Title: Clinical acceptability of the sense_assess© *kids*: children and youth perspectives

Running title: The sense_assess© *kids*

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Acknowledgements

We would like to thank all the participants and their families who gave up their time so generously. We would also like to thank Curtin University and Princess Margaret Hospital for Children for their ongoing logistical support and provision of resources throughout this study. This research was completed with financial support from an Australian Postgraduate Award, Curtin Research Scholarship and Princess Margaret Hospital Foundation PhD Top-Up Scholarship. Support from NHMRC project grant (#1022694 to LMC) and the James S. McDonnell Foundation Collaborative Award (# 220020413 to LMC) are acknowledged.

Conflict of interest declaration

The authors have no conflict of interest to declare.

Word count for main text: 4,770

Word count for abstract: 164

Figures and tables: 0

This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/1440-1630.12429

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Article type : Feature Article

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Clinical acceptability of the sense_assess© kids: children and youth perspectives

Abstract

Introduction: The sense_assess© kids is a standardised, norm-referenced assessment designed to measure the functional somatosensation capacity of the upper limb of children with cerebral palsy. The objective of the current study was to determine if the sense_assess© kids was clinically acceptable to children and youth.

Methods: A questionnaire was completed by participants following administration of the sense_assess© kids by a trained occupational therapist. Twenty-six children with spastic hemiplegic cerebral palsy (aged 6y –15y 6m; mean 10y 8m; 16 boys) were recruited. Participants responded to questions regarding the administration and level of difficulty of the sense_assess© kids using a Q-Sort of 'like' and 'dislike', Likert scales and short answers. Content analysis was applied.

Results: Twenty-one of twenty-six children, indicated they were 'very happy' or 'happy' with the administration process of the sense_assess© kids. Most participants indicated that they liked the sensation they felt in the hand when tested.

Conclusion: This study has demonstrated the acceptability of sense_assess© kids for the population for whom it is intended.

Keywords: Sensation, Upper limb function, Adolescence, Cerebral palsy, Child development

Introduction

Somatosensory function is the ability to detect, recognise and discriminate body (somato) sensations (Carey, 2012). The somatosensory system allows us to interpret sensory messages received from our body and consists of sensory receptors located in the skin, tissues, and joints; the nerve cell tracts in the body and spinal cord; and brain centres that process and modulate incoming sensory information (Puce & Carey, 2010). It contributes to our capacity to continually detect changes in the external and internal environment (Marieb, 2007). The somatosensory system receives information relating to limb movement and limb position (kinaesthesia and proprioception), touch (tactile registration and tactile discrimination), and perception of temperature, pain and itch (Barker, 2008; Wingert, Burton, Sinclair, Brunstrom, & Damiano, 2008). Somatosensory inputs are also involved in more complex central nervous system processes such as haptic object recognition (Carey, 2012). Somatosensory capacity greatly influences the achievement of functional hand skills for children and youth (Auld, Boyd, Moseley, & Johnston, 2011; Dunn et al., 2015). Somatosensation enables skilful manipulation, precision grip, anticipatory control and effective fine movement of the hand (Cooper, Majnemer, Rosenblatt, & Birnbaum, 1995; Majnemer, Bourbonnais, & Frak, 2008; Lundy-Ekman, 2002). Haptic object recognition involves in-hand manipulation and tactile and proprioceptive feedback to identify sensory attributes such as texture, size, weight or the shape of objects (Overvliet, Smeets & Brenner, 2008). Recognition of objects using tactile and proprioceptive feedback is particularly important when the hands are occluded from vision (Carey, 2012; American Occupational Therapy Association, 2002).

Recent studies document the maturation of somatosensory function across early childhood to adolescence (Dunn et al., 2015; Gori, Giuliana, Sandini, & Burr, 2012; Mallau, Vaugoyeau, & Assaiante, 2010). If the pathways for receiving afferent somatosensory feedback are damaged, maturation of the somatosensory system and subsequent upper limb function may not develop as expected (Sakzewski, Ziviani, & Boyd, 2010; van Haastert et al., 2011). The neural pathways subserving somatosensory function pass through areas of the brain that are commonly injured in the developing brain in children with cerebral palsy (CP) (Hoon Jr et al., 2009). CP is the most common childhood physical disability (Rosenbaum, 2003). Data from the Western Australian, Victorian and South Australian population registers identified that CP affects 2.1 individuals per 1,000 live births and almost 40,000 Australians

are living with this condition (ACPR Group, 2013; Access Economics, 2007). The revised definition of CP published in 2007 clarified that the movement disorder was frequently accompanied by a number of other disorders such as, disturbances in sensation, communication, cognition, perception, and/or behaviour, and/or by an accompanying seizure disorder (Rosenbaum, Paneth, Leviton, Goldstein, & Bax, 2007). Somatosensory deficits can impact self-care, such as eating and dressing, and leisure activities like team sports, resulting in restrictions in activity and participation for children with CP (Koldoff & Holtzclaw, 2015). In current literature, somatosensory deficits are reported in 31% and up to 97% of children with CP (Auld et al., 2011; Majinemer, Bourbonnais & Frak, 2008; McLean, Taylor, Valentine, Carey, & Elliott, 2017; Sakzewski et al., 2010). The wide range of prevalence reported may be impacted by use of a variety of different assessment tools, psychometric properties of measures used, sensitivity of scale of the measures, and the domain of somatosensation under examination; consistent with similar findings in other neurological conditions, such as stroke (Carey & Matyas, 2011). The most commonly reported areas of somatosensation affected are tactile discrimination, object recognition, and proprioception (Auld, Boyd, Moseley, Ware, & Johnston, 2012). Traditionally, assessments for children with CP have focussed on motor function and the evaluation of somatosensory capacity is underdeveloped (Auld, Boyd, Moseley, & Johnston, 2011). Due to the impact of sensation on function and the number of children with CP with somatosensory disturbances, a comprehensive somatosensory assessment to plan and evaluate therapeutic interventions is required (Rosenbaum et al., 1990; Sakzewski, Boyd & Ziviani, 2007).

Despite the recognised need to measure somatosensory functioning, there is little use of standardised outcome measures in clinical practice (Auld et al., 2011; Pumpa, Cahill & Carey, 2015; Taylor et al., 2016a; Walmsley et al., 2017). Clinical pressures, including time constraints, expanding caseloads, lack of assessment accreditation, and limited perceived utility may negatively influence the use of outcome measures by occupational therapists (Bowman & Llewellyn, 2002). Assessment of somatosensory capacity in children with CP requires evaluative measures with specific structural characteristics that are clinically useful (Rosenbaum et al., 1990). A recent clinimetric review (Auld, Ware, Boyd, Moseley, & Johnston, 2012b) recommended the use of the full 20-item Semmes Weinstein Monofilament kit (Weinstein, 1993) to evaluate tactile registration and the Disk-Criminator (MacKinnon & Dellon, 1985) to evaluate domains of spatial perception in children with CP. Measures of

double simultaneous testing (Burns, Ensby & Norrie, 1989) and stereognosis (Klingels et al., 2010) provide good discrimination among children with CP, but may lack responsiveness to change over time (Auld et al., 2012b). There is limited evidence of clinical utility of somatosensory assessments for paediatric use. Clinical utility is particularly important when assessing vulnerable populations such as children with CP so not to burden them with lengthy or complicated assessment procedures (Australian Government, 2007). However, clinical utility is a multifaceted construct incorporating clinical acceptability to both patients and therapists as well as pragmatic consideration of ease of use and interpretation and the financial and temporal demands entailed (Smart, 2006).

Clinical acceptability is a fundamental aspect that is missing from several frameworks of clinical utility (Bourke-Taylor, 2003; Law, 1987; Rosenbaum et al., 1990). Clinical acceptability supports investigation of the barriers and facilitators perceived by therapists and clients when introducing novel outcome measures to clinical practice. A comprehensive framework of clinical utility is proposed that includes clinical acceptability as a fundamental construct. The framework is based on existing literature and includes examination of (1) clarity of instructions and validated purpose; (2) clarity about constructs to be measured and the intended population; (3) administration format; (4) time to complete administration, scoring and interpretation; (5) equipment cost and therapist accreditation and (6) clinical acceptability to clients (Bourke-Taylor, 2003; Law, 1987; Rosenbaum et al., 1990; Smart, 2006). Clinical utility is not classified as a psychometric property of an assessment tool therefore it stands outside of current taxonomies of measurement properties such as the Consensus-based Standards for the selection of health Measurement INstruments (COSMIN) (Mokkink et al., 2010). Evaluation of clinical utility occurs after the clinical feasibility of an intervention or validity of an assessment has been established. The proposed framework can be used to review validated assessment tools within the clinical setting to determine the tool's suitability for the specific environment.

Occupational therapists desire appropriate pediatric outcome measures that are easy to use with administration procedures acceptable to their clinical population (Law, Hurley, Hurley, King, & Hanna, 2003). If paediatric evaluative measures are not acceptable to children or youth they have limited utility in clinical practice. In the current paper we report

on one aspect of the clinical utility of the sense_assess© kids (Carey et al., 2017; Taylor et al., 2016b) namely, the clinical acceptability, using self-report from children and youth with CP.

Adopting a structured approach to tool development has several advantages when assessment tools are in an early phase of development (i.e. testing feasibility) (Robey & Schultz, 1998). Advancing novel assessment tools from one phase of development to the next provides clear understanding of (a) the level of existing psychometric evidence, and (b) the psychometric testing required for moving forward in the process (Robey & Schultz, 1998). A phased clinical-outcome research model can be adapted, from the more familiar interventional model, and applied to outcome measure development (Whyte, Gordon, & Gonzalez Rothi, 2009). The model includes Phase 1: Research hypotheses formulation and initial tool selection or development; Phase 2: Early efficacy (formulating and standardising assessment protocols and testing in optimal environments); Phase 3: Late efficacy (hypotheses related to psychometrics and assessment usefulness are tested with appropriate sample sizes and clinical populations in sub-optimal environments); Phase 4: Effectiveness (new assessments are introduced into routine clinical practice) and Phase 5: Post-marketing effectiveness (clinical utility is evaluated including cost, positive changes to clinical care pathways and consumer acceptability). This research was undertaken as Phase 3 Late efficacy; testing the clinical acceptability of a newly adapted assessment tool. Evaluating clinical acceptability appears in this mid phase of hypothesis testing so feedback and modifications can be integrated prior to post-marketing effectiveness and comprehensive evaluation of clinical utility in Phase 5. Research relating to Phase 1 and Phase 2 for the sense_assess© kids are available from the authors. The objective was to determine if the sense_assess© kids (Carey et al., 2017; Taylor et al., 2016b) was acceptable for use with children and youth with CP aged 6-15 years. We predicted that participants would respond neutrally or positively to all aspects of the assessment procedure.

The sense_assess© kids: Test description and association with somatosensory domains

The sense_assess© kids (Carey et al., 2017; Taylor et al., 2016b) is a standardised, norm-referenced assessment designed to measure the functional somatosensory capacity of the

upper limb of children with CP. The sense_assess© kids test battery is comprised of four somatosensory tests that have been separately validated in children and adults, primarily by the authors and their colleagues (figure 1). The battery includes a measure of tactile registration (Protective Touch Test; Carey et al., 2017; Touch-Test® Sensory Evaluator, 2002) tactile discrimination (Tactile Discrimination Test; Carey, Oke & Matyas, 1997), wrist position sense (Wrist Position Sense Test; Carey, Oke, & Matyas, 1996) and haptic object recognition (functional Tactile Object Recognition Test (Carey, Nankervis, LeBlanc & Harvey, 2006). Test, ref).

[Insert Figure 1. The sense_assess© kids test battery here]

Protective Touch Test (PTT) (Carey et al., 2017; Touch-Test® Sensory Evaluator, 2002). Tactile registration is the basic initial processing of stimuli and/or sensing of surfaces (Auld, Boyd, Moseley & Johnston, 2011). The first sense_assess© kids subtest measures tactile registration, close to the threshold of protective touch, across regions of the dorsal and palmar aspects of the hands and uses the 4.56 monofilament of the Touch-Test Sensory Evaluator kit (Carey et al., 2017; Touch-Test® Sensory Evaluator). The PTT has high interobserver agreement of 99%-100% with typically developing children and youth aged 6-15 years (Taylor et al., 2016b).

Tactile Discrimination Test (TDT) (Carey et al., 1997). Tactile discrimination is the ability to distinguish between different surface textures using information received through the sense of touch (Carey, Matyas & Oke, 2002; Dunn et al., 2013). The TDT (Carey, Oke & Matyas, 1997) measures the ability of the index finger to discriminate differences in finely graded textured surfaces using a three-alternative forced choice design. The TDT has high retest reliability and normative standards for adults and normative standards for children aged 6-15 years (Carey et al., 1997; Taylor et al., 2016b).

Wrist Position Sense Test (WPST) (Carey et al., 1996). Wrist position sense is a component of proprioception that aids in detection of the position of the upper limbs in space (Bremner et al., 2013). The WPST (Carey et al., 1996) is a measure of proprioceptively-guided limb position sense and quantifies the ability to identify wrist angle in the flexion-extension range following therapist imposed movements at the wrist. The box-like apparatus uses a protractor scale to measure degrees of error (difference between actual test position and participant response). The test form contains 20 predetermined test angles, between 25° and 152°, presented in pseudo random order. The WPST has normative standards for adults

(~40-85 years) and children (6-15 years) and has high retest reliability for both populations (Carey et al., 1996; 2002; Taylor et al., 2016b). The test has good discriminative validity and has demonstrated construct validity and responsiveness for children with CP aged 6-15 years (Taylor et al., 2017a).

functional Tactile Object Recognition Test (fTORT) (Carey et al., 2006). Haptic object recognition is a higher order cognitive process and involves a complex integration of touch, proprioception and fine motor skills. Haptic object recognition is the ability to use touch to identify the nature of the material (e.g. texture or temperature) or geometric properties of objects (Lederman & Klatzky, 1987; 2009). The fTORT (Carey et al., 2006) is designed to test haptic recognition of objects with vision occluded. Sets of common everyday objects are displayed on a poster and identical test objects are presented for manipulation in a standardised manner. The fTORT has age-adjusted normative standards, high reliability (r = .85 to .92) and good discriminative test properties for adults aged 21 - 79 years (Carey et al., 2011; Nankervis, 2004). The test has also demonstrated construct validity for children with CP aged 6-15 years (Taylor et al., 2017b) and has normative standards for children aged 6-15 years (Taylor et al., 2016b). Practice trials are conducted prior to each subtest to ensure comprehension of instructions.

The sense_assess© kids satisfies the following components of clinical utility; (1) an administration manual that includes (i) a clear purpose and overview, (ii) standardised administration instructions and standardised script; (iii) descriptions of somatosensory constructs to be measured based on current literature, (iv) descriptions of the diagnostic groups for whom it is designed, (v) references to the empirical evidence of construct validity and intra-rater reliability, and (vi) description of the format of administration (requires active participation of children verbally and physically); (2) for accredited and experienced assessors time to complete administration is approximately 45 minutes and an additional 20 minutes for scoring, interpretation is simple based on pre-defined criteria from a normative sample; (3) current cost of the core sense_assess© kids assessment kit is approximately $3,000AUD, assessor accreditation and training is a two day course currently costing $450AUD.

Methods

The study design was cross sectional. A questionnaire, with open ended questions, was provided to participants following exposure to the sense_assess© kids to identify children and youth's perspectives of the measurement tool and experience. Descriptive and thematic analysis of responses from a questionnaire is a useful means of exploring individual perspectives when not much is known about the possible outcomes in advance (Greco, Lambert, & Park, 2016). As part of a larger study examining the psychometric properties of the sense_assess© kids and feasibility of a novel intervention, sense© training (McLean et al., 2017; Taylor et al., 2017a; 2017b), participants were administered a brief questionnaire immediately following completion of the sense_assess© kids. While the larger study obtained data using various outcome measures to validate the sense_assess© kids, the questionnaire was used for descriptive purposes and was not used as an outcome measure for the larger study.

Recruitment occurred via the larger study and the eligibility criteria were the same; Australian children with a paediatrician-confirmed description of spastic hemiplegic CP, aged 6-15 years. Exclusion criteria were also the same as the larger study and included surgery of the affected upper limb in the previous 12 months or inability to understand or respond to simple instructions such as, *'In this activity you will be asked to tell me the everyday objects I* put in your hand to feel, without looking. T*his curtain will be pulled across'*. All participants eligible for the larger study were invited to complete the questionnaire. The study protocol was approved by the Human Research Ethics Committee of Princess Margaret Hospital for Children (2052) and Curtin University (HR 87/2014), Perth, Australia and all procedures were in accordance with the revised (2000) Helsinki Declaration. All participants were informed of the study's risks and benefits, that their participation was voluntary, and that their identity would remain confidential. Signed informed consent and/or assent were obtained for all participants.

Data collection instrument

The six-item questionnaire was designed to be a client-centred interview and contained two semantic differential scales, a photographic Q-Sort, and three questions requiring short answers (Figure 1). The main outcome variables were emotional responses to the administration process (e.g., scale of happy to sad), perceived level of difficulty when completing assessment items and overall opinion of the assessment procedure and equipment.

Item selection was based on relevance to acceptability and current literature regarding qualitative measurement and self-reporting for children (Berdeaux, Hervié, Smajda, & Marquis, 1998; Portney & Watkins, 2009).

[Insert Figure 2. Data collection instrument here]

Rationale and details of the questionnaire follow. Question 1 and 6. A Semantic differential scale is based on a continuum that extends between two extreme opposites (Portney and Watkins, 2009). Question 1 aimed to measure the participants' feelings about the administration procedure and question 6 was used to assess participants' perception of difficulty. Similar self-report scales have been used with children to assess perceptions of pain (Garra et al., 2010).

Question 2. Q-sort methodologies have been used as an effective and interactive way to characterise the attitudes, opinions or judgements of individuals with CP aged 5-12 years (Calley et al., 2012). For question 2 participants in the current study were asked to sort a photograph of each sense_assess© kids subtests into a pile of 'like' or 'dislike'. The occupational therapist specified that the photographs needed to go in one of the two piles so that the participant was forced to make a choice (Portney and Watkins, 2009).

Questions 3 to 5. Open-ended questions requiring short answers are useful when the researcher is not sure of all possible responses to a question (Portney and Watkins, 2009). Questions 3, 4 and 5 aimed to record responses in the participants' own words about what aspects they liked and didn't like about each assessment subtest.

As the questionnaire was designed for the current study, little is known about its reliability and validity or its use for children with CP, but it is the only tool specific to assessing children's responses to assessment procedures to the authors' knowledge. However, face validity of the questionnaire was considered acceptable by three senior occupational therapists at a tertiary care hospital and the format of the questionnaire allowed children to be active participants. Each age group was able to respond without assistance from parents.

Data collection procedures

Questionnaires were administered by an occupational therapist (first author) immediately after administration of the sense_assess© kids. All participants sat and responded to the

questionnaire, however not all questionnaire items were completed by all participants. Administrator error, children's motivation to complete the questionnaire and difficulties keeping young children on task impacted data collection. Field notes from the research investigator often noted poor concentration and data were missing more frequently for the youngest children (six to seven years).

To address potential observation bias the questionnaire was designed with standardised instructions thus limiting the effect of personal interview technique. Interviewer bias was controlled for by utilising participant self-report in the questionnaire design. The occupational therapist recorded responses immediately and in the participant's own words. To control for recall bias the questionnaire was administered immediately following administration of the sense_assess© kids.

Data analysis

A summative content analysis was used to count and compare keywords and sentences derived directly from the short answer text data. This process was performed by the occupational therapist who administered the questionnaires and the process repeated by an independent coder who was not involved in the data collection, as recommended by Neuendorf (2002). Participants' responses were brief and concise which limited the risk of misinterpretation e.g. 'Tickly, liked feeling on finger' or 'good challenge'. Statements such as these were reduced into concept categories. Consensus was reached for minor discrepancies via discussion between the two coders. Descriptive statistics were generated in Microsoft Excel 2010.Ink to calculate responses to the semantic differential scales and photographic Q-Sort.

Results

Twenty-eight children were potentially eligible and invited to participate in the acceptability study. Two children were unable to complete the questionnaire after the sense_assess© kids administration due to poor concentration. Twenty-six children with spastic hemiplegic CP were confirmed eligible and included for analysis (age range 6y - 15y 6m; mean 10y 8m; 16 boys, 10 girls; Manual Ability Classification Scale (MACS) (Eliasson et al., 2006) level I, n=10; level II, n=16; right hemiplegia n=14; left hemiplegia n=12). All participants attended main stream school and had at least one family member that was employed full time. The

majority of participants, 21 of 26, indicated they were 'Very happy' or 'Happy' with the administration process, the remaining 5 indicated they felt 'Just ok'. Not all participants responded to all questions concerning specific tests: 17/25 liked the PTT, 17/24 liked the TDT, 23/25 liked the fTORT and 18/25 liked the WPST. None of the 20 participants found it 'Very difficult' to complete; 7 found it 'Difficult', 10 found it 'Easy' and 3 found it 'Very easy' though this was not reflected in their test scores. Of 20 responders regarding duration of the test: 7 found it 'Too long', 12 'Just right' and 1 found it 'Too short'. Content analysis revealed that the majority of participants liked 'guessing', i.e., trying to identify the sensory stimuli without vision and reported that the subtests were a good challenge. The majority of participants also liked the sensation felt at the hand when tested with different subtest equipment, such as the monofilament, dissimilar textures, common objects and movement at the wrist.

The most common short answers from the children who liked the PTT (n = 17) were that they liked the sensation of the monofilament because it felt 'unusual' and 'tickled', that it was challenging and they reported enjoyment when identifying the presence or absence of stimuli. Children who reported not liking the PTT (n = 8) said the monofilament 'hurt' or 'tickled' their finger and some didn't like the sensation of 'spikiness'. For the children who liked the TDT (n = 17), the most common short answers revealed that they liked feeling the textures and enjoyed choosing which texture was different, and that it was challenging. The children who did not like the TDT (n = 7) said they disliked how 'hard' it was and they disliked feeling the textures as they 'hurt' or were 'uncomfortable'. Children who liked the fTORT (n = 23) said it was fun feeling the objects, and recognising the objects by touch, as it was challenging and they enjoyed wearing the ear muffs. There was only one common negative short answer for the children who disliked the fTORT (n = 3); they reported it was hard to recognise objects in the hand. For the children who liked the WPST (n = 18), they liked their hand being moved by the occupational therapist, they liked identifying their hand's position and that it was challenging, they liked the splint as it was comfortable and they liked using the pointer. The children who did not like the WPST (n = 7) reported that the wrist and forearm splint 'hurt', they disliked how 'hard' it was and disliked having their wrist being moved by the occupational therapist as it produced confusion.

Discussion

This study has established that the administration process and duration, subtest equipment and perceived level of difficulty of the sense_assess© kids were generally acceptable to children and youth with spastic hemiplegic CP aged 6-15 years. Obtaining the perspective of children and youth about the sense_assess© kids has clearly demonstrated its clinical acceptability prior to further psychometric testing and knowledge translation. Across the different subtests, the majority (60%-92% depending on subtest) of participants responded positively to all aspects of the assessment procedure. The importance of an acceptable paediatric assessment is reflected in literature; functional, engaging and easy to use measures enhance the assessment experience and provide reliable data (Linder & Linus, 2009).

The current findings are consistent with other tool development studies that also found assessment procedures that are enjoyable, fun and simple to administer are more acceptable for clinical use (Jongbloed-Pereboom, Nijhuis-van Der Sanden, & Steenbergen, 2013; Krumlinde-Sundholm & Eliasson, 2003). Although participants generally responded positively, the areas where responses were not so positive require further development. It is noteworthy that the two subtests (fTORT; WPST) requiring active participation of children and an opportunity for choice (selecting object from response poster; moving pointer on protractor) rated more favourably than the subtests where the therapist was in control of all stimulus administration (pressing monofilament on skin, moving child's finger across textures). Assessments involving autonomous choice, game-play or active participation of the child, where children are meaningfully involved, encourage self-motivation to complete tasks and may be more readily accepted into clinical practice (O'Grady & Dusing, 2015; Poulsen, Ziviani, Cuskelly, 2013).

Negative responses relating to the TDT such as 'uncomfortable' might be because the therapist is required to move the index finger across the plastic graded textures multiple times using a standard pressure and speed. It is recommended that the amount of exposures is reduced and additional breaks are incorporated into the testing procedure. Standardised exposure to the textures supports the tool's psychometric properties however being able to adjust finger pressure and number of repetitions is surely part of successfully interpreting sensation for an individual. In future, it may be worth assessing whether children identify the correct answer more often if they are allowed to choose their own finger pressure and number of repetitions.

A small number of children (n = 4) reported that the WPST test apparatus was 'uncomfortable' or that it 'hurt'. This is a critical finding in this early phase of tool adaptation. This issue may be resolved with a simple adjustment to the size of the wrist and forearm splints. It is recommended that interchangeable small, medium and large sized splints are included in test equipment. A further essential recommendation is to ask the child's level of comfort after the practice trial of the WPST and checking throughout the administration procedure. If a child's position on the chair, or alignment to the equipment has changed, the administration should be paused and the child's postural positioning should be corrected as per the administration manual. The examiner will also need to reset the child's hand position to 90 degrees once the child is repositioned to avoid complete loss of limb position awareness. Although some children perceived the TDT, fTORT and WPST as 'hard', this challenge is important from a psychometric testing perspective and avoids the risk of this population achieving maximum scores on the subtests, i.e., a ceiling effect (Auld et al., 2012). With that in mind, extending the range of difficulty to also include 'easy' stimuli, to provide children with an opportunity to identify at least one difference correctly would not only make the children happier, but also provide greater precision at the lower end of achievement, i.e. avoiding a floor effect.

Limitations

The brief clinical acceptability questionnaire was designed for the purposes of the current study only. Although authors tested face validity, and based it on current literature, the questionnaire lacked a formal evaluation of its measurement properties (Ramaswami et al., 2012). Findings from content analysis within this study may be limited in that participants were familiar with the occupational therapist conducting the questionnaire which could have biased results. In the current study authors were not able to measure sensory integration or behaviour or emotional responses to somatosensory stimuli that may be triggered by imposed touch. It is recommended that this be considered in future research considering that children with CP may have comorbid medical conditions.

Future research

Self-report by a child has been described as a simple and reliable measure of emotional responses in clinical practice (Voepel-Lewis et al., 2008). The translation of research into clinical practice is made easier by simple to use, time efficient and cost effective instruments with supporting psychometric data reported in a meaningful way (Radia-George, Imms, & Taylor, 2014). A perceived lack of clinical utility of outcome measures can inhibit their use by clinicians and department managers and this often persists because of the resulting lack of evidence to refute this perception (Radia-George et al., 2014).

The current study was conducted under research conditions and indicated the acceptability to participants of the sense_assess© kids in clinical practice. The next phase of tool development (Phase 4) is recommended to involve evaluation of clinical acceptability to therapists (clarity of instructions, purpose, format, administration time, cost and overall acceptability). Outcomes could be used to identify practical implementation obstacles preventing adoption of the sense_assess© kids into clinical practice (Voepel-Lewis et al., 2008). Current perspectives regarding knowledge translation recognise the need for active collaboration between therapists as end users, and researchers (Metzler & Metz, 2010). This approach of consumer involvement ensures thorough examination of the implications for therapists and clients prior to transfer of new research knowledge.

Conclusion

The current study has demonstrated preliminary clinical acceptability of the sense_assess© kids for children with hemiplegic CP aged 6 to 15 years. The sense_assess© kids is the only comprehensive standardised assessment of somatosensory function for children with CP. The current study contributes to the further understanding of this novel assessment tool to measure somatosensory capacity, inform intervention outcome, and improve functional outcomes for children with neurological disorders.

Key points for Occupational Therapy

This study breaks new ground by advancing clinical measurement of somatosensation for children with cerebral palsy for which there is currently no standardised comprehensive occupational therapy measure. The clinical acceptability of the sense_assess© kids has been demonstrated for the intended population. The assessment is intended for use by occupational therapists and other allied health and medical professionals.

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Participant code_____ D.O.B_____ Date of assessment_____

Question 1. How did you feel when doing this activity? Please mark on here with a pencil.



Very happy Happy Just ok Unhappy Very unhappy

Question 2. Please look at these picture cards of the activity that you just did. Sort them into two piles. Put the ones you liked on the left, put the ones you disliked on the right.

Record participant's response here with an **L** or a **D**

PTT ____ **TDT** ____ **fTORT** ____ **WPST** ____

From the 'Like' and 'Dislike' piles ask the participant the following questions for each card:

Question 3. What did you like about:

PTT_____

TDT_____

fTORT_____

WPST_____

Question 4. What didn't you like about:

PTT_____

TDT_____

fTORT_____

WPST_____

Question 5. What did you think about the time it took to do?

i.e. Too long ☐ Too short ☐

Other response_____

Question 6. How difficult did you find the activity? Please mark on here with a pencil.

_____

Very difficult Difficult Easy Too easy

Thank-you

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