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Enabling physical activity participation for children and youth with disabilities following a goal-directed, family-centred intervention



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ABSTRACT

Background: There is a paucity of research demonstrating the optimisation and maintenance of participation outcomes following physical activity interventions for children and youth with disabilities.

Aim: To evaluate changes in physical activity participation in children with disabilities following a goal-directed, family-centred intervention at a healthsports centre, and to identify factors influencing participation following the intervention.

Methods and procedures: A mixed methods pre-test post-test cohort design was applied. Recruitment occurred over a 12 month period during standard clinical service provision. The Canadian Occupational Performance Measure (COPM) was administered to children and parents pre (T1) and post-intervention (T2), and at 12 weeks follow-up (T3). Goal Attainment Scaling (GAS) was applied to assess outcomes at 12 weeks follow-up (T2–T3). Qualitative inquiry described barriers to goal attainment at T3.

Outcomes and results: Ninety two children with a range of disabilities (mean age 11.1yr; 49 males) were included in the study. Statistically significant and clinically meaningful improvements in parent ratings of COPM performance and satisfaction of participation goals were observed following intervention. Ratings at 12 weeks follow-up remained significantly higher than baseline, and 32% of children attained their COPM-derived GAS goal. Environmental factors were the most frequent barrier to goal attainment following intervention.

Conclusion and implications: These results provide preliminary evidence for goal-directed, family-centred interventions to optimise physical activity participation outcomes for children with disabilities.

What this paper adds

Children and youth with disabilities participate in alarmingly low levels of physical activity. In contrast to previous research attempting to optimise physical activity outcomes, the intervention model in this study is centred on a participation- and environment-focused approach. Our findings indicate the potential for goal-directed, family-centred interventions to improve physical activity participation outcomes in children and youth with disabilities. Additionally, this study provides insight into factors that may

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influence the sustainability of physical activity behaviours acquired from interventions, particularly in relation to the environment. To our knowledge, this is one of the first studies to evaluate participation as the primary outcome measure in a physical activity intervention in children and youth with disabilities. Future studies using randomised, controlled designs are needed to provide higher level evidence for the effectiveness of this approach.

1. Introduction

Enabling participation in physical activity is an important goal for children and youth with disabilities, parents and health professionals. It is widely acknowledged that children and youth can experience health and psychosocial benefits from regular participation in physical activity. However, children and youth with disabilities are more restricted in their physical activity participation than their typically developing peers (Maher, Williams, Olds, & Lane, 2007; Van den Berg-Emons et al., 1995), and are less active as they become older (Claridge et al., 2015; MacDonald, Esposito, & Ulrich, 2011). The need to identify strategies that facilitate meaningful involvement in physical activity is recognised as an urgent priority (Peterson, 2015).

A range of environmental, personal and activity-related factors affecting physical activity participation in children and youth with disabilities have been identified (Kang, Zhu, Ragan, & Frogley, 2007; Lin et al., 2010; Shields, Synnot, & Barr, 2012; Verschuren, Wiart, Hermans, & Ketelaar, 2012). Recently, emphasis has been placed on the importance of the environment in enabling a child's participation (Anaby, Law, Feldman, Majnemer, & Avery, 2018; Darrach et al., 2011; Law, Anaby, Imms, Teplicky, & Turner, 2015); increasing accessibility, decreasing negative attitudes, and ensuring staff are adequately trained to adapt activities for children and youth if required (Verschuren, Wiart, & Ketelaar, 2013). Furthermore, it has been suggested that attempts to increase children's activity should target the whole family (Timperio, Salmon, & Ball, 2004; Willis et al., 2017), and engage communities and municipalities (Gorter, Galuppi, Gulko, Wright, & Godkin, 2017).

There is a strong evidence base in the paediatric rehabilitation literature that supports the efficacy of goal-directed and family-centred interventions to enhance outcomes across all domains of the International Classification of Functioning, Disability and Health (ICF) (Novak et al., 2013). Combined use of the Canadian Occupational Performance Measure (COPM) and Goal Attainment Scaling (GAS) has been suggested as beneficial in the assessment of outcomes in paediatric rehabilitation interventions, as they provide different but complementary information about goal progress (Cusick, McIntyre, Novak, Lannin, & Lowe, 2006; Keenan, King, Curran, & McPherson, 2014). These measures enable the development of personalised outcomes, with the COPM also able to be utilised as a self- and proxy-report measure. The COPM and the GAS have previously been employed as outcome measures in interventions targeting leisure participation in children and youth with disabilities (Imms, Mathews, Nicola Richmond, Law, & Ullenhag, 2015; Law et al., 2015).

While exercise programs for children with disabilities have become a contemporary focus of intervention, limited studies have demonstrated improvements in the participation outcomes of participants. Recent systematic reviews concluded that training interventions and body function-focused approaches demonstrated little effect on participation (Adair, Ullenhag, Keen, Granlund, & Imms, 2015; Bloemen, Van Wely, Mollema, Dallmeijer, & Groot, 2017; Reedman, Boyd, & Sakzewski, 2017). These reviews also reported that few intervention studies have focused on participation as a primary outcome measure (Adair et al., 2015). Although we know that exercise programs can be beneficial in children with disabilities, training interventions alone are not enough for them to stay physically active (Gorter, 2017). Currently, there are limited studies that demonstrate the optimisation and maintenance of an individual's physical activity participation at a community level, and in the long-term (Van der Ploeg et al., 2006; Van der Ploeg et al., 2007).

The purpose of this study was to evaluate change in physical activity participation following a goal-directed, family-centred intervention in children and youth with a disability immediately post-intervention and at 12 weeks follow-up. We hypothesised that i) the intervention will increase perceived (parent and child) performance and satisfaction of individual physical activity participation goals post intervention (T2) and at 12 weeks follow up (T3); and ii) children will attain goals relating to physical activity participation in their local community set post-intervention (T2). Additionally, we aimed to explore the factors affecting goal attainment in a child's local environment following intervention (T2–T3), as reported by the parent.

2. Methods

2.1. Study design

A pre-test post-test cohort design was used to determine changes in physical activity goal attainment, performance and satisfaction following a child's participation in the Local Environment Model (LEM) intervention at Beitostolen Healthsports Centre (BHC), and to determine whether participation outcomes achieved from the intervention could be transferred into the child's local community. This study was an evaluation of a clinical program that has longitudinal outcome measurement embedded within it. Ethics approval for this study was obtained from the Norwegian Regional Committee for Medical and Health Research Ethics, section South-East C (S-08658a 2008/18016), and The University of Western Australia (RA/4/1/8263).

2.2. Participants

Recruitment occurred over a 12 month period using consecutive sampling during standard clinical service provision at BHC. Children were eligible to participate in this study if they were a) participating in a stay at BHC in a Local Environment Model group,

b) between 5 and 17 years of age, and c) had parents who also consented to participate. Eligibility criteria for participating in the LEM are broad and non-specific (i.e. children aged 5–17 years with activity limitations and participation restrictions, as identified by a medical practitioner), thus no disability types were excluded.

2.3. Description of intervention

BHC is a specialist rehabilitation centre in Norway, seeking to enhance lifelong activity and participation for children with disabilities in their local environments (Dalen, Nyquist, Saebu, Roe, & Bautz-Holter, 2013). Using an ecological model, rehabilitation programs at BHC are designed to change the characteristics of the task and/or environment as a means of facilitating participation in physical activities. The LEM intervention is underpinned by principles of adapted physical activity (Hutzler & Sherrill, 2007) and situated learning theory (Lave & Wenger, 1991). The intervention is considered a learning process, with the acquisition of new skills, activity preferences, and physical activity behaviours evolving from involvement in activities. The LEM is goal-directed and family-centred, with emphasis on cooperation with local communities to facilitate long-term physical activity participation.

Prior to the commencement of the program, a multidisciplinary field team of allied health professionals from BHC travel to the local community of the group coming to stay the Centre. The purpose of this meeting is to engage children, parents, and local service providers (allied health, education, leisure) from the same municipality in the preparation, intervention and follow-up stages of service delivery.

The intervention is delivered at BHC, where groups of 8–10 children and their parents stay for 19 days. The intervention is intensive, consisting of physical, social and cultural activities, and extensive use of the outdoor facilities 2–5 h a day, six days a week. The intervention is based on the child's goals (e.g. learning to ski), but also designed to introduce children and their families to new and different physical activities and participation experiences (e.g. rock climbing). During the stay, parents participate in a specially designed 'Parental Guidance Program', that provides knowledge and practical experience focused on how parents can facilitate their child's participation at home and in the community. Additionally, local service providers of each child are invited to participate in a short training course designed to provide strategies to adapt environments, and to connect service providers from the same municipality to encourage collaboration. These programs are designed to emphasise the role of parents and local service providers as facilitators to their child's participation in physical activity in local communities.

Twelve weeks after families return home, the same field team travels back to the local community of the group. The primary objective of this meeting is to map each child's progress towards the achievement of their goals, discuss any barriers families may still be facing in accomplishing this, and support local communities to provide solutions.

2.4. Measures

2.4.1. The Canadian occupational performance measure (COPM)

The COPM (Law et al., 1990) is a clinical assessment tool used to identify client priorities in everyday tasks. Using a semi-structured interview, the COPM is a five step process which measures individually-identified focus areas in self-care, productivity, and leisure. The COPM rating scales use a 10-point scale, with a higher score reflecting a perceived better performance and increased satisfaction. A change of at least two points is considered clinically significant (Law et al., 1990). Adequate validity, excellent test-retest reliability and responsiveness to change of the COPM has been reported (Dedding, Cardol, Eysen, & Beelen, 2004).

2.4.2. Goal attainment scale (GAS)

The GAS is an outcome tool that assesses the extent to which an individual's goals are achieved in the course of intervention (Kiresuk, Smith, & Cardillo, 1994). The procedure involves defining five levels of possible outcomes for the specified goal. The levels range from the individual's current level (–2), to the level of achievement that would exceed expectations but is believed to be possible for that individual (+2). The middle level (0) represents the expected level of attainment after intervention. The GAS is reported in normalized T scores; a score of 50 corresponds to the achievement on the '0' level (i.e. goals, on average, are achieved) (Kiresuk et al., 1994).

A strength of both the GAS and COPM is their highly individualised nature, allowing participants with different goals and health conditions to be compared on the basis of goal achievement. Both measures are considered to be client-centred (Donnelly & Carswell, 2002), with good responsiveness (Donnelly & Carswell, 2002), sensitivity to change (Cusick et al., 2006), and good reliability and validity (Donnelly & Carswell, 2002).

2.5. Procedure

Outcome assessments were conducted at baseline (T1), end of intervention (T2) and at 12 weeks follow-up (T3) (Fig. 1).

At T1, children (in collaboration with their parent/primary caregiver) identified three of their most important participation goals using the COPM. The goals were based on the outcomes of the Norwegian version (Nordtorp, Nyquist, Jahnsen, Moser, & Strand, 2012) of the Children's Assessment of Participation and Enjoyment (CAPE) (King et al., 2004) and the Preferences for Activities of Children (PAC) (King et al., 2006), and identified aspirations for physical activity participation at home, at school and/or in their local community. Baseline data from the CAPE and PAC is included in publications elsewhere (Baksjøberget, Nyquist, Moser, & Jahnsen, 2017; Nyquist, Moser, & Jahnsen, 2016). Parents and children completed the COPM with an experienced occupational therapist, physiotherapist or adapted physical activity specialist. Parents completed the standard COPM using a 10-point scale.

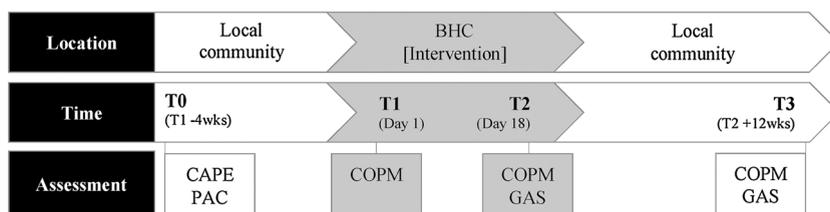


Fig. 1. Timeline of assessment.

CAPE, Children's Assessment of Participation and Enjoyment; PAC, Preferences for Activities of Children; COPM, The Canadian Occupational Performance Measure; GAS, Goal Attainment Scaling.

Children used a simplified (non-validated) 5-point scale to indicate performance and satisfaction, an attempt to make the self-report process a possibility for as many children as possible. Parents and children rated the same goals and were blinded to each other's scores.

The intervention was developed by the administering therapists, according to the children's individual goals within each group. Subsequently, the type of activities delivered in the intervention were not the same between each LEM group. The dosage of intervention was the same between all LEM groups; 2–5 h a day, six days a week, for 19 days.

At the end of the intervention (T2), the COPM was administered to each child and their parent (rating the same goals but completed separately) to monitor their level of performance and satisfaction of their physical activity participation goals. Parents and children were blinded to their previous response.

Using their responses to the COPM at T2, participants identified a physical activity participation focus for their return home collaboratively with families and administering therapists at BHC (King, McDougall, Palisano, Gritzan, & Tucker, 2000). One individualised goal was determined for each child using the GAS, to highlight the focus of ongoing goal-directed physical activity participation in the families' local environment after the rehabilitation stay.

Follow up COPM and GAS outcomes were evaluated 12 weeks post-intervention (T3). The COPM satisfaction and performance ratings of all three original physical activity goals were repeated individually by parents and children, again blinded to previous responses. The GAS goal was re-scored by the child and parent in collaboration with the primary researcher or by a therapist who did not deliver the intervention (King et al., 2000; Kiresuk et al., 1994).

2.5.1. Qualitative inquiry

During the GAS rescore at follow-up (T3), a short structured interview was conducted with parents of children who did not reach their expected level of goal attainment (i.e. GAS score of -2 or -1). Allied health professionals from BHC who travelled to the local community of the participants (and may or may not have delivered the intervention) conducted all interviews. Parents were asked to describe what (if any) barriers affected the attainment of the GAS goal. Purposive sampling and the triangulation of quantitative and qualitative data sources strengthened the credibility of interpretations (Guba, 1981).

2.6. Statistical analysis

Analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 23. Descriptive statistics were used to summarise participant characteristics. Due to the non-parametric nature of the COPM data, Friedman tests were used to compare performance and satisfaction medians over time. Post hoc analysis with Wilcoxon signed-rank tests were conducted with a Bonferroni correction applied (significance level set at $p = 0.01$). Effect sizes were determined for statistically significant comparisons using Pearson's r calculation ($r = z/\sqrt{N}$), with a value of 0.5 considered a large effect, 0.3 a medium effect, and 0.1 to be a small effect (Cohen, 1992).

Wilcoxon signed rank tests were applied to post-test GAS T-scores to determine any significant difference from the expected mean ($T = 50$). Secondary analysis was conducted by collapsing the GAS data into two categorical variables (achieved GAS goal, $T \geq 50$; and, did not achieve GAS goal, $T \leq 40$). Mann-Whitney U tests were used to determine any differences in COPM performance and satisfaction ratings (T3) between children who did and did not achieve their GAS goal during the follow-up period.

A framework approach (Gale, Heath, Cameron, Rashid, & Redwood, 2013) informed by the ICF was applied to qualitative data to identify the barriers associated with goal attainment in local communities. Open coding methods were used to classify responses, with similar codes merged and synthesised upon review. Refined codes were categorised into ICF components to describe the main factors influencing goal attainment. The coding procedure was performed individually by two of the study authors, with uncertainties resolved by discussion until consensus was reached.

3. Results

All children and parents participating in the study provided informed consent. Ninety two of 111 eligible children were included in the sample (82% retention). These children had GAS data at 12 weeks follow up (T3). For eighty of these children, parents had rated the child's performance and satisfaction level (COPM) of the goal activity for all three time points (T1–T3). Sixty-one children had also been able to independently complete the 5-point COPM at all time points (Fig. 2).

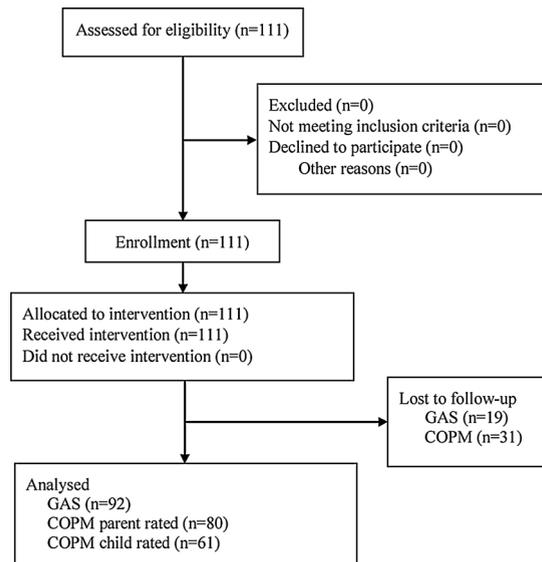


Fig. 2. Study enrolment flow diagram.

Demographic information of the 92 children (43 females and 49 males) who completed the study is outlined in Table 1. Children had a mean age of 11y 1 m (*SD* 2y 8m) and had a range of disabilities. Disabilities with the highest representation in the sample included cerebral palsy (48%) and intellectual disability (26%). Thirty nine percent of participants reported current use of a leisure support person in their local community. Data were recorded regarding the location type of 44 of the 92 children; 16.7% resided in a city, 62.5% in a rural town, and 20.8% in a remote village.

3.1. COPM

Using the Friedman test, there was a significant difference in parent ratings of COPM performance ($\chi^2(2, n = 80) = 73.12, p < 0.01$) at baseline (T1), end-of-intervention (T2) and at 12 weeks follow up (T3) (Fig. 3a). Post hoc analysis using Wilcoxon signed-rank tests indicated a significant difference in performance between T1 and T2 ($Z = -7.24, p < 0.01$), with a large effect size ($r = 0.81$). A significant difference in performance ratings between T1 and T3 ($Z = -6.67, p < 0.01$), with a large effect size ($r = 0.74$), was also observed. Fifty one percent of performance ratings at follow up remained clinically meaningful (a difference of 2 points or more) when compared to baseline. There was no significant difference in performance ratings between the end of intervention (T2) and 12 weeks follow up (T3). Median COPM performance ratings across the three time points (T1–T3) were 5.0, 7.0 and

Table 1
Participant demographics.

Characteristic	N = 92
Age, y:mo (<i>SD</i>)	11:1 (2:8)
Age range, y	6–17
Gender, n (%)	
Male	49 (53%)
Female	43 (47%)
Child's primary health condition, n (%)	
Cerebral palsy	44 (48%)
Intellectual disability	24 (26%)
Other neurological and neuromuscular disorders ^a	16 (17%)
Pervasive and specific developmental disorders	8 (9%)
Leisure support person, n (%)	
Yes	36 (39%)
No	56 (61%)
Family type, n (%)	
Lives with both parents	65 (71%)
Lives with one parent	20 (21%)
Foster care, other	7 (8%)

^a including muscular dystrophy, spina bifida and neural injuries.

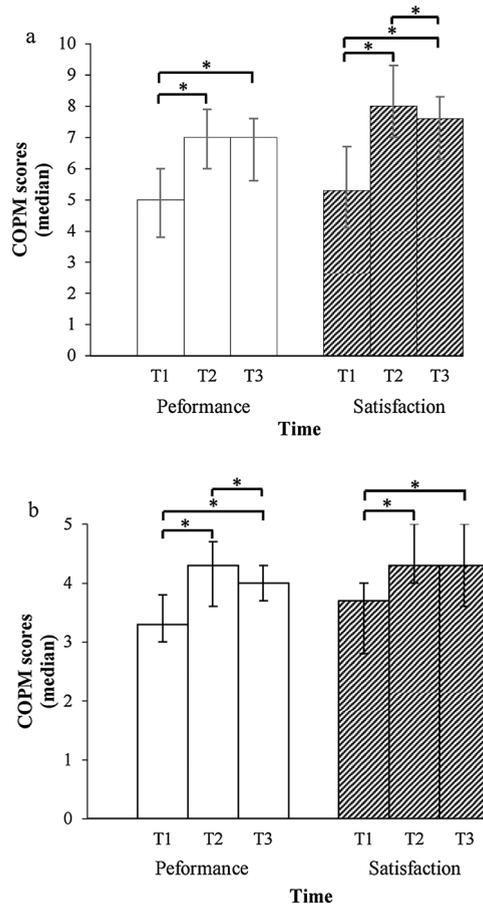


Fig. 3. (a) Parent-rated Canadian Occupational Performance Measure (COPM) performance and satisfaction scores over time. *within group difference $p < 0.01$. (b) Child-rated Canadian Occupational Performance Measure (COPM) performance and satisfaction scores over time. *within group difference $p < 0.01$.

6.8, respectively.

Significant differences were also observed in parent ratings of COPM satisfaction ($\chi^2 (2, n = 80) = 73.32, p < 0.01$) across the three time points (T1–T3) (Fig. 3a). Satisfaction ratings showed a significant difference between T1–T2 ($Z = -7.32, p < 0.01$), with a large effect size ($r = 0.82$), and between T1–T3 ($Z = -6.19, p < 0.01$), also with a large effect size ($r = 0.69$). There was a significant difference in ratings of satisfaction between the end of intervention and at follow up ($Z = -3.38, p = 0.01$) with a medium effect size ($r = 0.38$). This was not considered a clinically significant change in 70 out of the 80 parents. Median COPM satisfaction ratings across the three time points (T1–T3) were 5.3, 8.0 and 7.7, respectively.

As rated by the child on the 5-point scale, the Friedman test demonstrated a statistically significant difference in ratings of performance across the three time points ($\chi^2 (2, n = 61) = 49.87, p < 0.01$). Post hoc analysis using Wilcoxon signed-rank tests showed significant differences in performance ratings between T1–T2 ($Z = -5.92, p < 0.01$) with a large effect size ($r = 0.76$), between T1–T3 ($Z = -4.86, p < 0.01$) also with a large effect size, and between T2–T3 ($Z = -3.07, p < 0.01$), with a medium effect size ($r = 0.39$). Median performance ratings using a 5-point scale across the three time points (T1–T3) were 3.3, 4.3 and 4.0, respectively (Fig. 3b).

There were statistically significant differences in child-ratings of satisfaction ($\chi^2 (2, n = 61) = 45.87, p < 0.01$) across the three time points (Fig. 3b). Post hoc analysis showed significant differences in ratings of satisfaction between T1–T2 ($Z = 5.35, p < 0.01$), with a large effect size ($r = 0.69$). Significant differences were also observed between T1–T3 ($Z = -4.85, p < 0.01$), with a large effect size ($r = 0.62$). According to the child-ratings, there was no significant difference in ratings of satisfaction between T2–T3. Median satisfaction ratings using a 5-point scale across the three time points (T1–T3) were 3.7, 4.3 and 4.3, respectively.

3.2. GAS

Each child identified one primary goal at T2 for their return home, with a combined total of 92 measured GAS goals. For 75 children, their GAS goal was derived from their initial COPM. The remaining 17 children chose a new goal (based on their exposure to new activities during the course of their stay at BHC) to work towards upon return to their local communities.

Table 2
GAS T-scores at 12 weeks follow up.

	GAS score at 12 w follow-up				
	Much less than expected T = 30	Less than expected T = 40	Expected outcome T = 50	More than expected T = 60	Much more than expected T = 70
<i>n</i> , (% of participants)	40 (43%)	23 (25%)	22 (24%)	2 (2%)	5 (6%)
Age, y:mo (SD)	11:3 (2:6)	11.0 (3:0)	11:3 (2:7)	8:0 (1:5)	9:0 (2:5)
Age range, y	7–16	6–17	7–16	7–9	6–12
Gender <i>n</i> (%)					
Male	20 (50%)	17 (74%)	9 (41%)	1 (50%)	2 (40%)
Female	20 (50%)	6 (26%)	13 (59%)	1 (50%)	3 (60%)
Diagnostic group, <i>n</i> (%)					
Cerebral palsy	19 (48%)	11 (48%)	11 (50%)	1 (50%)	2 (40%)
Intellectual disability	12 (30%)	5 (22%)	6 (27%)	0	1 (20%)
Other neural, neurological and neuromuscular disorders	5 (12%)	6 (26%)	3 (14%)	0	2 (40%)
Pervasive and specific developmental disorders	4 (10%)	1 (4%)	2 (9%)	1 (50%)	0
Leisure support person <i>n</i> (%)					
Yes	21 (52%)	8 (35%)	6 (27%)	0	1 (20%)
No	19 (48%)	15 (65%)	16 (73%)	2 (100%)	4 (80%)
Family type <i>n</i> (%)					
Lives with both parents	29 (72%)	15 (65%)	15 (68%)	2 (100%)	4 (80%)
Lives with one parent	9 (23%)	5 (22%)	5 (23%)	0	1 (20%)
Foster care, other	2 (5%)	3 (13%)	2 (9%)	0	0

GAS, Goal Attainment Scale; SD, standard deviation.

All GAS goals were related to participation in physical activity. Fifty five percent of goals were pool-based and swimming activities, 11% bike and cycling activities, 9% activities in the snow (e.g. alpine skiing, cross country skiing), 8% activities in a sports hall (e.g. el bandy, school games), 8% horse riding, 4% rock climbing and the remaining 5% were classified as ‘other outdoor land and water activities’ (e.g. boating).

3.2.1. Goal attainment

The GAS T-scores for this analysis had a possible range from 30 to 70, with an expected mean of 50. Thirty two percent of children achieved a T-score equal to or greater than 50, indicating their achievement of the expected, more than expected or much more than expected outcome on their participation goal in their home community. Fifty seven percent of children made some progress ($T \geq 40$) towards their GAS goal. According to Wilcoxon signed rank tests, the median post-test T-score ($mdn = 40.0$) was significantly lower than the expected mean of 50 ($Z = -5.95, p < 0.01$). Characteristics of participants in relation to post-test T-scores can be seen in Table 2.

Following the categorisation of GAS data, Mann Whitney *U* tests indicated no significant difference in COPM performance ($p = 0.126$) or satisfaction ($p = 0.934$) scores between children who achieved their GAS goal ($n = 26$) and children who did not ($n = 54$).

3.2.2. Barriers to participation in local communities

Qualitative data regarding barriers to participation and/or reasons for not attaining expected outcomes were captured from the 51 of the 63 participants with GAS rescores of -2 ($n = 40$) or -1 ($n = 23$). Eleven of the 23 participants with a T-score of 40 reported that they were satisfied with their current level of goal attainment. Along with one participant with missing data, these participants did not contribute to this qualitative sample ($n = 51$). The two coding authors (CW, AU) agreed on 98% of the codes, with the discrepancies resolved through discussion.

Data of participants with much less or somewhat less than expected outcomes who were experiencing barriers to goal attainment is presented in Table 3. Environmental factors were the main barrier, described by 61% of participants. Body function and structure-related barriers were identified by 25% of participants. Seven participants indicated that they were currently participating in active recreation activities, but no longer working towards their identified GAS goal.

4. Discussion

Findings from this study indicate the potential for goal-directed, family-centred interventions to improve physical activity participation outcomes in children and youth with disabilities. In contrast to previous research attempting to optimise physical activity outcomes (Bloemen et al., 2017), the intervention model in this study utilised a participation- and environment-focused approach. To our knowledge, this is one of the first studies to evaluate participation as the primary outcome measure in a physical activity

Table 3

Barriers related to goal attainment at follow-up, described by 51 participants who did not attain their GAS goal.

ICF component	Barrier to goal attainment	n/51 (%)
Body functions and structures	Illness	7 (14%)
	Surgery/medical procedure	4 (7%)
	Motivation	2 (4%)
	Total	13 (25%)
Activity and participation	Participating, but not working towards specific GAS goal	7 (14%)
	Total	7 (14%)
Environment	Access to services and equipment	14 (27%)
	Climate/seasonal	8 (16%)
	Lack of support/guidance	5 (10%)
	Time	3 (6%)
	Friends do not participate in this activity	1 (2%)
	Total	31 (61%)

ICF, International Classification of Functioning, Disability and Health; GAS, Goal Attainment Scale.

intervention for children and youth with disabilities.

Our results reveal positive trends in physical activity participation in a child's home community following intervention at a Healthsports centre. Statistically significant and clinically meaningful improvements on COPM performance and satisfaction were observed following intervention at BHC, and both child- and parent-rated performance and satisfaction scores at follow up remained significantly higher than baseline. Whilst 51% of individual scores for parent-rated performance at follow-up remained clinically meaningful when compared to baseline, the median group change did not reach clinical significance (> 2 points). Characteristics of the participants lost to follow up may have biased this result; while we had complete COPM data for 101 participants from T1-T2 (i.e. 91% retention), datasets at follow up were complete for only 80 participants. As outlined in the intervention description, one of the primary objectives of the follow-up meeting (T3) is to discuss any barriers families may still be facing in attaining their participation goal, and attempt to provide solutions. This may reflect that families not present at the follow-up time point (and thus did not contribute to the final analysis) did not require further support for their child's physical activity participation in their local environment. Further, there was no significant difference in child ratings of satisfaction of performance of participation goals at follow up compared to post-intervention. The intervention at the Healthsports centre, with focus on learning and mastery experiences through involvement in activities, may assist in improving a child's self efficacy and sense of self in the performance of the goal activity in other environments. The promising results of this study add to the growing number of interventions enhancing participation outcomes for children and youth with disabilities (Anaby et al., 2018; Imms et al., 2015; Law et al., 2015).

Despite the results demonstrated in the COPM, only 32% of children in this study achieved a T-score of fifty or above (expected, or greater than expected level of achievement) on their GAS at 12 weeks follow-up. Importantly, 57% of children made some progress ($T \geq 40$) towards their GAS goal. These results may suggest that the 'O' score (expected outcome) on the GAS exceeded what was possible to achieve in 12 weeks. Qualitative inquiry at follow up described that almost half of participants who did not attain expected outcomes (as rated by the GAS) were satisfied with their current progress towards their physical activity goal, or were participating in physical activities not specified on the GAS. A significant focus of the intervention at BHC is dedicated to introducing children and their parents to new and diverse physical activities. Thus, upon leaving the centre, families are equipped with the knowledge and skills of enabling participation across a variety of activities and contexts. Measuring the multiple dimensions of participation (Imms et al., 2016) in addition to goal attainment, and employing longer follow-up periods within the study design, may be necessary to more accurately document changes in physical activity participation in future interventions.

Environmental factors were identified as the main barrier to goal attainment at 12 weeks follow-up. This is in line with the growing body of literature identifying environmental factors as a major determinant of participation of children and youth with disabilities (Anaby et al., 2013). In this study, barriers relating to services in the community were the most common environmental barrier described by children and families following the intervention. Verschuren et al. (2013) have previously described that families classified in the intention and action stage of behavioural change (e.g. families participating in an intervention) were more likely to identify barriers related to facilities, programs or the social environment than families at the pre-intention stage. Previous interventions intended at increasing community leisure participation for youth with disabilities also highlighted service-related barriers (e.g. registration fees) as a primary determinant to ongoing participation in activities (Law et al., 2015). These results highlight that it is equally important to ensure the accessibility of environments, and specifically services, to enhance the sustainability of acquired physical activity behaviours following interventions. Encouragingly, Zwinkels et al. (2015) have recently published their protocol of the 'Sport to Stay Fit' intervention to investigate if an after school sport program can sustain the positive effects of a standardised interval training intervention. Although outcome measures relate primarily to physical fitness (Zwinkels et al., 2015), enabling access to a community program after the intervention addresses key service-related barriers identified in our study, and others.

Whilst the distinctive nature of this intervention must be acknowledged, there are a number of implications that are transferable across clinical settings. Active participation in goal setting and choice in meaningful activity may be essential for the physical activity behaviours children with disabilities adopt. Care must be taken in future studies and in practice to ensure that the goals constructed for interventions are framed as participation goals (and not activity or body function goals), if physical activity participation is the

intended outcome (Imms et al., 2016; Imms et al., 2015). Further, the family-centred nature of this intervention involves parents' active engagement in physical activity sessions. Involving parents within interventions, in addition to the goal setting process, may be an essential consideration for the continuation of physical activity behaviours once an intervention has ceased (Willis et al., 2017).

There are several methodological limitations of this study. As there was no control group, it is not possible to separate the outcomes of intervention from other influencing effects. However, the pre-test post-test design enabled us to enrol a large number of participants and demonstrate the replication of the effect of the intervention across different goals and environments. Importantly, it facilitated the evaluation of a model of service as it is delivered; this must be highlighted as a strength of the study, as it enables new knowledge generated from the research to be implemented directly into clinical care. Using repeated measures throughout a longer follow-up period post-intervention would have provided more information about goal attainment, especially as participants indicated high levels of satisfaction with their progress towards their goal at 12 weeks. To increase the participation of children in the goal setting process, a five-point scale on the COPM was used. As this is not a standardised or validated version of the instrument, clinically significant changes in performance and satisfaction could not be determined. Furthermore, obtaining information regarding the facilitators to goal attainment is equally as important as understanding the barriers. This is recommended for future studies. Finally, our understanding may be further limited without data describing parent educational level, socioeconomic status, and a child's functional level. Obtaining information regarding function is not a part of standard clinical practice at BHC – anyone of any ability is able to participate, function is not a barrier nor a primary intervention target. Generally, if an individual has a leisure support person to assist their participation in activities, it is indicative of a lower functional level. Almost 40% of children in this study had a leisure support person in their home community.

5. Conclusion

The results of this study provide preliminary evidence for goal-directed, family-centred interventions to optimise participation in meaningful physical activities for children and youth with a disability. The participation-focused intervention improved the performance and satisfaction of individual physical activity participation goals. This study provides insight into factors that may influence the sustainability of physical activity behaviours acquired from interventions, particularly in relation to the environment. Future studies using randomised, controlled designs are needed to provide higher level evidence for the effectiveness of this approach.

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