td>
<td>2</td>
<td>6.7</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>6</td>
<td>20.0</td>
</tr>
<tr>
<td>Multifactorial</td>
<td>2</td>
<td>6.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location of clients</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-patient/acute care</td>
<td>13</td>
<td>43.3</td>
</tr>
<tr>
<td>In-patient/sub-acute care/rehabilitation</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>Community-based, service at centre</td>
<td>3</td>
<td>10.0</td>
</tr>
<tr>
<td>Community-based, service at home</td>
<td>12</td>
<td>40.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length of time worked with clients</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to seven days</td>
<td>12</td>
<td>40.0</td>
</tr>
<tr>
<td>Between 8 and 14 days</td>
<td>9</td>
<td>30.0</td>
</tr>
<tr>
<td>Over two weeks to less than one month</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>One month to less than two months</td>
<td>13</td>
<td>43.3</td>
</tr>
<tr>
<td>Two months to less than three months</td>
<td>8</td>
<td>26.7</td>
</tr>
<tr>
<td>Three months to less than six months</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
<td>Six months to less than 12 months</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td>12 months or longer</td>
<td>4</td>
<td>13.3</td>
</tr>
</tbody>
</table>

Participants were able to select as many items as appropriate to describe their clients as necessary for each characteristic, so percentages do not equal 100%.

Table 2. Participants’ responses on the minimum amount of change that is clinically significant (MCID) on AusTOMs – OT (n = 30 clinicians).

<table>
<thead>
<tr>
<th>Domain</th>
<th>0.5-point change</th>
<th>1-point change</th>
<th>1.5-point change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Impairment</td>
<td>11 (36.7)</td>
<td>13 (43.3)</td>
<td>4 (13.3)</td>
</tr>
<tr>
<td>Activity/limitation</td>
<td>10 (33.3)</td>
<td>16 (53.3)</td>
<td>2 (6.7)</td>
</tr>
<tr>
<td>Participation/restriction</td>
<td>11 (36.7)</td>
<td>15 (50.0)</td>
<td>2 (6.7)</td>
</tr>
<tr>
<td>Distress/well-being</td>
<td>10 (33.3)</td>
<td>16 (53.3)</td>
<td>2 (6.7)</td>
</tr>
</tbody>
</table>

Injury, Poisoning and Certain Other Consequences of External Causes (ICD-10 code S). Each of the 787 clients was scored on more than one AusTOMs – OT scale, and the scores for the Impairment and Activity/Limitation domains for each scale are scored separately. Hence, there is a minimum of 1574 (787 clients × 2 domains) scores generated for these domains. However, the Participation Restriction and Distress/Well-Being domains can be scored only once at admission, and once at discharge, regardless of the number of scales scored (since these are generic constructs and not related to a particular scale). Hence, the maximum possible number of scores (with all data sets complete) would be 1574.

To confirm the responsiveness of the AusTOMs – OT scales to detect change over time, paired Student’s t-tests were initially conducted for the AusTOMs – OT scales for each diagnostic group where there were adequate sample sizes, and the findings are listed in Tables 3–6. Adequate data (n = 11) were available for four diagnostic groups of clients (ICD-10 codes G, I, M and S), and for three of the 12 AusTOMs – OT scales; Scale 2, Functional Walking and Mobility; Scale 5, Transfers; and Scale 7, Self Care. Responsiveness of AusTOMs – OT scales 2, 5 and 7 was confirmed for the majority of diagnostic groups of clients for most domains, although not for all (four diagnostic groups × 3 AusTOMs – OT scales × 4 domains = 48). There were nine instances where responsiveness was not confirmed, and in six cases, this related to the Impairment domain, and in three cases, this related to the Participation/Restriction domain. Finally, means, SDs and half SDs were calculated for admission as well as discharge scores on each of the four AusTOMs – OT domains, as displayed in Table 7. For all domains, the half SD was slightly greater than 0.5 and ranged from 0.51 to 0.61.

Discussion

To establish criterion determined MCID, the researchers resolved that 50% of clinicians surveyed needed to agree on the point shift required to indicate a clinically meaningful change in client status on AusTOMs – OT. Although the response rate was not high, clinicians responded from four countries where AusTOMs is commonly used to measure client outcomes following participation in occupational therapy. Unlike the findings of Howard et al. [36], most of the group was able to agree on the MCID, and the results from most clinicians indicated that, from their experience of using AusTOMs – OT, a change in score of one point from admission to discharge represented a MCID. However, the 50% threshold set was not achieved for the impairment domain, where clinicians also thought that a 0.5 shift was clinically meaningful. This finding is not surprising as the therapy offered by occupational therapists is targeted at the Activity/Limitation, Participation/Restriction and Distress/Well-being domains, and clinicians do not generally expect their interventions to ameliorate clients’ impairment. Since the Impairment domain is not expected to change, it is likely that clinicians view even small changes (0.5 point shift) as clinically detectable and meaningful. The idea that occupational therapy interventions do not generally target impairments, and thus outcomes are not generally captured for this domain, was also borne out in the responsiveness calculations (presented in Tables 3-6) using the data set from out-patients in an at-home therapy program. For the 12 possible occasions (four diagnostic groups × 3 scales) where change could be viewed as statistically significantly different for the Impairment domain, this was only achieved for six. Finally, the results from the MCID analysis of this data set indicated that the distribution-based clinically important difference was just over half a point, ranging from 0.51 to 0.61. Both these results suggest that a clinically important change on AusTOMs – OT is somewhere between 0.5 and 1 point on the 11-point scale.

In summary, the research team argues that a one-point change on AusTOMs – OT should be used as the MCID based on the following rationale. Using criterion-determined MCID ratings from a sample of clinicians, a one-point shift was selected by most clinicians for most domains. Using distribution-determined MCID, the 0.5 SD for AusTOMs – OT ranged from 0.51 to 0.61, or just over 0.5 point on the 11 level AusTOMs – OT scale. As guided by Norman et al. [29] and Howard et al. [36], it is important that the ubiquitous 0.5 SD value as the MCID should be converted back into a value related to the original scale so that it can be easily used. Hence, our research team recommends that for ease of use, a one-point shift be used as the MCID the four domains for the AusTOMs-OT scales.

Limitations of this research include data collection within one health service for the distribution-determined MCID and the
### Table 3. Responsiveness of the AusTOMs – OT scales to detect change over time. Clients with diseases of the nervous system (ICD-10 code G).

<table>
<thead>
<tr>
<th>Scale 2 – Functional Walking and Mobility</th>
<th>Domain</th>
<th>n</th>
<th>Mean admission score (SD)</th>
<th>Mean discharge score (SD)</th>
<th>t</th>
<th>p Value</th>
<th>LL</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>47</td>
<td>2.372 (1.101)</td>
<td>2.479 (1.147)</td>
<td>-1.700</td>
<td>0.096</td>
<td>-0.232</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>Activity/Limitation</td>
<td>44</td>
<td>2.716 (1.291)</td>
<td>3.534 (1.331)</td>
<td>-5.521</td>
<td>&lt;0.001*</td>
<td>-1.117</td>
<td>-0.519</td>
<td></td>
</tr>
<tr>
<td>Participation/Restriction</td>
<td>46</td>
<td>2.880 (1.313)</td>
<td>3.478 (1.265)</td>
<td>-4.311</td>
<td>&lt;0.001*</td>
<td>-0.877</td>
<td>-0.319</td>
<td></td>
</tr>
<tr>
<td>Distress/Well-being</td>
<td>46</td>
<td>3.141 (1.324)</td>
<td>3.815 (1.176)</td>
<td>-3.815</td>
<td>&lt;0.001*</td>
<td>-1.030</td>
<td>-0.318</td>
<td></td>
</tr>
</tbody>
</table>

### Table 4. Responsiveness of the AusTOMs – OT scales to detect change over time. Clients with diseases of the circulatory system (ICD-10 code I).

<table>
<thead>
<tr>
<th>Scale 2 – Functional Walking and Mobility</th>
<th>Domain</th>
<th>n</th>
<th>Mean admission score (SD)</th>
<th>Mean discharge score (SD)</th>
<th>t</th>
<th>p Value</th>
<th>LL</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>30</td>
<td>2.917 (1.160)</td>
<td>2.817 (1.329)</td>
<td>0.682</td>
<td>0.501</td>
<td>-0.200</td>
<td>0.400</td>
<td></td>
</tr>
<tr>
<td>Activity/Limitation</td>
<td>30</td>
<td>2.900 (1.248)</td>
<td>3.633 (1.438)</td>
<td>-5.707</td>
<td>&lt;0.001*</td>
<td>-0.996</td>
<td>-0.471</td>
<td></td>
</tr>
<tr>
<td>Participation/Restriction</td>
<td>30</td>
<td>3.233 (1.128)</td>
<td>3.400 (1.185)</td>
<td>-1.775</td>
<td>0.086</td>
<td>-0.359</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>Distress/Well-Being</td>
<td>29</td>
<td>3.810 (1.105)</td>
<td>4.172 (1.879)</td>
<td>-2.402</td>
<td>-0.023*</td>
<td>-0.671</td>
<td>-0.053</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Responsiveness of the AusTOMs – OT scales to detect change over time. Clients with diseases of the musculoskeletal system (ICD-10 code M).

<table>
<thead>
<tr>
<th>Scale 2 – Functional Walking and Mobility</th>
<th>Domain</th>
<th>n</th>
<th>Mean admission score (SD)</th>
<th>Mean discharge score (SD)</th>
<th>t</th>
<th>p Value</th>
<th>LL</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>63</td>
<td>3.333 (0.857)</td>
<td>3.587 (0.816)</td>
<td>-3.351</td>
<td>&lt;0.001*</td>
<td>-0.406</td>
<td>-0.103</td>
<td></td>
</tr>
<tr>
<td>Activity/Limitation</td>
<td>64</td>
<td>3.453 (0.853)</td>
<td>4.156 (0.904)</td>
<td>-7.673</td>
<td>&lt;0.001*</td>
<td>-0.886</td>
<td>-0.520</td>
<td></td>
</tr>
<tr>
<td>Participation/Restriction</td>
<td>59</td>
<td>3.788 (0.952)</td>
<td>4.153 (0.944)</td>
<td>-4.606</td>
<td>&lt;0.001*</td>
<td>-0.523</td>
<td>-0.206</td>
<td></td>
</tr>
<tr>
<td>Distress/Well-Being</td>
<td>58</td>
<td>3.698 (1.021)</td>
<td>4.284 (0.828)</td>
<td>-5.692</td>
<td>&lt;0.001*</td>
<td>-0.792</td>
<td>-0.380</td>
<td></td>
</tr>
</tbody>
</table>

n = number of clients; SD = standard deviation; t = t-test; CI = confidence interval; LL = lower limit; and UL = upper limit.
*Denotes statistically significant findings at α < 0.05.
relatively small sample of clinicians who provided the criterion-
determined MIDC data. Future research should confirm these
results with larger samples of clinicians and also using data sets
from multiple countries. The MIDC has been confirmed for the
domain of four commonly used AusTOMs – OT scales (Scale 2, Functional Walking and Mobility; Scale 5, Transfers; and Scale 7, Self care) and are assumed to hold true for the
remaining nine scales. However, this needs to be empirically
demonstrated in future research. When confirming clinician
determined MIDC, a Delphi procedure could be used to achieve
consensus on the MIDC, as proposed by Wells et al. [30]. Although AusTOMs – OT is not a client administered outcome
measure, future research might also consider obtaining client
views on what level of change, as measured by AusTOMs – OT, is
clinically important to them. Consistent with research in this
field using client measures of clinically important change [33,34], it
would be possible for clinicians to construct a client version of the
AusTOMs – OT using a visual analogue scale similar to the
thermometer used in the EQ-5D [2] to capture client impressions
of change. Clients could also provide a global rating of change to
provide a basis for analysis of MIDC as used by Jaeschke et al.
[33,34].

Conclusion
This research adopted a triangulated method to collect data to
determine the MIDC for the four domains of the AusTOMs – OT.
Using a criterion approach with clinicians providing their views on
a clinically meaningful difference in AusTOMs – OT scores showed
that between a 0.5 and 1 point shift is clinically significant for the
impairment domain, and a one-point shift on AusTOMs – OT is clinically significant for the
Activity/Limitation, Participation/Restriction and Distress/Well-
Being domains. Calculating the MIDC following the approach
advocated by Norman et al. [29] using a large AusTOMs – OT
data set collected over four years, indicated that the recommended
0.5 SD for each domain ranged from 0.51 to 0.61. Considering
both these findings, and the arguments presented by Norman
et al., concerning converting the 0.5 SD calculation back to
points related to the scale under investigation, it is suggested that
a one-point shift on AusTOMs – OT scales represents the MIDC
for this outcome measure.

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Declaration of interest
The authors of this manuscript declare not to have any conflict of
interest regarding this manuscript. None of the authors have any
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this manuscript.

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