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Implementation of physical activity interventions for children and young people with intellectual and developmental disabilities: an international modified Delphi study

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ABSTRACT

Objectives This study aimed to establish consensus on items to be included in professional guidelines supporting clinical practitioners and community organisations to effectively implement physical activity (PA) interventions for children and young people with intellectual and developmental disabilities.

Methods A modified Delphi study was conducted in two stages. First, a roundtable discussion was held with a steering panel of 12 experts in the field to inform initial items for consideration within the Delphi survey. This was followed by a two-round survey of a wider panel of international experts to establish consensus of agreement on the items that should be included in implementation guidelines for PA interventions for this population ensuring relevance across geographical and cultural contexts.

Results 46 experts from eight countries, academics and practitioners in the field of PA took part. Consensus was reached on 73 items for inclusion in implementation guidelines. These included items related to context for the PA (eg, familiar spaces, community needs assessments and marginalised communities), activities to support implementation (PA prioritisation and facilitator training) and key outcomes to measure from individual (eg, participation in and enjoyment of PA) to systems level (eg, drop-out, reach and number of PA opportunities).

Conclusion The items identified through this study will be incorporated into professional guidelines supporting effective and sustainable implementation of PA interventions for children with intellectual and developmental disabilities. This will include using cross-sector collaboration between health, education and community services; workforce training and support; accessible infrastructure and resources; family engagement; and system-level monitoring and evaluation.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ We know that children with intellectual and developmental disabilities are less active than their typically developing peers. While interventions to address low physical activity (PA) levels are effective, long-term sustainability and scalability of these interventions is poor.

WHAT THIS STUDY ADDS

⇒ There is currently no available guidelines for professionals to better design and implement PA interventions among this population. This study identifies important contextual and implementation factors that will inform the development of guidelines for professionals and practitioners to better implement PA interventions in their communities.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The information from this study will support multisectoral approaches to address the physical health of children and young people with intellectual and developmental disabilities. Our findings offer policymakers, commissioners, local planners, sports and recreation organisations and facilitators a deeper understanding of the role of context and offer a range of implementation strategies and outcomes that could promote and sustain PA engagement with this population.

BACKGROUND

The WHO has emphasised the significance of physical activity (PA) as a crucial opportunity to improve and sustain physical health.[1] However, compared with their typically developing peers, children and young people (aged up to 25 years old) with impairments in intellectual functioning and adaptive behaviour that originate during the developmental period, or intellectual and developmental disabilities (IDD), spend less time being physically active and increased time in sedentary behaviours.[2–4] They also experience numerous barriers to accessing and engaging with PA opportunities, beyond those experienced by their peers, for example, PA

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professionals' lack of knowledge and experience working with individuals with IDD, stigmatising attitudes in relation to ability and engagement and a lack of opportunities that meet their unique needs.[5–8]

Theoretically underpinned and multicomponent interventions have demonstrated positive effects in improving PA levels, executive functions and health-related outcomes for children and young people with IDD.[9] However, the evidence for the sustainability of these interventions and impact on long-term engagement in PA is ambivalent. This emphasises the need to understand the contextual factors and strategies to be considered during intervention implementation to support sustained PA and decrease sedentary behaviour.[10] Implementation science may play a crucial role in enhancing the long-term success of PA interventions for individuals with IDD across the lifespan.[11]

Implementation science is the rigorous study of the methods and strategies to promote the systematic uptake of evidence-based practices and interventions into regular use by practitioners and policymakers.[12] It aims to understand and improve contextual factors and processes that influence successful integration of research into 'real-world' settings.[13] Appropriate development and application of implementation strategies, with key collaborators, can boost the long-term acceptance, adoption and maintenance of effective PA interventions.[14] This approach helps address access disparities and scales interventions to reach more children and young people with IDD.[15]

National and international guidelines exist with recommendations for the frequency, volume, intensity and type of PA for children and young people with disabilities.[16 17] However, to date, no guidelines exist on how best to implement PA interventions to support children and young people with IDD to reach recommended levels of PA and maintain behaviour change. With the need for greater understanding of implementation science and strategies when implementing PA interventions for children and young people with IDD, the present study aimed to establish a consensus on items that should be included in international guidelines to support practitioners and community organisations to effectively implement these interventions. Input was sought from experts based in different countries to ensure applicability across geographical and cultural contexts.

METHODS

Design

A two-stage modified Delphi study was conducted between February and July 2024. A Delphi survey is an iterative methodology for reaching a consensus on a given topic among a panel of experts.[18] The process involves a predetermined series of 'rounds' in which the panel is asked to rate a series of items, aiming to reach a predefined level of agreement or consensus, among the panel on each item.[19] This study was considered 'modified' as the items presented to the expert panel for rating and ranking were devised through (1) a review of existing literature and (2) a roundtable discussion with a multidisciplinary 'steering' group of researchers and practitioners in the field (stage 1 outlined below). This approach has been used extensively in the medical, social and behavioural sciences.[20 21]

The decision was made a priori that the survey would consist of two rounds, and consensus of agreement was defined as 70% agreement of importance from respondents for each item to be retained (70% of respondents rating each item either 4 (important) or 5 (very important)).[22]

Patient and public involvement

Patient and public involvement (PPI) informed the development of this project by highlighting the disparities in the provision of PA interventions for children and young people with IDD, emphasising the need for more equitable access and tailored support. PPI activity was conducted across three consultation meetings. PPI participants included children and young people, parents and caregivers, teachers from special educational needs settings, paediatric physiotherapists and members of community sport and leisure groups supporting individuals with IDD. These consultations provided opportunities for participants to share views on practical and acceptable approaches to PA, including considerations relevant to participation, engagement and feasibility of PA intervention implementation.

DATA COLLECTION

Literature review

A literature review of PA or exercise interventions for children and young people with IDD was conducted by systematically searching four online databases (PubMed, Scopus, CINAHL, Web of Science) (see online supplemental table 1). Titles were screened to identify systematic reviews conducted on PA interventions for the target population. Nine systematic reviews were identified that included a measure of PA as an outcome measure of interest, including self-reported, observed, proxy-reported or device-measured PA. From these systematic reviews, 15 experimental and quasi-experimental intervention studies were identified that included PA as an outcome measure. The 15 studies were explored, applying realist evaluation principles to understand how and why interventions worked, or did not, within their specific contexts.[23] Using a realist lens we explored contextual factors, mechanisms of change, outcomes and theoretical frameworks used in intervention development.[24] The findings from the literature review were synthesised and included within the roundtable discussions of the expert steering group.

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Table 1 Roundtable expert panel participant demographics

		Frequency n (%)
Country of practice	Australia	1 (8.3)
	China	1 (8.3)
	Ireland	1 (8.3)
	South Africa	1 (8.3)
	Belgium	1 (8.3)
	Finland	1 (8.3)
	UK	3 (25.0)
	USA	3 (25.0)
Gender	Male	4 (33.3)
	Female	8 (66.7)
Professional background	Academic	4 (33.3)
	Dietician	1 (8.3)
	Physio/physical therapist	3 (25.0)
	Psychologist	3 (25.0)
	Sport, leisure or physical activity certified instructor	1 (8.3)
Experience working with children with intellectual and developmental disabilities	Clinical	8 (66.7)
	Non-clinical	4 (33.3)
Years of experience	0–5 years	2 (16.7)
	6–10 years	0 (0.0)
	11–15 years	2 (16.7)
	16–20 years	4 (33.3)
	21–25 years	1 (8.3)
	26–30 years	2 (16.7)
	>30 years	1 (8.3)

Delphi process and participants

Roundtable steering group

12 experts in PA interventions for children and young people with IDD were invited to join the expert steering group for this project (table 1). The experts were invited following inclusive principles of diversity in discipline, geography and gender. Eight women and four men, representing both high (n=10) and middle (n=2) income countries across five continents, were included in the steering group. Both clinical and non-clinical professional backgrounds were represented, with years of experience ranging from junior to senior level investigators.

Expert survey panel

For the wider survey, a panel of global experts in PA for children and young people with IDD was identified using purposive sampling. Researchers were identified using multiple sources: (1) first and last authors from individual systematic reviews published in the last 10 years (2014–2024) on PA interventions for children and young people with IDD; (2) first authors with two or more papers cited in the systematic reviews included in the reviews identified; (3) top cited authors (h-index >10) identified in a Scopus 'Researcher Discovery' search for 'physical activity, children and young people and intellectual and developmental disability'; (4) key researchers and practitioners identified by the project steering group.[18 25 26] A total of 97 experts were invited to participate in the modified Delphi survey.

Data collection

Virtual roundtable

Within stage one, the steering group was asked to join a virtual roundtable discussion. Two roundtables of six participants each were hosted virtually on Microsoft Teams to accommodate different time zones and allow input from experts across the world. An introduction to the project was provided along with an overview of the literature review findings. The expert steering group was invited to discuss key implementation strategies or considerations for interventions to enhance the PA of children and young people with IDD. Each roundtable discussion lasted approximately 1 hour.

Survey item development and piloting

Initially, 93 items for the modified Delphi survey were developed through synthesis of the literature review findings and roundtable discussions. These items were reviewed by all steering group members, after which a revised survey was collated comprising 81 items organised into three sections (figure 1):

1. Contextual items determinants or moderators that affect whether implementation of the PA intervention succeeds.
2. Intervention inputs (resources needed), activities (actions, processes or strategies carried out to implement or support the intervention, eg, staff training) and outputs (concrete, observable byproducts of activities, eg, number of training sessions delivered).
3. Outcomes considered at the individual, interpersonal and organisation or systems socioecological levels.

These three sections follow the application of a logic model framework, outlining the assumptions regarding the fundamental conditions necessary for programme implementation.[27] The survey was piloted and reviewed by five members of the research team (EB, LT, PM, TH and AS) for functionality of the interface and readability.

Delphi round 1

The Delphi survey was distributed via JISC online surveys (JISC, 2020). An invitation email explaining the background, rationale and outline of the Delphi process was sent through JISC, along with weekly reminders to complete. Personalised emails were sent to ensure the platform invitation was not blocked by email servers. The

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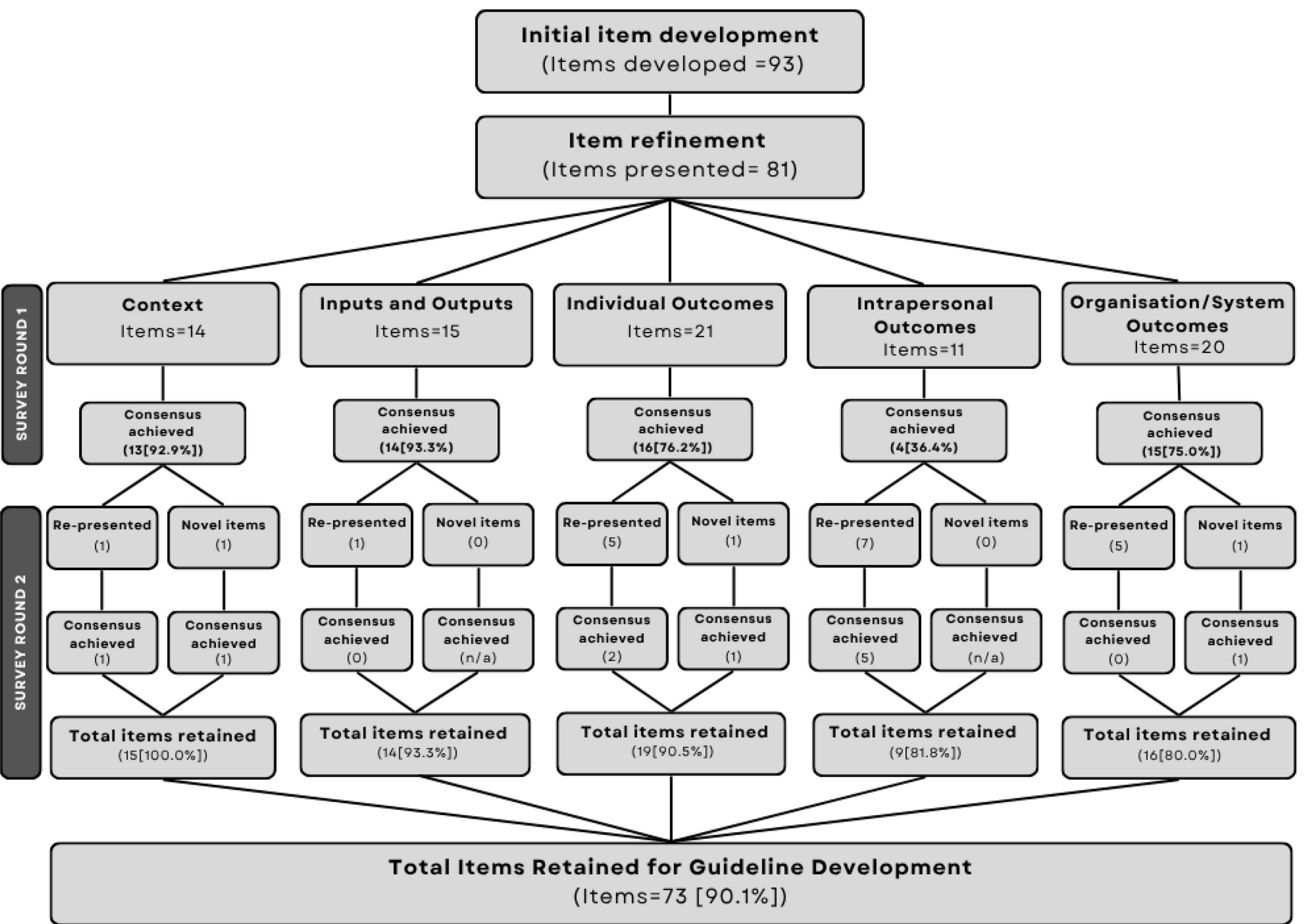

Figure 1 Flow diagram of survey item development and retention.

experts participating in the survey were asked to review each item and rate the importance of inclusion within professional guidelines to support the successful implementation of PA interventions for children and young people with IDD. Experts rated each item using a 5-point Likert scale (5=very important, 4=important, 3=unsure, 2=little importance and 1=unimportant). Opportunities were provided for participants to suggest further items they considered important or to expand on their answer to any of the items, through free-text boxes.

Delphi round 2

An interim discussion took place between the two survey rounds in June 2024 and was attended by five members of the steering group. Results from round 1 of the survey were presented in terms of levels of consensus and further presentation of items in round 2 of the survey. Qualitative responses from participants were analysed and reviewed by the research team, with a consensus decision made on whether to include any novel items in round 2. Three novel items were developed and presented to the expert panel in round 2 of the survey. Items that achieved a 70% (rounded) consensus level were retained to be included in the guidelines. Items that did not achieve the target consensus level in round 1 were re-presented in round 2 along with group-level feedback on each item and an option for each respondent to keep or change their original rating. In total, 22 items were re-presented in round 2, 19 from round 1 and the 3 novel items: 2 context items (1 re-presented, 1 novel), 1 item related to intervention inputs or outputs (re-presented), 6 individual outcome measure items (5 re-presented, 1 novel), 7 interpersonal level outcome measure items (re-presented) and 6 systems or organisation level outcome measure items (5 re-presented, 1 novel). Any respondent suggestions on improvement of items were considered before re-presentation of item.

DATA ANALYSIS

The roundtable discussions were recorded, transcribed and analysed using deductive content analysis[28] with commonly identified issues combined into single items. Content analysis was performed independently by three members of the research team (EB, LT and PM) with subsequent discussions to review developed items for consideration in the survey. Development of the item wording and disagreements on inclusion or exclusion of an item were resolved through discussion.

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Responses to the Delphi survey were exported to SPSS (V.29.0.1.0) for analysis. Descriptive statistics were presented for participant demographic data and all quantitative responses from round 1. The mean, median, SD and ranges were calculated for each item. The IQR was calculated to measure the spread of responses and understand the level of agreement among participants. SD for each measure was calculated to assess variability in responses. The percentage of agreement was calculated to determine the proportion of respondents who agreed with each item. The coefficient of concordance was calculated through Kendall's W analysis to evaluate the degree of agreement among experts within each round. Content analysis was conducted on qualitative data from free-text responses to identify any additional items to be included in round 2 of the survey. Items in round 2 were additionally assessed for 'stability of agreement' in responses to all items by each individual respondent from round 1 to round 2 using a weighted-kappa. A kappa value of 0.0–0.2 was used to represent slight agreement; 0.21–0.4 fair agreement; 0.41–0.6 moderate agreement; 0.61–0.8 substantial agreement; and 0.81–1 almost perfect agreement.[18 29]

RESULTS

46 experts completed round 1 (response rate 47%). This response is considered sufficient to produce high levels of replicability for individual stakeholder groups, such as in this current study.[30] All surveys were completed fully and included in the analysis. 39 experts completed round 2, indicating an 85% retention rate. Demographics, including years of experience and professional background of the respondents, are presented in table 2. The even split between clinical and non-clinical backgrounds

Table 2 Survey expert panel participant demographics

		Frequency (n=)	Per cent (%)
Country of practice	Australia	10	21.7
	Canada	1	2.2
	China	1	2.2
	Ireland	3	6.5
	South Africa	1	2.2
	Sweden	2	4.3
	UK	9	19.6
	USA	19	41.3
Professional background	Academic	14	30.4
	Health and well-being professional	1	2.2
	Medical doctor	1	2.2
	Nurse	1	2.2
	Occupational therapist	1	2.2
	Physio/physical therapist	17	37.0
	Psychologist	3	6.5
	Sport, leisure or physical activity certified instructor	2	4.3
	Sports development	1	2.2
	Other	5	10.9
Experience working with children with intellectual and developmental disabilities	Clinical	23	50
	Non-clinical	23	50
Years of experience	0–5 years	4	8.7
	6–10 years	8	17.4
	11–15 years	10	21.7
	16–20 years	5	10.9
	21–25 years	6	13.0
	26–30 years	3	6.5
	>30 years	9	19.6
	Not specified	1	2.2

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Table 3 Weighted kappa analysis of stability

	Kappa value	P value	Level of agreement
Context			
Q14 Organisational readiness to change	0.14	0.16	Slight
Inputs and outputs			
Q28 Use of digital resources	0.43	<0.001	Moderate
Individual level outcomes			
Q44 Executive function	0.44	<0.001	Moderate
Q46 Self-reported physical activity	0.41	<0.001	Moderate
Q48 24-hour movement behaviour	0.30	0.00	Fair
Q52 School absences	0.11	0.29	Slight
Q53 Independence in ADLs	0.13	0.17	Slight
Family, carer and facilitator level outcomes			
Q62 Physical activity and sedentary behaviour	0.33	<0.001	Fair
Q65 Perceived skill development	0.32	<0.001	Fair
Q66 Fidelity of intervention delivery	0.14	0.13	Slight
Q67 Enjoyment of physical activity	0.09	0.31	Slight
Q68 Experience of participation	0.18	0.06	Slight
Q71 Need for additional in home care	0.16	0.07	Slight
Q72 Anxiety around long term burden of health	0.13	0.19	Slight
Organisation and systems level outcomes			
Q89 Health and social care use	−0.06	0.57	Disagreement
Q90 Hospitals admission	0.11	0.21	Slight
Q91 Healthcare waitlist data	0.16	0.08	Slight
Q92 Life expectancy	0.28	0.00	Fair
Q93 Social and economic outcomes	0.21	0.02	Fair

ensured an adequate sample of at least 15 individuals per group, for a homogenous sample.[31]

Overall, in round 1, consensus agreement was achieved in 62 of the 81 presented items (76.5%), with 73 items reaching consensus after round 2 (90.1%) (figure 1). Online supplemental table 2 includes descriptive statistics and percentage consensus agreement for the full list of items. The Kendall W score (W=0.26; p<0.001) indicated a moderate level of agreement among experts in both round 1 and 2 independently.

For the items re-presented at round 2, weighted-kappa scores ranged from slight stability (K=0.12, p=0.266) to moderate level of stability (K=0.54, p<0.001) between rounds (table 3).

Context items

13 context-related items met consensus in round 1. Consensus of agreement reached between 73.9% and 95.7%. One new item was presented to the panel of experts in round 2 and achieved 94.9% agreement. One item that failed to reach consensus in round 1 (65.2%) was re-presented to the expert group in round 2 and achieved 74.4% consensus agreement. The highest degree of consensus (95.7%) was reached with three items on PA to take place in familiar spaces, conducting of an organisation needs assessment and support for marginalised and disadvantaged communities (item 1, item 5 and item 13 (table 4)).

Input and output items

14 items related to intervention inputs and outputs reached consensus in round 1 (76.1%–97.8%). One item failed to reach consensus agreement in both rounds on digital resources. The highest degree of consensus (97.8%) was reached in two items on prioritising PA and training of facilitators (items 16 and 26 (table 4)).

Individual level outcomes

16 items related to individual-level outcome measures reached the target level of consensus agreement in round 1. Consensus of agreement reached between 69.6% and 95.7%. Five items failed to reach consensus in round 1 and were re-presented in round 2. Two of these five items achieved target consensus in round 2 (71.8%–79.5%). The three items that failed to reach consensus in both rounds were on executive function, 24-hour movement behaviours and school absences. One new item was presented to the expert panel in round 2 and met consensus (92.3%). The items that reached the highest level of consensus agreement were item 44 on

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Table 4 Context, input, output and activity items to be included in professional guidelines for implementation of physical activity interventions for children and young people with intellectual and developmental disabilities

Category	Item	
Contextual considerations	1	Physical activity should be encouraged to take place in as many familiar spaces as possible (eg, school, community gym, home, residential home)
	2	Seasonal variations, in terms of availability of spaces (indoor or outdoor), weather patterns and hours of daylight, should be taken into consideration when planning activities
	3	Organisations should consider the safety of the physical environment when designing and delivering physical activity interventions
	4	A needs assessment of each child participating in the physical activity intervention should be conducted, considering the complexity of needs, including but not limited to comorbid conditions, behavioural challenges, communication skills, medication use, age, motivation and physical ability of the child
	5	A needs assessment of the organisation should be completed identifying gaps in knowledge, practices or skills of staff to deliver physical activity interventions
	6	An assessment of an organisation's readiness for change should be conducted
	7	An assessment of current perceptions of family, facilitator or organisational beliefs around the importance of physical activity for children and young people with intellectual and developmental disabilities and any possible impact on activity delivery should be conducted
	8	Organisations should assess current cultural beliefs of family or facilitators around children and young people with intellectual and developmental disabilities, and their competence, physical and cognitive ability to take part in physical activities
	9	A needs assessment should be conducted around the level of parental knowledge, skill and the extent and nature of parental involvement needed to sustain physical activity behaviours
	10	Organisations should promote physical activity with an emphasis on both fun and competition, based on the preferences and needs of the children and young people
	11	A needs assessment should be conducted to assess physical environmental readiness and prepare an inventory of physical resources/equipment (including the need for adapted equipment and physical activity spaces)
	12	Organisations should work creatively and collaboratively to source appropriate funding for physical activity interventions
	13	Organisations should assess how they can better support the physical activity of children and young people with intellectual and developmental disabilities from vulnerable, marginalised or disadvantaged communities
	14	Organisations should be aware of current national or international guidelines and policies for the physical activity of children and young people (with and without disability)
	15	An assessment should be conducted of available local resources within the participants' area of residence to explore transportation, physical activity infrastructure or a built environment that supports physical activity, for children and young people with intellectual and developmental disabilities

Continued

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Table 4 Continued

Category	Item	
Inputs, outputs and activities	16	Organisations and funding bodies should identify physical activity as a priority strategy to support the health of children and young people with intellectual and developmental disabilities
	17	Organisations should develop a physical activity policy, with a statement of intent and commitment to a principle of action for the promotion of physical activity for children and young people with intellectual and developmental disabilities
	18	Organisations should ensure an allocation of appropriate resources to the physical activity intervention including time allocation, fiscal and human resources
	19	Leadership teams within the organisation should identify core staff to act as physical activity trainers/facilitators/champions with clearly identified roles and responsibilities
	20	Organisations should ensure that children and young people with intellectual and developmental disabilities have regular access to facilities and equipment that support physical activity including outdoor play areas, sporting fields, multipurpose spaces, gymnasiums etc.
	21	Organisations should ensure the implementation of evidence-based physical activity interventions that are tailored and adaptable to children and young people with intellectual and developmental disabilities
	22	Children and young people with intellectual and developmental disabilities should have a degree of choice and autonomy in selecting and engaging in physical activity
	23	Organisations should ensure the availability of additional familiarisation sessions for children and young people with intellectual and developmental disabilities to address any additional sensory/environmental needs, communication needs, cognitive comprehension, mastery of movements and enhance well-being and comfort
	24	Organisations should engage with young people, families, communities and other local agencies to co-produce physical activity interventions
	25	Local partnerships should be built and fostered between schools, leisure providers and community groups to ensure sustainability of physical activity interventions
	26	Additional training should be provided for all individuals involved in the delivery of the physical activity intervention, such as facilitating staff, volunteers and families, to provide support to children and young people with intellectual and developmental disabilities
	27	Training should be provided for children and young people with and without intellectual and developmental disabilities to become future facilitators or peer buddies in physical activity intervention delivery to enhance sustainability
	28	Organisations should collaboratively agree to the measurement and monitoring of outcomes for the physical activity intervention, with young people with intellectual and developmental disabilities and their families
	29	Key indicators or measures used to assess the performance or effectiveness of the physical activity intervention (such as quality measures and participant satisfaction) should be agreed to collaboratively in advance, with appropriate resources made available for the collection of data

participation and engagement in PA (95.7%), item 48 on engagement and participation in social activities (92.3%) and item 42 on enjoyment of PA (89.1%) (table 5).

Family and facilitator level outcomes

Four items related to family, carer and facilitator level outcome measures reached consensus agreement in round 1. Consensus reached between 78.3% and 91.3%. Seven items failed to reach consensus in round 1 and were re-presented in round 2. Five of these seven items achieved consensus in round 2 (74.4%–87.2%). The two items that failed to reach consensus were on perceived skill development and facilitator enjoyment. The items that reached the highest level of consensus were item 51 on facilitator confidence delivering (91.3%), item 52 on intervention fidelity (87.2%) and item 50 on beliefs about PA (84.8%) (table 5).

Organisation and systems level outcomes

15 items related to organisation and systems-level outcome measures reached the target level of consensus agreement in round 1. Consensus of agreement reached between 76.1% and 95.7%. Five items failed to reach consensus in both rounds. All of these items were systems level outcomes and included measures of health and social care use, hospital admissions, healthcare waitlist data, life expectancy and social and economic outcomes.

One new item was presented to the expert panel in round 2 and met the target consensus of agreement (97.4%). The items that reached the highest level of

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Table 5 Outcome Items to be included in professional guidelines for implementation of physical activity interventions for children and young people with intellectual and developmental disabilities

Category	Item	
Individual level outcomes	30	At an individual level a measure of physical fitness (eg, fixed distance/time walk test, step test, strength) should be included
	31	At an individual level a measure of sleep quality and quantity should be included
	32	At an individual level a measure of physical health monitoring (eg, weight, number or status of physical health comorbidities) should be included
	33	At an individual level a measure of movement ability (balance, coordination, reaction time) should be included
	34	At an individual level a device-based measurement of physical activity by standardised/validated and agreed upon method (eg, step count, accelerometry) should be included
	35	At an individual level a self-reported measure of physical activity behaviour should be included
	36	At an individual level a proxy or parent/caregiver reported measure of physical activity behaviour should be included
	37	At an individual level a measure of long-term physical activity behaviours and carryover to different contexts (eg, physical activity behaviours at home, community or outside of organised physical activity) should be included
	38	At an individual level a measure of sedentary behaviour either through device-based methods or self-report should be included
	39	At an individual level a measure of social connectedness, social communication or loneliness should be included
	40	At an individual level a measure of independence in activities of daily living should be included
	41	At an individual level a measure of knowledge, motivation and self-efficacy to participate in physical activity independently should be included
	42	At an individual level a measure of enjoyment of physical activity should be included
	43	At an individual level a measure of experience of participation in the intervention should be included
	44	At an individual level a measure of participation and engagement with physical activity intervention should be included
	45	At an individual level a measure of motor skill acquisition or physical literacy should be included
	46	At an individual level a measure of quality of life should be included
	47	At an individual level a measure of emotional well-being and behaviours that challenge (eg, Strength and Difficulties Questionnaire) should be included
	48	At an individual level, a measure of the impact of the intervention on engagement and participation in social activities should be included
Intrapersonal level outcomes	49	At a family, carer or facilitator level, a measure of family, carer or facilitator physical activity levels and sedentary behaviour should be included
	50	At a family, carer or facilitator level, a measure of knowledge, attitudes and beliefs around physical activity for children and young people with intellectual and developmental disabilities should be included
	51	At a family, carer or facilitator level, a measure of confidence in supporting, delivering or facilitating physical activity for children and young people with intellectual and developmental disabilities should be included
	52	At a family, carer or facilitator level, a measure of fidelity of intervention delivery should be included
	53	At a family, carer or facilitator level, a measure of experience of participation in the intervention should be included
	54	At a family, carer or facilitator level, a measure of feelings of caregiver 'burden' should be included
	55	At a family, carer or facilitator level, a measure of the impact of participation in physical activity programme on mental health and well-being of family, carer or facilitator should be included
	56	At a family, carer or facilitator level, a measure of the need for additional in-home caring support should be included
	57	At a family, carer or facilitator level, a measure of the levels of anxiety around long-term burden of physical or mental health comorbidities should be included

Continued

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Table 5 Continued

Category	Item	
Organisation and systems level outcomes	58	At an organisation level, evidence of a physical activity strategy or policy within the organisation should be included
	59	At an organisation level, a measure of the number of children who encounter or participate in the physical activity intervention should be included
	60	At an organisation level, a measure of the number of physical activity opportunities for children and young people with intellectual and developmental disabilities that are embedded within provided services (eg, community) or curriculum (eg, school) should be included
	61	At an organisation level, a measure of the percentage of children and youth with intellectual and developmental disabilities who have regular access to facilities and equipment that support physical activity (including outdoor play areas, sporting fields, multipurpose space for physical activity and gymnasium in school) should be included
	62	At an organisation level, evidence of sustained physical, fiscal and human resource allocation to physical activity interventions for children and young people with intellectual and developmental disabilities should be included
	63	At an organisation level, a measure of the retention of staff or protection of number of hours assigned to physical activity facilitation for children and young people with intellectual and developmental disabilities should be included
	64	At an organisation level, a measure of the percentage of organisation staff who have received additional training around physical activity for children and young people with intellectual and developmental disabilities should be included
	65	At an organisation level, a measure of the percentage of leadership team who have undergone additional training around physical activity for children and young people with intellectual and developmental disabilities should be included
	66	At an organisation level, evidence of a school/organisation leadership team who is responsible for and takes ownership of the implementation of interventions that support or promote physical activity for children and young people with intellectual and developmental disabilities should be included

consensus agreement were item 68 on non-engagement and drop out (97.4%), item 59 on reach of the PA intervention (95.7%) and item 60 on the number of PA opportunities available (95.7%) (table 5).

DISCUSSION

Our modified Delphi survey has established a consensus on items that should be included in international guidelines to support practitioners and community organisations working with children and young people with IDD, to effectively implement PA interventions. Sustained engagement in and access to evidence-informed PA interventions and opportunities is vital to maintain physical and mental health and well-being in this population. The guidelines developed using the items from this Delphi study will help support practitioners and organisations to use clear implementation plans and strategies to ensure equity, inclusion and diversity in the provision, sustainability and scalability of PA interventions for children and young people with IDD.

One of the main concepts identified as important was that PA should be identified as a priority strategy for practitioners and organisations to support their health and well-being. While research has emphasised the importance of PA for health outcomes, historically, there has been a noticeable absence of policies regarding PA and health promotion within organisations working with individuals with IDD, leading to organisational cultures that do not prioritise PA.[32]

All items related to contextual factors reached consensus agreement for inclusion in implementation guidelines. This highlights the importance of understanding the context in which physical activities are taking place. Reaching underserved or marginalised groups was identified as being particularly important. While children and young people with IDD and their families face inequalities and barriers to accessing physical health and PA interventions, there is a need to understand, find and engage with those facing intersecting inequalities from compounded disadvantages due to economic deprivation or identity-based discrimination, alongside their disabilities.[33 34] Children and young people facing multiple and intersecting social disadvantages engage in low-intensity PA below the moderate intensity threshold shown to support the achievement and maintenance of good health (Brown *et al*, 2024). The results of our survey indicate that the expert respondents understand the importance of using socio-demographic-tailored strategies to reach children who experience intersecting social disadvantages.

The importance of knowledge, skills and training for practitioners to deliver PA interventions for children with

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IDD all featured within the items reaching the highest consensus. Sport coaches and PA practitioners play a key role in supporting the participation of children and young people with IDD.[35] Sport and PA coaches or practitioners have the potential to impact not only fundamental motor skill development and physical fitness of these children and young people but can also foster the development of social interaction skills and enhance inclusion.[36] Therefore, there is a need for clubs and organisations to invest in staff training to support children and young people with IDD.[37]

We sought the opinion of the expert panel on the importance of inclusion of outcome measures across all levels of the socioecological model (individual, intrapersonal, community, organisational, systems and policy levels). This is important for a comprehensive understanding of behaviour change, intervention effectiveness and evaluation of implementation processes. This multifaceted approach allows organisations to capture the complexity of PA dynamics and tailor implementation strategies accordingly.[38]

For individual outcome measures, the highest consensus of agreement achieved was around engagement with, enjoyment of and social benefits of PA. Understanding how children experience physical activities can help create more inclusive environments that foster positive peer interactions, promote participation and support social development of children and young people with IDD.[39–41]

Consensus was achieved in all organisation-level measures, including measures of the reach of interventions and the availability of opportunities for PA for children and young people with IDD. This underscores the importance of developing an adequate monitoring and evaluation system, to ensure the sustainability and continued improvement of the PA interventions implemented.[42] Consensus on all organisational level outcomes highlights the value of good governance over the interventions implemented, which is essential for measuring progress, spotting issues in delivery and accessibility and enabling adjustments to enhance intervention delivery and achieve targeted results.[43]

However, many system-level outcomes failed to meet consensus for inclusion in the guidelines. Despite research demonstrating that individuals with IDD who participate in organised sport and PA programmes have significantly lower healthcare usage,[44 45] experts within this modified Delphi survey failed to reach consensus on the inclusion of systems indicators such as health and social care usage, hospital admissions and life expectancy. This is not an uncommon finding and is similar to Vugts (2023), who found experts were most likely to vote on and reach consensus on system indicators related to structure (eg, evidence of collaboration across a system) or processes (eg, inflow, throughflow and outflow within systems) than outcomes.[46] Due to the complexity and cross-sectoral nature of systems-level outcomes,[47 48] experts may express concerns about the relevance, influence of PA on and utility of these indicators.

STRENGTHS AND LIMITATIONS

There are several limitations to this study. First, it is recognised that the modified-Delphi technique used is inherently subjective; choosing the expert panel, opinions expressed by the panel and the evaluation of feedback and modification of items presented. Additionally, we recognise that the Delphi methods used are subject to conformity bias. Steps were taken to minimise this bias, such as maintenance of anonymity between participants, implementation of pre-study analysis plans and purposive stratified sampling of experts.

The items included within the survey include complex concepts of implementation science and contextual understanding, meaning very complicated and nuanced concepts were often condensed into shortened item statements. This may have led at times to different interpretations between participants. Similarly, as we attempted to take a 'Global' perspective, we have likely missed valuable insights from the wider PA community. Additionally, despite efforts from the research team to recruit experts from across low-income, middle-income and high-income countries (HICs), most participants (95.7%) were from HIC. It may therefore be necessary to further refine the guidelines for application in different contexts, settings and geographical regions, particularly low- and middle-income countries.

A key strength of this study was defining the percentage threshold of consensus a priori.[49] A predefined consensus threshold ensured the recommendations retained for inclusion are robust and widely accepted among experts.[50] Additionally, the recruitment strategies used ensured input from a wide range of international 'expert' participants within the survey, from various professional backgrounds and beyond those experts known to the steering group.

POLICY AND PRACTICE IMPLICATIONS

Not only is it important to embed international PA guidelines for children and young people with IDD into public health policy, but it is also important to consider how these PA guidelines are implemented within multisectoral approaches (including schools, local communities and sports organisations) to address social determinants of health. Our findings offer policymakers, commissioners, local planners, sports and recreation organisations a deeper understanding of the role of the context in which such behaviours take place. Additionally, the guidelines developed from these items will offer a range of implementation strategies and outcomes that could promote and sustain PA engagement with this population across settings, consequently narrowing the gaps between policy and action. There is a need for further research and innovation into policy development to enhance PA

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promotion globally for children and young people with IDD.

At an individual and clinical level, this study highlights the importance of delivering individualised activity plans, based on an informed needs assessment, which takes account of potential barriers to activity including complexity of needs, comorbid conditions, behavioural challenges, communication skills, medication use, age, motivation and physical ability of the child. Clinicians and PA practitioners also should take account of contextual factors such as parental knowledge and activity levels, as well as their attitudes towards PA and wellness.

CONCLUSION

This modified Delphi study has identified key considerations for the implementation of PA interventions for children and young people with IDD, including contextual factors influencing, resources needed, activities to support, outputs to complete and outcomes and impacts to monitor. The items agreed on within this study will inform the development of professional guidelines for implementing PA interventions for this population. It is important that organisations implementing PA interventions for children and young people with IDD, do so with clear implementation plans and strategies to ensure equity, inclusion and diversity in the provision, sustainability and scalability of these interventions. This will aim to support best practices by encouraging the delivery of evidence-based and contextually relevant PA interventions.

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