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The Perceptions of Pediatric Occupational Therapists Regarding Constraint-Induced Movement Therapy

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The Perceptions of Pediatric Occupational Therapists Regarding Constraint-Induced Movement Therapy

Abstract

Background: Research has shown constraint-induced movement therapy (CIMT) to be of benefit in pediatric occupational therapy practice to treat children with hemiplegia. The perceptions of adult clients, pediatric clients, child caregivers, and occupational therapists working with the adult population has been explored in the past. However, little is known about the perceptions of occupational therapists working with the pediatric population regarding CIMT. This qualitative study explored the perceptions of pediatric occupational therapists who had awareness of CIMT as an intervention method.

Methods: Eight pediatric occupational therapists from the Midwest United States participated in the study. Structured interviews were conducted focusing on the participants' knowledge, implementation practices, and current perceptions of CIMT in pediatric practice. Coding and thematic analysis was used to determine themes.

Results: Three themes emerged from the data: perceived benefits of CIMT, varying comfort levels with delivery of the intervention, and differing methods of implementation.

Conclusion: This study was a preliminary attempt to understand pediatric occupational therapists' perceptions and implementation of CIMT. Future research should expand on findings by exploring the perceptions of pediatric occupational therapists from across the country as well as adapting the interview to allow for more open-ended responses.

Comments

The authors report that they have no conflicts of interest to disclose.

Keywords

hemiparesis, lived experience, effectiveness, barriers, constraint-induced movement therapy, pediatric occupational therapists

Cover Page Footnote

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Unilateral upper extremity dysfunction can be a significantly debilitating condition, affecting occupations such as self-care, feeding, dressing, and grooming (Gordon & Okita, 2010). As such, constraint-induced movement therapy (CIMT) is an intervention used by occupational therapists to address unilateral paresis or dysfunction of the upper extremity in patients across the lifespan (DeLuca, Case-Smith, Stevenson, & Ramey, 2012). This intervention involves restraining the unaffected upper extremity to improve functional use of the affected upper extremity through repetitive and adaptive tasks (Aarts et al., 2012). Implementation of CIMT has three essential features: method of constraint of the unaffected upper extremity, intensive repetitive practice of motor activity, and “shaping” and “successive approximation” (Brady & Garcia, 2009, p. 103) of more complex function through the breaking down of occupations into rewardable and targeted performance skills (American Occupational Therapy Association [AOTA], 2014). Methods and duration of CIMT delivery vary from wearing removable or nonremovable constraint, to time frames ranging from 30 min to 6 hr a day or more (Brady & Garcia, 2009; Cope, Forst, Bibis, & Liu, 2008; Pedlow, Lennon, & Wilson, 2014).

Quantitative research has shown CIMT to be of benefit in pediatric occupational therapy practice. From a top-down perspective, CIMT has demonstrated efficacy in improving performance of occupations, such as activities of daily living and play for children, that display unilateral upper extremity dysfunction (Cope et al., 2008; Dickerson & Brown, 2007; Glover, Mateer, Yoell, & Speed, 2002), as well as increased spontaneous use of the affected arm during dressing, bathing, and feeding (Cope et al., 2008). Glover et al. (2002) reported that children had significant gains in upper extremity usage in a variety of domains, including some aspects of everyday functions. DeLuca et al. (2012) studied CIMT in children with cerebral palsy and found significant improvements in occupations, such as puzzle-solving, toy activation, and self-help task completion, using the affected upper extremity. From a bottom-up perspective (Fritz, George, Wolf, & Light, 2007), CIMT has been shown to elicit changes in upper extremity function through improvements in components of performance skills practiced repetitively. Another study reported increased use of the affected arm in reach, grasp, release, push, pull, sustained grasp, and bilateral use during play (Dickerson & Brown, 2007). These performance skills, such as reaching for an object or increased awareness of the upper extremity, are influenced by the enhancement of motor output (Boylstein, Rittman, Gubrium, Behrman, & Davis, 2005). Implementation of CIMT has resulted in increased gray matter volume in the sensorimotor cortex in pediatric patients and was positively correlated with motor function improvement (Sterling et al., 2013). This was likely due to alterations in brain plasticity and cerebrocortical reorganization (Dickerson & Brown, 2007). Neuroplasticity was demonstrated in a case-study by Cope et al. (2008) with a 12-month old with hemiplegia, in which changes in cortical size, shifting, and firing were noted following use of CIMT. In a 6-year follow-up study, young adults with unilateral cerebral palsy maintained functional use of the affected upper extremity after receiving CIMT during early adolescence (Nordstrand & Eliasson, 2013).

From a qualitative perspective, research studies have focused on the perceptions of adult clients (Marklund, Klässbo, & Hedelin, 2010), pediatric clients (Mancini et al., 2013), child caregivers (Mancini et al., 2013; Milton & Roe, 2016), and occupational therapists working with the adult population (Pedlow et al., 2014). Current literature, however, has not explored the perceptions of occupational therapists working with the pediatric population. In the adult population, researchers found that participants felt hopeful and that CIMT provided them with greater independence and higher self-esteem (Marklund et al., 2010). Children and their caregivers acknowledged increased use of the

affected arm and decreased need for assistance following CIMT and expressed that the achievements made in function compensated for the struggles experienced during the daily routine (Mancini et al., 2013). When reporting children's upper extremity improvement and satisfaction with CIMT, evidence suggests that caregivers also found this intervention to be worthwhile (Milton & Roe, 2016). Therapists working in adult neurological rehabilitation recognized limited resources and training as the main barriers regarding the use of CIMT in their practices, despite evidence supporting its usage (Pedlow et al., 2014).

Despite the demonstrable and perceived effectiveness of CIMT in improving upper extremity function in adults and children, there are inconsistencies in the literature regarding implementation. While protocols have been developed and shown to be beneficial in the adult stroke population (Brady & Garcia, 2009), Fleet et al. (2014) described the lack of clearly defined protocols, decreased knowledge, ethical concerns, and little facility support as barriers to implementation. Research also varies regarding delivery of pediatric CIMT (Barzel et al., 2013). Differences in time, the materials used for constraints, delivery settings, and dosage levels have made it difficult to draw conclusions about what combination is most effective (Brady & Garcia, 2009; DeLuca et al., 2012). Therapists have voiced ethical considerations and hesitation with implementation of pediatric CIMT, specifically describing concern for the child and/or family's ability to endure the stress, intense practice, and restraint protocols typically associated with CIMT (Cope et al., 2008). It is reported that occupational therapists working in stroke rehabilitation have an interest in the use of CIMT, but time constraints, inadequate knowledge, insufficient research skills, lack of confidence, decreased support from management, and inadequate resources are the challenges that cause hesitation in potentially implementing the intervention (Walker & Pink, 2009).

In response to these gaps and discrepancies in the literature, the aims of this study were to explore the perceptions of pediatric occupational therapists regarding (a) why CIMT may or may not be beneficial, (b) how CIMT is performed, and (c) what contextual barriers and enablers may be present during implementation. We employed qualitative methods to gather the narratives of pediatric occupational therapists who had awareness of CIMT as an intervention method.

Method

Participants

The participants in this study were licensed pediatric occupational therapists in the Midwest United States. Purposive sampling was employed through emails sent to local therapists and members of an occupational therapy state association. Snowball sampling was also used, as we requested that the emailed therapists kindly forward the email to other potential participants. Emails contained a promotional flyer explaining the purpose, inclusion criteria, and researchers' contact information. Therapists were included in the study if they had current licensure, at least 1 year of experience as an occupational therapist, knowledge of CIMT, and clinical practice in pediatric occupational therapy. A sample size between six to 12 participants was suggested to be acceptable for a study of this nature (Boylstein et al., 2005; Mancini et al., 2013).

Procedure

This study was granted institutional review board approval, and written consent was obtained at the interview or through email. Potential risks and benefits were explained. Following a therapist's initial contact with the researchers, structured interviews were scheduled and held on a university campus in the occupational therapy department. If a participant was available for an in-person interview,

the interview questions were sent via a secure email account. One member of the research team conducted the structured interviews. The researchers considered the temporal limitations of conducting this type of study; therefore, interview times were flexible and scheduled to meet the participants' needs. The participants were not compensated for their involvement in the study.

Measures

Structured interviews included a series of 10 questions (see Appendix). The authors developed the interview questions based on barriers and enablers identified through an extensive literature review and expert consensus. The interview focused on current perceptions of CIMT in pediatric practice, implementation methods, and barriers or enablers to CIMT. The questions were open-ended and no prompts were given to aid in forming a response. Clarification for questions was only given in the form of the interviewer repeating the question.

Analysis

Coding and thematic analysis was used in this study, as the goal was to listen to the authentic voice of pediatric occupational therapists and explore their perceptions of CIMT. Following completion of each interview, Researcher 2, 3, or 4 transcribed the recorded interview into a word document. Researcher 1 then listened to the recording while reading the word document to ensure transcription accuracy. All four researchers then coded the transcripts independently. The researchers were blind to each other's codes to control for bias. The researchers met to discuss the emergent themes and establish a consensus. Cross-case analysis was then employed to ensure rigor and appropriations of themes. Recruitment occurred on an ongoing basis to support data saturation.

Results

Eight participants completed an interview (see Table 1). Three main themes emerged from the data: pediatric occupational therapists' perceived the benefits of CIMT, varying comfort levels with delivery of the intervention, and differing methods of implementation.

Table 1

Demographics

Participant	Setting	Years of pediatric practice	Current use of CIMT
Participant 1	School	15	Yes
Participant 2	Outpatient	24	Yes
Participant 3	Higher Education	15	Yes
Participant 4	Outpatient	24	Yes
Participant 5	Higher Education	17	No
Participant 6	Outpatient	7	No
Participant 7	Inpatient Care	30	Yes
Participant 8	Higher Education	18	No

Perceived Benefits of CIMT

All eight of the participants perceived CIMT to be a beneficial intervention for children with hemiparesis. They discussed that CIMT has been shown to be effective in adult and pediatric populations with different neurological conditions. They commented about how, in some patients, the improvement in the motor function of the upper extremity was accompanied by increased sensation and

awareness in their affected arm following the CIMT intervention. In addition, the participants made comments regarding the child's increased use of the affected arm in daily activities and play.

Participant 1 reported, "The main gain I see in children is their increased awareness of their affected (non-constrained) arm." Participant 3 stated, "Additionally, I have noticed increased bilateral arm use during functional activities," while Participant 7 shared that "I have observed CIMT improve the function of the client's affected UE."

The participants also commented on how some patients and their caregivers found the CIMT intervention to be beneficial and were not deterred by its intensity.

I believe in it because it's just trying to rewire that brain, you know, and it's hard to participate in the intense program, but if you can just get that, and they can understand that I do have another side and to use it, I've just kind of seen the results. I think it's good. (Participant 4)

Varying Comfort Levels

The participants expressed that when using CIMT in practice their comfort levels were related to their prior levels of training on the intervention and their perceptions of its safety in practice. Most of the participants had completed continuing education and literature reviews to gain competence in implementing the intervention. The participants indicated that formal training methods also increased their comfort levels when using the intervention. Participant 5 said, "Resources I used at the time included workshops, presentations, and effectiveness studies. The facility ensured we completed yearly casting-competency training." Participant 2 reported,

I have my knowledge from the NDT [Neuro-developmental Treatment] training that I've done... understanding the neurology behind rehab, and understanding that really pushed me to go into lots of things. I had my NDT training, I had the adult program doing a CIT program, which was 3 or 4 weeks, 5 days a week. I feel pretty competent, and I feel pretty good about how I prepare. Safety concerns also impacted the participants' comfort levels with implementing CIMT.

Identified concerns included skin integrity, protective reactions, and psychological harm. The participants shared that some children seemed unable to tolerate the intensity of the treatment and that having a child wear a restraint on the unaffected arm could cause the child stress and pose a safety concern. Participant 7 stated,

The unaffected hand is casted and can experience skin breakdown, edema, decreased circulation and joint stiffness. CIMT needs to be presented to the child in a manner to prevent the child from the psychological effects of feeling CIMT is a punishment for doing something wrong.

Participant 3 also expressed concern, stating,

The biggest reservation is the safety of the child. Do they have enough protective reactions to catch themselves in the event they get off balance and fall? There are some children with whom I have worked where I have been concerned about their protective reactions and safety and with temperature safety as well.

Differing Methods of Implementation

The participants described differing methods of implementation when using CIMT. There was no consistent protocol reported among the participants. The participants discussed the need for an evidence-based protocol to provide guidelines and suggestions for using CIMT in pediatrics. Participant 1 reported, "Our protocol is mostly just spur of the moment." Participant 5 said, "Furthermore, my main reservation is lack of continuity of practice across settings and practice areas. Clinical practice guidelines need to be established and supported by AOTA."

As CIMT intervention protocol can be modified by the patient and the occupational therapist, materials used for constraining the affected upper extremity varied among the participants as well. The participants mentioned the use of splints, oven mitts, casts, and their own bodies as viable options for constraints. Another participant identified difficulty with picking the right kind of restraint. Participant 3 reported, “In regard to availability of materials, I was working home-based and did not have the resources to implement it.” Participant 7 added that “The caregivers and insurers need to be able to implement this intensive therapy during the CIMT treatment period.”

The participants also discussed intervention compliance, which they perceived as greatly influencing CIMT implementation, methods, and materials. The participants shared that it was difficult for some parents to follow the protocols appropriately and commit the time needed for intensive CIMT. Participant 2 stated, “Picking the right constraint that’s safe with the parents donning and doffing and relying on them to follow through accurately is difficult.” Participant 8 added, “Additionally, CIMT was discontinued as splints could be removed by clients and parents. [We] did not see positive results . . . compliance to treatment is difficult to monitor.”

Discussion

This study was a preliminary exploration of the perceptions of pediatric occupational therapists regarding their use of CIMT. The participants’ responses suggested that pediatric occupational therapists perceived CIMT to be beneficial, that their use of CIMT was based on their comfort levels, and that differing methods of implementation can discourage or encourage the use of the intervention. Previously published qualitative research studies have investigated the perceptions of adult clients, pediatric clients, child caregivers, and occupational therapists working with adults, but there is a paucity of research that seeks to capture pediatric occupational therapists’ narratives regarding CIMT implementation.

The participants unanimously expressed that CIMT was beneficial. This perception reflects current qualitative and quantitative research positing CIMT as an effective intervention for increased function and motor performance for children with unilateral upper extremity dysfunction (Dickerson & Brown, 2007; Gordon & Okita, 2010; Mancini et al., 2013). The participants reported improvements in motor performance and awareness of the affected upper extremity, consistent with published findings (Boylstein et al., 2005). Patients who take part in CIMT perceive the intervention to be efficacious. Although the intervention was difficult and intensive, the experience was worth it and perceived as “necessary” (Marklund et al., 2010, p. 138).

This study’s results are also in agreement with previously identified barriers to CIMT implementation (Walker & Pink, 2009), as the participants associated increased comfort levels with CIMT following education and training. The therapists’ levels of comfort also increased when proper safety precautions were accounted for while implementing CIMT. These findings may indicate a need for more accessible continuing education or facility-based training and safety awareness courses. In agreement with Cope et al. (2008), the participants also spoke to the fact that children may not be developmentally ready to endure the intense practice and restraint protocols associated with CIMT, which may cause unnecessary stress on the children and their families. Thus, the risk of psychological stress was another concern voiced by the participants, leading to decreased comfort when considering CIMT implementation for their client.

The participants in this study affirmed current research, as they reported various time and duration parameters and materials were used in CIMT. Practice settings and dosage levels tended to differ, and conclusions about implementation methods were inconsistent (Barzel et al., 2013; Brady &

Garcia, 2009; DeLuca et al., 2012; Pedlow et al., 2014). Despite differing methods of implementation, all of the participants reported that they perceived CIMT as an effective intervention for unilateral upper extremity dysfunction. However, to call oneself an evidence-based occupational therapist means to balance clinical judgement and experience with patient perspectives and relevant scientific evidence (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). One way to strengthen evidence-based practice is through the development of reproducible and empiric treatment protocols or implementation guidelines. Clinical practice guidelines help the therapist to make decisions regarding patient care and should be based on strong evidence that provides well-defined recommendations about specific clinical situations (Law & MacDermid, 2014). These ideas are supported by Nascimento, Gloria, and Habib (2008), whose systematic review found that inconsistencies in protocols made it difficult for researchers to derive clear conclusions and for therapists to translate steps into practice.

Limitations

Inherent in this study's design are known limitations. This study was a preliminary attempt to understand pediatric occupational therapists' perceptions and implementation of CIMT. Purposive sampling and a limited number of the participants may have impacted the ability to reach saturation and decreased the transferability of the study. The use of structured interviews limited the participants' responses and may have influenced the study's findings. Thus, a more open-ended and conversational interview style may have fostered increased depth and breadth of responses.

Conclusion

This foundational qualitative study served as a first step to explore the perceptions of pediatric occupational therapists in one region of the United States. Thus, it may strengthen future research investigating the perceptions of pediatric occupational therapists' use of CIMT in pediatric populations nationwide. In addition, it may lead to the development of research exploring potential barriers and enablers of CIMT implementation across contexts, populations, and practice settings. Also, in accordance with the participants' statements, research on potential stress experienced by pediatric clients undergoing CIMT is needed. Further studies are suggested to clarify and develop treatment protocols and stipulate implementation guidelines for CIMT in support of occupational therapy's call to ensure evidence-based practice.

The pediatric occupational therapists in this study perceived that children with unilateral upper extremity dysfunction might benefit from the implementation of CIMT. Therefore, CIMT should be critically and rigorously evaluated as a treatment option for this population. Therapists should seek training and continuing education opportunities, understand safety precautions related to the implementation of CIMT, and conduct further research to provide clear and empirically tested CIMT protocols.

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Appendix

Interview Questions

1. What setting do you currently work in?
2. How many years have you been practicing in pediatric occupational therapy?
3. Do you currently use CIMT in practice?
 - a. If you use CIMT, can you explain why?
 - b. If you do not use CIMT, can you explain why?
4. What resources shaped your decision to use, or not use, CIMT (formal education, mentorship, continuing education, peers, etc.)?
5. How do you administer CIMT to your patients?
6. Do you follow a specific protocol?
 - a. If so, how was that protocol established?
 - b. If no, tell me about your protocol.
7. Tell us about the materials you use for CIMT. Why?
8. Tell us about the role of your facility when it comes to using CIMT in practice.
9. Do you have any reservations for using CIMT?
10. What do you appreciate about CIMT?