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# Goals of children with unilateral cerebral palsy in a brainstimulation arm rehabilitation trial

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## PUBLICATION DATA

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## ABBREVIATIONS

AHA	Assisting Hand Assessment
BBT	Box and Block Test
CIMT	Constraint-induced movement therapy
COPM	Canadian Occupational Performance Measure
CMOP-E	Canadian Model of Occupational Performance and Engagement
ICF	International Classification of Functioning, Disability and Health
rTMS	Repetitive transcranial magnetic stimulation
TMS	Transcranial magnetic stimulation

**AIM** To explore relationships between category classifications for children's rehabilitation goals, outcomes, and participant characteristics.

**METHOD** Children with hemiparetic cerebral palsy due to perinatal stroke rated self-selected goals with the Canadian Occupational Performance Measure (COPM) and completed the Assisting Hand Assessment (AHA) and Box and Block Test (BBT), at baseline and 6 months, in a randomized, controlled 10-day neuromodulation rehabilitation trial using repetitive transcranial magnetic stimulation. Goals were classified with the Canadian Model of Occupational Performance and Engagement and the International Classification of Functioning, Disability and Health. Analysis included standard linear regression.

**RESULTS** Data for 45 participants (mean age 11y 7mo, SD 3y 10mo, range 6–19y, 29 males, 16 females) on 186 goals were included. Self-care goal percentage corresponded with baseline BBT by age (standardized  $\beta = -0.561$ ,  $p = 0.004$ ). Leisure goal percentage corresponded with baseline BBT (standardized  $\beta = 0.419$ ,  $p = 0.010$ ). AHA change corresponded with productivity goals (standardized  $\beta = 0.327$ ,  $p = 0.029$ ) and age (standardized  $\beta = 0.481$ ,  $p = 0.002$ ). COPM change corresponded with baseline COPM and age by AHA change ( $p < 0.05$ ).

**INTERPRETATION** Younger children with lower motor function were more likely to select self-care goals while those with better function tended to select leisure goals. Functional improvement corresponded with older age and productivity goals. COPM change scores reflected functional improvement among older children. Children chose functionally and developmentally appropriate goals. Consequently, children should be free to set goals that matter to them.

Cerebral palsy (CP) is a result of injury to the developing brain and affects more than 17 million individuals worldwide.<sup>1,2</sup> Most children with CP have difficulty performing motor tasks, adversely affecting their ability to participate in day-to-day activities. CP research and rehabilitation has evolved from a focus on heterogeneous syndromic populations to focus on more specific disease states such as perinatal stroke, which accounts for most cases of unilateral CP.<sup>3</sup> Such precision has facilitated the execution of novel rehabilitation clinical trials investigating the combination of intensive motor learning and non-invasive brain stimulation.<sup>4–6</sup> While early results are promising, attention to individual factors that are likely to influence personalized outcomes has been lacking.

A primary goal of rehabilitation is to optimize functional ability and, in turn, to maximize participation in activities

that are meaningful for children and their families. Collaborative goal setting with children and families is an essential component of family-centred rehabilitation practice.<sup>7,8</sup> Establishing specific and challenging goals can increase motivation and enhance performance.<sup>9</sup> An emphasis on family involvement, collaboration, and knowledge theoretically increases motivation and engagement, and may subsequently enhance child outcomes.<sup>10,11</sup> Hence, it is imperative that rehabilitation goals are based on the priorities of the child and their family.

The Canadian Occupational Performance Measure (COPM) is a personalized goal-setting tool and outcome measure that facilitates identification of meaningful client-centred goals related to daily life activities. The COPM can be used to detect change in a client's self-perception of

occupational performance over time for individuals with varying abilities across all developmental stages.<sup>12</sup> The COPM has established reliability, validity, and responsiveness with children and is a commonly used subjective outcome of goal performance in pediatric clinical trials.<sup>13,14</sup> Goals identified with the COPM form the foundation for a comprehensive rehabilitation plan based on child- and family-identified priorities.

The COPM is based on the Canadian Model of Occupational Performance and Engagement (CMOP-E).<sup>12</sup> This conceptual framework depicts the interactions between the person, occupation (i.e. activity), and environment.<sup>15</sup> The International Classification of Functioning, Disability and Health (ICF), including the Children and Youth version, has also been used to support goal setting.<sup>16–18</sup> Similar to the CMOP-E, this framework acknowledges the role of the environment and person in shaping function.<sup>19</sup> In the ICF, function is a multidimensional construct, consisting of body functions and structure, activities, and participation. It is able to organize and describe constructs of child function for children with CP.<sup>20</sup>

While goal setting is a crucial component of rehabilitation practice and it is assumed that family engagement improves child performance, few studies have evaluated the relationship between goal characteristics and outcomes. Gaining insight into how chosen goals influence meaningful outcomes is important. This was explored in a quasi-experimental study with parents and children with CP using the ICF.<sup>21</sup> In this study, a qualitative interview tool was employed alongside the COPM to facilitate goal setting. The authors reported that perceived improvement mirrored objective motor outcomes, although no statistical analysis was reported. An experimental approach using additional measures such as the CMOP-E within a well-powered interventional trial may further add to understanding of the role of goal setting in advancing personalized pediatric neurorehabilitation.

The objectives of this study were to: (1) characterize goals identified by children with unilateral CP due to perinatal stroke and (2) explore relationships between goals, outcomes, and participant characteristics within an intensive interventional trial.

## METHOD

### Trial design and participants

The PLASTIC CHAMPS trial (Plastic Adaptation Stimulated by TMS and Induced Constraint for Congenital Hemiparesis After Perinatal Stroke; NCT01189058) was a factorial, randomized, controlled, double-blind clinical trial of repetitive transcranial magnetic stimulation (rTMS) and/or constraint-induced movement therapy (CIMT).<sup>5</sup> Participants were school-aged children with unilateral CP as a result of perinatal stroke ( $n=45$ , mean age 11y 7mo, SD 3y 10mo; 29 males, 16 females). See Table 1 for participant demographics and baseline characteristics. The study was approved by the Conjoint Health Research Ethics Board (Calgary, Canada). Recruitment occurred via

### What this paper adds

- Children in a brain stimulation trial chose divergent upper extremity functional goals.
- Younger children with lower ability chose more self-care goals.
- Children with higher ability chose more leisure goals.
- Older children's goal ratings reflected objective functional motor gains.
- Children chose goals appropriate to their function and level of development.

a population-based research cohort from 2010 to 2013 (Alberta Perinatal Stroke Project) and informed written consent was obtained from parents for participants under 18 years and additionally from older participants.

### Interventions

All participants received structured, child-centered intensive upper extremity motor learning therapy at the Alberta Children's Hospital for 10 consecutive weekdays (Fig. S1, online supporting information). Participants were randomized to receive brain stimulation or sham, and wear a custom bivalve cast for 90% of waking hours or participate in therapy without a cast.<sup>5</sup>

All participants received 80 hours of intervention (20 individual therapy, 55 group, and 5 rTMS/sham). Individual therapy was customized to ensure a 'just-right' challenge, grade age-appropriate skills, and provide intensity of practice. Group therapy comprised of a variety of age-appropriate activities such as sports, cooking, and arts facilitated by experienced allied health professionals.

### Outcomes

Outcomes were administered before the study, within a week of study completion, 2 months after completion, and 6 months after completion (Fig. S1). COPM self-rating of performance and satisfaction were the primary subjective outcomes. During interviews before treatment, the children, their parent(s), and therapist discussed activities that were difficult. While the COPM does not have a standard list of potential goals, it is designed to help recognize occupational performance issues in self-care, productivity, and leisure domains. Goal setting was collaborative; the therapist would typically use reflective questions to help the child and parent identify potential goals. In turn, parents would often ask their child a probing question about a specific task that they perceived to be difficult. Parental involvement for goal setting varied and was generally

**Table 1:** Participant demographics and baseline characteristics

Characteristic	Participant values
Total, <i>n</i>	45
Stroke (arterial/venous), <i>n</i>	29/16
Sex (female/male), <i>n</i>	16/29
Age (y:mo), mean (SD), range	11:7 (3:10), 6–19
Pre-AHA (logit), mean (SD), range	62.2 (18.1), 33–100
Pre-COPM performance, mean (SD), range	3.3 (1.4), 1.0–6.8
Pre-COPM satisfaction, mean (SD), range	3.9 (1.9), 1.0–10.0

SD, standard deviation; AHA, Assisting Hand Assessment; COPM, Canadian Occupational Performance Measure.

**Table 2:** Distributions of goals categorized with the CMOP-E and ICF categories (note that participants chose two to six goals), with examples from study data

Goals by model and category	% of goals by participant ( <i>n</i> =45), mean (SD), range	% of total goals ( <i>n</i> =186)	Participant example
<b>CMOP-E</b>			
Self-care	47 (26), 0–100	45.2	
Eating	15 (21), 0–100	12.9	Use a knife and fork to cut food
Hygiene	8 (14), 0–50	7.5	Cut fingernails on right hand
Dressing	19 (21), 0–80	19.9	Do small buttons
Community management	1 (4), 0–25	1.1	Carry bag on right shoulder
Transportation	4 (10), 0–33	3.8	Shift bike gear with left hand
Productivity	15 (17), 0–67	15.6	
Household management	4 (10), 0–33	3.2	Hold pot hand with left to stir
Community participation	2 (8), 0–33	1.6	Do hockey signals with both hands
School	10 (13), 0–40	10.8	Type with both hands
<b>Leisure</b>			
Leisure	35 (25), 0–100	35.5	
Quiet leisure	4 (10), 0–33	3.8	Use game controller with right hand
Active leisure	29 (27), 0–100	29.6	Catch a ball with both hands
Socialization	2 (7), 0–33	2.2	Text on cell phone with both hands
<b>ICF Children and Youth</b>			
Body functions and structure	5 (12), 0–50	5.9	Supinate left forearm
Activity	77 (20), 33–100	76.9	Open a bag of chips
Participation	18 (18), 0–67	17.2	Use right side in dance class

CMOP-E, Canadian Model of Occupational Performance and Engagement; ICF, International Classification of Functioning, Disability and Health; SD, standard deviation.

greater with younger children. Goal selection was also highly individual and shaped by child and family priorities and routines, as well as the child's functional level and developmental age. A minimum of two and maximum of six specific goals were established by consensus that were considered achievable.

The therapist used their best clinical judgment to coach children and families to specify realistic and achievable functional goals within the context of a 2-week therapy camp. Hence, goals were qualified in consideration of each participant's ability. For example, 'catch a ball' could involve catching a beach ball with both hands for a child with less ability or catching a baseball with a gloved more-affected hand for a child with more ability. Current performance and satisfaction for each goal was rated by the child and parents using a 10-point Likert scale (1 representing 'not able to do' or 'not satisfied at all', and 10 representing 'able to do extremely well' or 'extremely satisfied' respectively). COPM administration was conducted at 1 week, 2 months, and 6 months without prompts with previous scores.

The Assisting Hand Assessment (AHA) was the primary objective outcome. The AHA measures how effectively children with unilateral motor disability spontaneously use their assisting hand during a bimanual play session.<sup>22</sup> It is valid, reliable, and responsive to change.<sup>23</sup> The Box and Block Test (BBT) was a secondary motor outcome. It measures unimanual function; the score is determined by the number of blocks moved across a partition in 1 minute by a single arm.<sup>24</sup> The score for the more affected arm was used. An occupational therapist, blinded to patient characteristics and treatment allocation, completed assessments at the same time points as the COPM.

### Classification of goals

Goals were extracted from participant records. Each goal was categorized by two independent raters (EH and LB). In cases of rater disagreement, a third rater (AK) was included to achieve consensus. Raters were blinded to patient characteristics and outcomes but were allowed to see the context in which the goal was framed. Goals were classified twice with the CMOP-E and ICF Children and Youth frameworks.

CMOP-E classification categories included: (1) self-care, (2) productivity, and (3) leisure. Within the CMOP-E, self-care encompasses activities done to care for one's physical self, such as tying shoelaces and eating. Productivity includes school-related activities, such as typing or printing homework. Leisure implies activity done for enjoyment rather than self-care and productivity, such as a family board game night. For the purposes of classification, play activities were coded under leisure. These three main categories were further classified into 11 subcategories (Table 2).

ICF categories included: (1) body functions and structure, (2) activity, and (3) participation (Table 2). Body functions and structure describes physiological functions such as coordination of voluntary movement. Activity involves performance of tasks such as dressing while participation reflects connectedness within society, such as playing on a sports team.

### Statistical methods

Cohen's *K* was used to evaluate agreement between raters for goal categorization. Percentages were used to describe the frequency of specific goal categories.

To examine factors associated with goal choices, standard linear regression models for the percentage of participant

goals that mapped to each category were performed. For all standard linear regressions, variables that failed to reach significance within each model were removed, but only if their removal did not change the beta of remaining variables (threshold of >15% change). Models were checked for assumption violations and reported models met all assumptions; details are available from the first author on request. Included predictors were age, sex, and baseline AHA, BBT, and COPM performance and satisfaction.

Spearman's rank-order correlation was used to measure the strength of association between outcomes of: (1) AHA and (2) COPM with the rank of three goal categories for (1) CMOP-E and (2) ICF. To examine if goal choice was associated with clinically important changes in outcomes, participants were grouped according to whether or not they achieved the minimum clinically important difference for COPM performance and satisfaction ( $\geq 2$  points) and the recommended minimal detectable change for the AHA ( $\geq 5$  points).<sup>13,25</sup>

Standard linear regression was used to account for the many potential factors influencing change in AHA (CIMT or not, and rTMS or sham), including goal selection. COPM baseline and change scores were calculated by summing performance and satisfaction scores together. Standard linear regression was used to examine factors influencing COPM change for participants. Analysis was performed using SPSS Statistics v25 (IBM Corp., Armonk, NY, USA) and Stata version 13 (Statcorp, College Station, TX, USA).

## RESULTS

### Goal classification

Goals were extracted for all 45 participants. All participants completed the trial and all outcome measures, with the exception of one unrated goal at baseline. The total number of goals was 186, with a median of four goals ( $SD=1.1$ ; range=2–6). See Table 2 for examples of goals that fell under each category.

For the CMOP-E, seven goals were unclassifiable resulting in classification of 179 goals. Interrater reliability for CMOP-E classification was 'almost perfect' ( $K=0.92$ , 95% CI 0.88–0.96,  $p<0.001$ ) while ICF goal classification was 'fair to good' ( $K=0.66$ , 95% CI 0.58–0.75,  $p<0.001$ ).<sup>26</sup>

### Frequency of goal categories

The most common CMOP-E goal category was self-care (45%), followed by leisure (36%) and productivity (16%, note that 7 of 186 goals were not classified). The most common ICF goal was activity (77%), followed by participation (17%) and body functions and structure (6%) (Table 2, Fig. 1).

### Factors associated with goal choice

Linear regression of percentage of CMOP-E self-care goals revealed significant relationships with the interaction of baseline BBT by age (standardized  $\beta=-0.56$ ,  $p=0.004$ ) and sex (standardized  $\beta=0.35$ ,  $p=0.013$ ). A higher

percentage of self-care goals was more common among younger children with lower baseline BBT scores and females (Fig. S2, online supporting information). The model was confounded by age (>15% change in  $\beta$  of remaining variables with removal) and was thus retained in the model. Baseline performance, satisfaction, and AHA neither confounded nor contributed to the model and were removed. Adjusted  $R^2$  was 0.22. All reported models met assumptions for multiple regression.

Linear regression of percentage of CMOP-E productivity goals only reached significance after model fitting. Age approached significance (standardized  $\beta=0.26$ ,  $p=0.08$ ), as did baseline COPM satisfaction (standardized  $\beta=-0.27$ ,  $p=0.063$ ). The trend was for older age and lower baseline satisfaction to be associated with selection of more productivity goals. Baseline AHA, BBT, performance, and sex neither confounded nor contributed to the model and were removed. Adjusted  $R^2$  was 0.13.

Linear regression of the percentage of CMOP-E leisure goals revealed a significant relationship with baseline BBT (standardized  $\beta=0.42$ ,  $p=0.01$ ). The relationship was confounded by age and sex (>15% change in  $\beta$  with removal) and they were thus retained in the model. Higher BBT initial scores corresponded with a higher percentage of leisure goals (Fig. S2). Baseline AHA and COPM scores, and the interaction of age by baseline BBT, neither confounded nor contributed to the model and were removed. Adjusted  $R^2$  was 0.13.

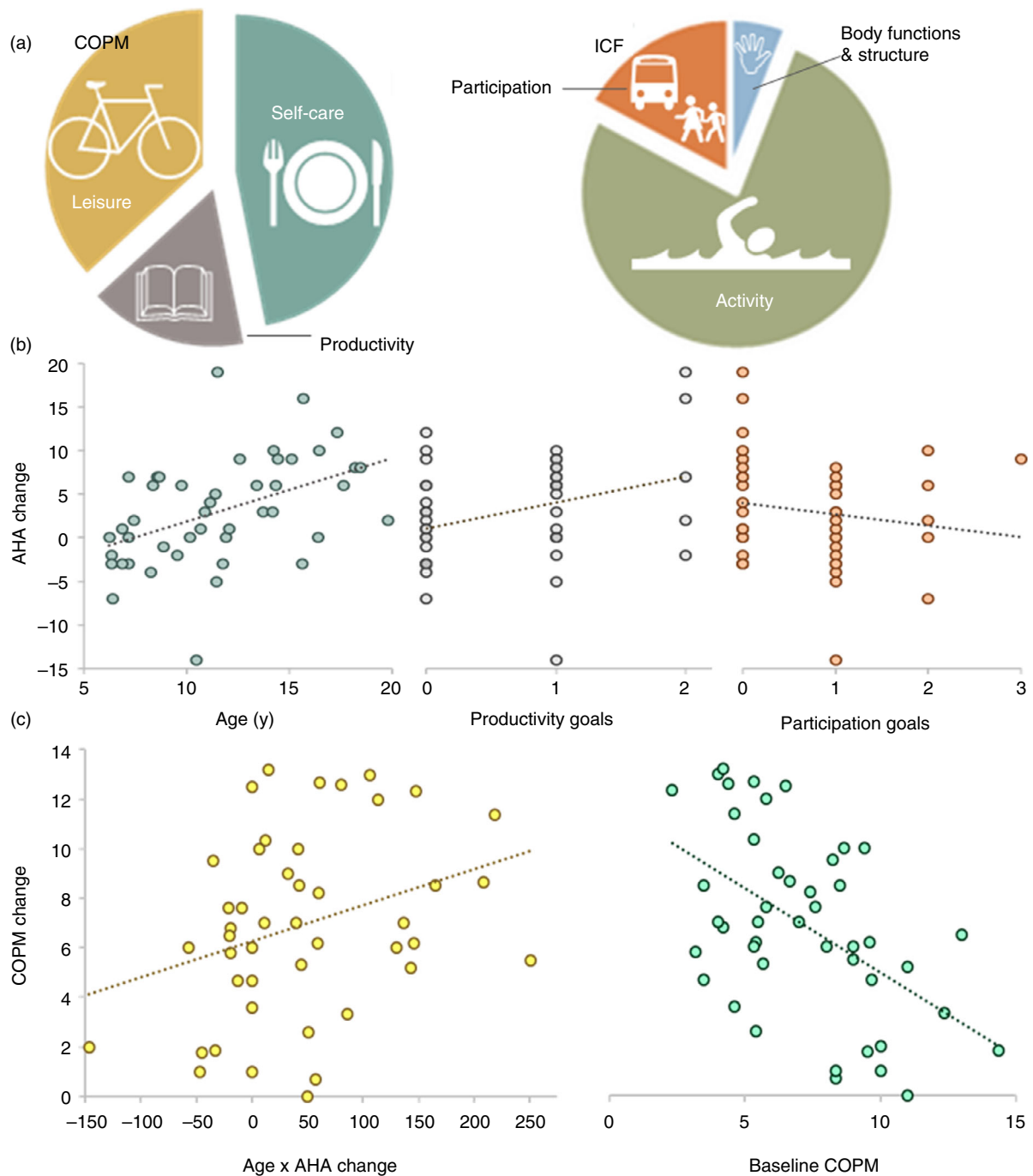
There were too few cases to analyze the percentages of ICF body functions and structure. Regression models for percentages of ICF activities and participation goals failed to reach significance.

### Relationship between goal categories and AHA change

Spearman's rank-order correlation failed to show relationships between CMOP-E or ICF categories and AHA change ( $p>0.05$ ). The AHA improved significantly for all categories, although only CMOP-E productivity reached the minimal detectable change.

Linear regression for change in AHA with CMOP-E categories showed relationships with CMOP-E productivity goal count (standardized  $\beta=0.33$ ,  $p=0.029$ ) and age (standardized  $\beta=0.48$ ,  $p=0.002$ ). Older age and a higher number of productivity goals corresponded with improvement on the AHA (Fig. 1, Fig. S2). The relationship was confounded by CMOP-E self-care and leisure goal counts (>15% change in  $\beta$  with removal) and were thus retained in the model. CIMT, transcranial magnetic stimulation (TMS), sex, baseline AHA, total goal count, and interaction of age and number of productivity goals did not confound or contribute to the model, and were removed. Adjusted  $R^2$  was 0.24.

Linear regression for change in AHA with ICF categories showed relationships with participation goal count (standardized  $\beta=-0.27$ ,  $p=0.049$ ), total goal count (standardized  $\beta=0.28$ ,  $p=0.05$ ), and age (standardized  $\beta=0.57$ ,  $p<0.001$ ). Fewer participation goals, more total goals, and



**Figure 1:** (a) Distribution of goals categorized by the Canadian Occupational Performance Measure (COPM) and the International Classification of Functioning, Disability and Health (ICF) Children and Youth. (b) Regression model contributors for Assisting Hand Assessment (AHA) change. (c) Regression model contributors for COPM change. [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

older age corresponded with AHA improvement (Fig. 1, Fig. S2). The large proportion of activity goals made it difficult to distinguish the total goal count as the contributor (i.e. collinearity), so count of activity goals was removed. CIMT, TMS, sex, baseline AHA and body functions, and structure goals neither confounded nor contributed to the model and were removed. Adjusted  $R^2$  was 0.27.

#### Relationship between goal categories and perception of functional change

Spearman's rank-order correlation failed to show associations between CMOP-E or ICF categories and change COPM ( $p > 0.05$ ). COPM performance and satisfaction improved significantly and reached the minimum clinically important difference for all categories ( $\geq 2$ ), with the

exception of ICF body functions and structure. However, note that the small size of this group markedly limits power.

Linear regression for change in COPM with both CMOP-E and ICF categories showed collinearity between CMOP-E self-care and leisure counts, and ICF total and activity goal counts, so the latter were removed from the models.

For change in COPM with the CMOP-E, the corrected model showed relationships with baseline COPM (standardized  $\beta=-0.57$ ,  $p<0.001$ ) and age by AHA change (standardized  $\beta=0.30$ ,  $p=0.028$ ). COPM improvement corresponded with lower baseline COPM and older age by higher AHA change (Fig. 1, Fig. S2). The relationship was confounded by self-care and productivity goal counts (>15% change in  $\beta$  with removal) and were thus retained in the model. Number of goals, sex, CIMT, TMS, baseline AHA, and age neither confounded nor contributed to the model and were excluded. Adjusted  $R^2$  was 0.32.

For change in COPM with the ICF, the corrected model showed relationships with baseline COPM (standardized  $\beta=-0.54$ ,  $p<0.001$ ) and age by AHA change (standardized  $\beta=0.32$ ,  $p=0.020$ ). As with the model for CMOP-E, COPM improvement corresponded with lower baseline COPM and older age by higher AHA change (Fig. 1, Fig. S2). The model was confounded by TMS, participation goal count, and the total goal count (>15% change in  $\beta$  with removal) and they were thus retained in the model. CIMT, sex, baseline AHA, and body functions and structure goals neither confounded nor contributed to the model, and were removed. Adjusted  $R^2$  was 0.32.

## DISCUSSION

School-aged children and their families favoured certain types of goals. Goals related to self-care and leisure were significantly more common. Children with lower baseline ability as per the BBT chose more self-care goals, whereas those with higher baseline ability chose more leisure goals. Intuitively, it is likely that self-care takes priority over leisure goals, but those children with higher baseline ability were likely to be more independent with self-care. This affirms that children tend to choose goals that are most relevant and meaningful to them.

Of interest is that the BBT, which is skill-based and best aligned with ICF body functions and structure, revealed a relationship with goal choice; whereas the AHA, which reflects activity, did not. This highlights the importance of considering the spectrum of function as described by the ICF in planning interventional trials.

Females selected a higher percentage of self-care goals than males. Goals included doing a ponytail ( $n=5$ ) and painting fingernails ( $n=4$ ), and suggests that females place a priority on self-care goals. It is important that goal choices are driven by the child and family, and are relevant to the individual's everyday life.

Productivity is not necessarily less important than other CMOP-E domains to children and families. Play activities

were coded under leisure, although play is considered to be the productivity of children. Additionally, average participant age was 11 years 7 months; productivity in terms of school-related function may be more important for older children for whom school is more resource-intensive and is involved in shaping future career options. Indeed, there was a trend for older children to have a higher percentage of productivity goals.

Greater AHA change was associated with more productivity goals as well as older age. The sizes of these effects were small. Nevertheless, it may point to a benefit associated with productivity goals and older age, and subsequent impact on motor outcome. Examining the circumstances under which goals shift focus toward productivity is important, as inclination for these types of goals may also point to amplified motivation and readiness for participation in rehabilitation.

Consistent with others' investigations of child and family goals, there was a strong preference for activity-related goals.<sup>27</sup> The COPM is designed to identify occupational performance issues and encourages reflection on challenges related to activity. For example, if supination is identified as a goal, the therapist would typically prompt for how everyday activity is impacted by supination. Further, families may have perceived the intervention to be activity-based and accordingly chose activity-related goals. Part of the rationale for employing a camp-based model is the benefit of interaction between participants. This type of participatory intervention may also have encouraged goals related to activity and participation.

It is also possible that with additional context, goals would have been coded under participation; raters noted that coding was difficult without additional details, for example whether swimming was related to participation in a community class or swimming in deep water. Participation is important to families and is increasingly targeted in interventions.<sup>28-30</sup> Attainment of occupational performance goals may create new opportunities for participation and represent a key coaching opportunity. It is notable that both the CMOP-E and ICF categories provided valuable insight into goal selection among children in the study.

The Plastic Adaptation Stimulated by TMS and Induced Constraint for Congenital Hemiparesis After Perinatal Stroke trial found that rTMS, CIMT, and rTMS and CIMT doubled the probability of clinically significant improvement, and the biggest AHA gains at 6 months were for the group that received rTMS and CIMT.<sup>5</sup> Despite this, rTMS and CIMT did not contribute significantly to the models for AHA change or COPM change. However, this is not surprising. With 45 participants and four treatment arms, there were only 10 to 12 participants in each treatment arm. A regression model has limited statistical power to detect the effect of a treatment arm unless the difference is large. The benefit of a regression model is its ability to hold the effects of other factors constant while examining the influence of the factor of interest, in this

case goal choices and how they mapped to CMOP-E and ICF domains.

Study limitations include a small sample size and ceiling effects of outcomes. Some participants had maximum baseline scores for the COPM, and baseline COPM score was a significant contributor to change in COPM for both the CMOP-E and ICF regression models, with lower initial scores corresponding to larger change in COPM. Such measures of client perception are an important metric of the success of interventions. However, employing techniques to facilitate client reflection about function while providing scores on Likert scales may increase the sensitivity of subjective measures.

Children's and family perceptions of goal attainment are valuable indicators of the success of rehabilitation. This study did not delineate who was most responsible for the goals identified. Goal setting is a collaborative process; techniques to maximize child participation in goal setting are integral to engagement in therapy. Examining this complex process is potentially important to the success of rehabilitation. Of interest, COPM improvement was also associated with the interaction between older age and improvement of the objective motor outcome. It may be that objective motor improvements are reflected in subjective scores among older children.

Personalized goals form the foundation for rehabilitation interventions. Understanding how goal choices shape the

rehabilitation process is important to optimize outcomes for children with perinatal stroke and their families. We found some effects of the types of goals and outcomes, namely that older children and those with more productivity goals improved more on functional activity outcomes, and that older children with larger functional improvement reported larger gains on participant-rated outcomes. Despite the diversity of goal choice, ultimately these effects are small. Children chose functionally and developmentally appropriate goals. These results confirm the importance of giving children and families the freedom to choose goals that matter most to them.

## ACKNOWLEDGMENTS

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## DATA AVAILABILITY STATEMENT

Research data are not shared.

## SUPPORTING INFORMATION

The following additional material may be found online:

**Figure S1:** Participant flow and study procedures.

**Figure S2:** Analysis procedures and relevant findings.

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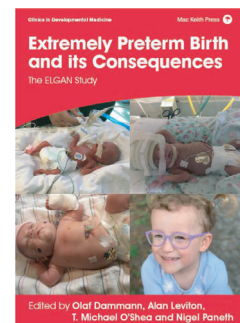
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## OBJETIVOS DE LOS NIÑOS CON PARÁLISIS CEREBRAL UNILATERAL EN UN ENSAYO DE REHABILITACIÓN DEL BRAZO Y ESTIMULACIÓN CEREBRAL

### OBJETIVO

Explorar las relaciones entre las clasificaciones de las categorías para los objetivos de rehabilitación de los niños, los resultados y las características de los participantes.

### MÉTODO

Los niños con parálisis cerebral hemiparética debido a un accidente cerebrovascular perinatal calificaron objetivos de autocuidado con la *Canadian Occupational Performance Measure (COPM)*, en español, Medida Canadiense de Desempeño Ocupacional) y completaron la *Assisting Hand Assessment (AHA)*, es español, Evaluación de la mano asistente) y el *Box and Block Test (BBT)*, en español, Test de Caja y Bloque), al inicio y a los 6 meses, en un ensayo de rehabilitación, de neuromodulación de 10 días controlado y aleatorizado, usando estimulación magnética transcraneal repetitiva. Los objetivos se clasificaron con el Modelo Canadiense de Desempeño Ocupacional y Participación y la Clasificación Internacional de Funcionamiento, Discapacidad y Salud. El análisis incluyó una regresión lineal estándar.

### RESULTADOS

Se incluyeron datos de 45 participantes (media 11 años 3 meses DE 3 años, rango 6–19 años, 29 niños, 16 niñas) sobre 186 objetivos. El porcentaje del objetivo de autocuidado se correspondió con el BBT basal por edad (estandarizado  $\beta=-0,561$ ,  $p=0,004$ ). El porcentaje del objetivo de ocio se correspondió con el BBT inicial (estandarizado  $\beta=0,419$ ,  $p=0,010$ ). El cambio en la AHA se correspondió con los objetivos de productividad (estandarizado  $\beta=0,327$ ,  $p=0,029$ ) y la edad (estandarizado  $\beta=0,481$ ,  $p=0,002$ ). El cambio en la COPM correspondió con la COPM inicial y la edad según el cambio de la AHA ( $p<0,05$ ).

### INTERPRETACIÓN

Los niños más pequeños con una función motora inferior fueron más propensos a seleccionar objetivos de autocuidado, mientras que aquellos con mejor función tendieron a seleccionar objetivos de ocio. La mejoría funcional correspondió con una mayor edad y objetivos de productividad. Las puntuaciones de cambio de COPM reflejaron una mejoría funcional entre los niños mayores. Los niños eligieron objetivos apropiados a su funcionamiento y desarrollo. En consecuencia, los niños deberían ser libres para establecer los objetivos que les interesen.

## OBJETIVOS DE CRIANÇAS COM PARALISIA CEREBRAL UNILATERAL EM UM ESTUDO DE REABILITAÇÃO COM ESTIMULAÇÃO CEREBRAL

### OBJETIVO

Explorar as relações entre categorias de classificações para os objetivos de reabilitação de crianças, resultados, e características dos participantes.

### MÉTODOS

Crianças com paralisia cerebral hemiparética devido a acidente vascular perinatal pontuaram seus objetivos auto-selecionados com a Medida Canadense de Desempenho Ocupacional (COPM), e completaram os testes Avaliação da mão auxiliar (AMA) e o Teste da Caixa e dos blocos (TCB) na linha de base e aos 6 meses em um estudo randomizado controlado envolvendo 10 dias de reabilitação com neuromodulação usando estimulação magnética transcraniana repetitiva. Os objetivos foram classificados com o Modelo canadense de Desempenho Ocupacional e Engajamento, e a Classificação Internacional de Incapacidade, Funcionalidade e Saúde. As análises incluíram regressão linear padrão.

### RESULTADOS

Dados de 45 participantes (média 11a 3m DP 3a, variação 6–19a, 29 do sexo masculino, 6 do sexo feminino) sobre 186 objetivos foram incluídos. A porcentagem de objetivos de auto-cuidado se associou à linha de base do TCB por idade ( $\beta$  padronizado= $-0,561$ ,  $p=0,004$ ). A porcentagem de objetivos de lazer se associou à TCB de linha de base ( $\beta$  padronizado= $0,419$ ,  $p=0,010$ ). A mudança na AMA foi relacionada aos objetivos de produtividade ( $\beta$  padronizado= $0,327$ ,  $p=0,029$ ) e idade ( $\beta$  padronizado= $0,481$ ,  $p=0,002$ ). A mudança na COPM foi relacionada à mudança na COPM na linha de base e idade pela mudança na AMA ( $p<0,05$ ).

### INTERPRETAÇÃO

Crianças com menor função motora tiveram maior probabilidade de selecionar objetivos de auto-cuidado, enquanto aquelas com melhor função tenderam a selecionar objetivos de lazer. A melhora funcional se relacionou com maior idade e objetivos de produtividade. Os escores de mudança da COPM refletiram melhora funcional entre crianças mais velhas. As crianças escolheram objetivos funcional e desenvolvimentalmente apropriados. Consequentemente, as crianças devem ser livres para decidir o que é importante para elas.