Physical Activity among Children with Intellectual Disabilities

Subjects: Health Care Sciences & Services

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Children and adolescents with intellectual disabilities (ID) have low levels of physical activity (PA). Understanding factors influencing the PA participation of this population is essential to the design of effective interventions. Continued exploration of factors influencing PA participation is required among children and adolescents with ID. Future interventions should involve families, schools, and wider support network in promoting their PA participation together.

children and adolescents | intellectual disability | physical activity | barriers | facilitators | scoping review

1. Introduction

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that requires energy expenditure [1] and is characterized by its modality, frequency, intensity, duration, and context of practice [2]. PA promotes numerous physical and mental health benefits in children, including children and adolescents with disabilities [3][4][5]. Regular and adequate levels of PA can improve children's cardiorespiratory and muscular fitness, bone health, and cardiovascular and metabolic health biomarkers, reduce symptoms of anxiety and depression, and help to maintain a healthy weight [6]. Despite the physiological and psychological health benefits associated with PA participation, previous studies reported that children with intellectual disabilities (ID) did not meet the PA guideline of at least 60 min of moderate-to-vigorous-intensity physical activity (MVPA) per day [7][8][9]. In addition, children and adolescents with ID are less active than their counterparts without disabilities [10][11].

2. Current Insights

2.1. Searching Results

The initial search identified 1876 studies (WOS, *n* = 761; ASP, *n* = 5; MEDLINE, *n* = 507; ES, *n* = 5; ERIC, *n* = 3; PsycINFO, *n* = 109; Psychology and Behavioral Sciences Collection, *n* = 1; Scopus, *n* = 485). Thirty-three additional studies were identified through related reviews. After removing duplicates from the original sample (*n* = 1909), title and abstract screening of 1301 articles was performed, from which 1228 studies were excluded. The researchers read the full text of the remaining 73 articles and excluded another 41. Finally, 32 studies were

included in this research. **Figure 1**, adapted from the PRISMA group [12], displays the detailed search and study selection process.

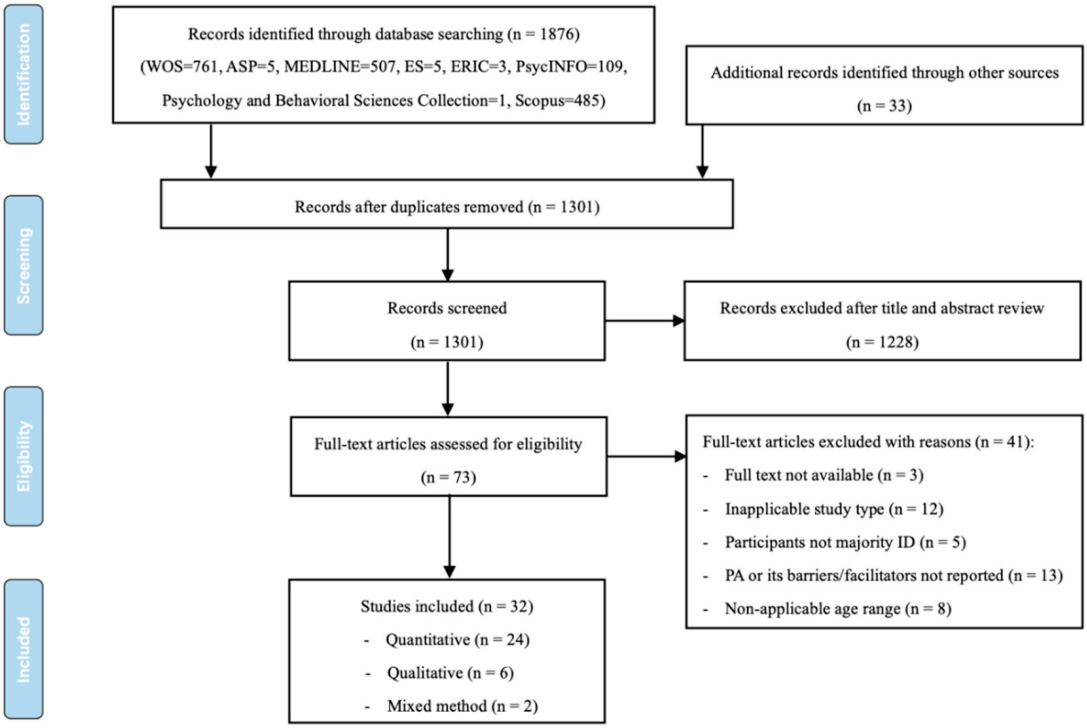

Figure 1. Flowchart of search and study selection.

2.2. Study Characteristics

Table 1 summarizes the details of the studies that met the inclusion criteria. The final 32 articles selected for review were published between 1992 and 2020, 24 of which (75%) were published after 2010. These studies the researchers conducted in the USA (12), UK (5), Canada (3), China (3), Australia (2), Iceland (1), Italy (1), the Netherlands (1), the Philippines (1), Saudi Arabia (1), Spain (1), and Trinidad and Tobago (1). A total of 24 studies employed quantitative methods of data collection, 6 used qualitative data collection methods, and the 2 remaining studies adopted mixed methods. Of the quantitative and mixed-method studies, 18 articles employed a cross-sectional design, 6 adopted intervention, one used a longitudinal design, and one utilized a case design. The six qualitative studies all employed a phenomenological design. Of the quantitative studies, 17 studies used objective measures including accelerometers (*n* = 11), pedometers (*n* = 3), heart rate monitors (*n* = 4), and quantitative observation (*n* = 6) to quantify PA. Nine studies used questionnaires as subjective measures. Two of the quantitative studies utilized more than one measurement tool. The intensity and duration of PA were presented as different ways due to different measurements. Among included quantitative studies, 17 studies used different PA d imensions including LPA, MPA, MVPA, and number of steps per day. Another 9 studies used regular PA, PA frequency, and PA perceptual characteristics based on subjective PA questionnaires. The qualitative studies used interviews (*n* = 4) and focus groups (*n* = 2) to explore the barriers and facilitators to PA among children and adolescents with ID. The mixed-method studies involved objective (e.g., accelerometers, quantitative observation, heart rate monitors) and subjective measurements (e.g., questionnaire, interviews). These two studies used different dimensions including MPA and MVPA. Of the 32 studies, 15 studies used a purposive sampling strategy,

10 studies used a convenience sampling strategy, and 7 studies did not provide an indication of the sampling strategy. The sample size ranged from 3 to 535, including one with more than 500 participants, 4 with 100 to 500 participants, 16 with 30 to 100 participants, and 11 with less than 30 participants. In all, 6 (19%) stated the use of theories, including social cognitive theory (*n* = 2), self-determination theory (*n* = 2), occupational perspective theory (*n* = 1), and dynamic systems theory (*n* = 1).

Table 1. Descriptive statistics of included studies.

First Author (Year)	Type of Study	Geographic Location	Sampling Strategy	Participant Details				Theory	Research Design	Measures
				Sample Size	Age	Gender	ID Level			
Alhusaini (2020) [13]	Quantitative	Saudi Arabia	purposive	78 (37DS/41TD)	8–12	male	DS	n/a	cross-sectional	pedometer
Pincus (2019) [14]	Quantitative	USA	purposive	3	16–18	1 male 2 female	moderate sever unspecified	n/a	intervention	quantitative observation (OSRAC-H)
Wouters (2019) [9]	Quantitative	Netherlands	purposive	68	2–18	43 male 25 female	moderate to severe	n/a	cross-sectional	accelerometer
Gobbi (2018) [15]	Quantitative	Italy	convenience	19	17.4 ± 1.7	15 male 4 female	mild to moderate	n/a	case study	accelerometer questionnaire
Johnson (2018) [16]	Quantitative	USA	could not be determined	32 (14DD/18TD)	5–9 (6.89 ± 1.11)	9/11 male 5/7 female	DD	self-determination theory	intervention	accelerometer
Robertson (2018) [11]	Quantitative	UK	purposive	535	13–20	356 male 179 female	mild to moderate	n/a	longitudinal	questionnaire
Ryan (2018) [17]	Quantitative	Canada	purposive	409	11–23	261 male 148 female	ASD ID	n/a	cross-sectional	questionnaire
Stevens (2018) [18]	Qualitative	UK	purposive	10	16–18	7 male 3 female	mild to moderate	Self-Determination Theory	phenomenology	semi-structured interview
Ptomey (2017) [19]	Mixed method	USA	could not be determined	31	11–21 (13.9 ± 2.7)	16 male 15 female	mild to moderate IDD	n/a	intervention	heart rate monitors, questionnaire, semi-structured interviews

First Author (Year)	Type of Study	Geographic Location	Sampling Strategy	Participant Details				Theory	Research Design	Measures
				Sample Size	Age	Gender	ID Level			
Einarsson (2016) [20]	Quantitative	Iceland	convenience	184 (91ID/93TD)	6–16	could not be determined	mild to severe	n/a	cross-sectional	accelerometers, questionnaire
Pitchford (2016) [21]	Quantitative	USA	convenience	113	2–21	72 male 41 female	DD	n/a	cross-sectional	questionnaire
Queralt (2016) [22]	Quantitative	Spain	convenience	35	15.3 ± 2.7	22 male 13 female	mild to moderate	n/a	cross-sectional descriptive	pedometers
Stanish (2016) [23]	Quantitative	USA	could not be determined	98 (38ID/60TD)	13–21	17/36 male 21/24 female	mild to moderate	social cognitive	cross-sectional	questionnaire
Boddy (2015) [24]	Quantitative	UK	convenience	70	5–15	57 male 13 female	ASD non-ASD	n/a	cross-sectional	accelerometers, quantitative observation (SOCARP)
Eguia (2015) [25]	Quantitative	Philippines	convenience	60	5–14	51 male 9 female	mild to moderate	n/a	cross-sectional	pedometers
Njelesani (2015) [26]	Qualitative	Trinidad and Tobago	purposive	9(parent)	(child) 10–17	(child) 6 male 3 female	moderate to severe DD	occupational perspective	phenomenology	semi-structured interviews, in-depth interviews
Pan (2015) [27]	Quantitative	China (Taiwan)	convenience	80 (40D/40TD)	12–17	30/30 male 10/10 female	21 slight 14 medium ID 3 high ID 2 total ID	n/a	cross-sectional	accelerometer
Downs (2014) [28]	Qualitative	UK	purposive	23 (teachers)	(child) 4–18	(teacher) 9 male 14 femle	ID level could not be determined	n/a	phenomenology	semi-structured focus groups
Downs (2013) [29]	Qualitative	UK	purposive	8	6–21 (16.38 ± 5.04)	3 male 5 female	DS	n/a	phenomenology	semi-structured interview
Shields (2013) [30]	Quantitative	Australia	could not be determined	68	17.9 ± 2.6	30 male 38 female	mild to moderate DS	n/a	intervention (RCT)	accelerometer

2.3. Thematic Synthesis

First Author (Year)	Type of Study	Geographic Location	Sampling Strategy	Participant Details				Theory	Research Design	Measures
				Sample Size	Age	Gender	ID Level			
Barr (2011) [31]	Qualitative	Australia	purposive	20 (parent)	(child)2–17 (9.9 ± 4.8)	10 female 6 male	DS	n/a	phenomenology	In-depth interview
Temple (2011) [32]	Quantitative	Canada	could not be determined	34 (20ID/14TD)	ID 17.8 ± 1.6 TD 16.4 ± 1.3	10/5 male 10/9 female	mild to moderate	n/a	intervention	questionnaire

	Dimensions of PA							
	Intensities of PA			Steps	Subjective PA Questionnaires			
Themes	LPA	MPA	MVPA	Steps/Day -Average Daily Steps Counts	Regular PA (Yes or No)	PA Frequency (Times Per Week)	PA Perceptual Characteristics (Perceived Exertion)	N/A
Barriers								
Individual factors								
- Physiological factors								
Conditions associated with ID								[29] [31] [37]
- Motor development								
Low motor development			[9]	[13][25]				
- Cognitive and psychological factors								
Low self-efficacy					[23]			[18]
Lack of understanding about importance of PA and its benefits to health								[28]
Preference for indoor activities							[42]	
Interpersonal factors								
- Family								

Lack of parental support	[39]		[26] [29] [31] [37]
Parents' vigilance and overprotection			[26] [31]
- Social network			
Lack of social network		[23]	[18]
Environmental factors			
- Social environment			
Inadequate or inaccessible facilities			[26]
Lack of appropriate programs			[31] [37]
Lack of public transportation	[39]		
- School environment			
Lesson contexts (management)	[36]		
Teaching behaviors (transmit knowledge)	[36]		
- Natural environment			
Poor weather			[18] [26]
Facilitators			
Individual factors			
- Physical abilities			
Physical skills	[33]		[31]

yndrome; ties; MR, Activity in CARP, the g Fitness

- Cognitive and psychological factors				
High self-efficacy			[23]	[18]
Weight loss			[20]	
Enjoyment of PA	[24]	[24]	[23]	[28] [29]
Personality traits				[31]
Caregiver's high educational level			[34]	
Interpersonal factors				
- Family				
Sufficient parental support			[17]	[18] [28] [29] [31] [37]
Positive parental beliefs			[21]	
Positive role of siblings				[31] [37]
- Social network				
Positive social interaction with peers			[11][32]	[18] [29] [31] [37]
Positive coach–athlete relationship			[17]	
Environmental factors				
- Social environment				
An exergaming context		[14]		

Adequate and available resources				[17]		
Adapted PA programs	[30]	[19][33]				[31]
- School environment						
Attending PE classes and participating PA during recess		[20][27] [35][38] [40][41]	[22][25]			[18]
Inclusive PE programs	[15]				[15]	
High autonomy–supportive climates on PA	[37]	[16]	[29]			
Lesson contexts (skill practice)		[36]		[31]	[18]	
Teaching methods			[28]			[28]
[44] A strong home-school link	[26][31]			[26][37]		[28]

ID, intellectual disabilities; LPA, light physical activity; MPA, moderate physical activity; MVPA, moderate to vigorous physical activity; N/A, not available; PA, physical activity; PE, physical education.

s with ID vailable in , such as hypotonia, t inhibited g on the ers to PA amily and (including [29], lack of information for parents on how to conduct home-based activities [37]), and parent's vigilance and overprotection [26][31] were identified as family barriers to PA participation among children and adolescents with ID. In addition, lack of social networks (e.g., lack of social connectedness with others) was also identified as an interpersonal barrier to PA participation among children and adolescents with ID [18]. At the environmental level, inadequate or inaccessible facilities [26] and lack of appropriate programs [31][37] were identified as social environmental barriers to PA participation among children and adolescents with ID. Poor weather, as one of the natural factors, prevented this population from participating in outdoor activity and thus decreased their PA [18][26].

Quantitative Studies

At the individual level, low motor development (e.g., low locomotor and object control skills) [9][13][25] was identified as a barrier that influenced MVPA or the number of steps per day among children and adolescents with ID. Low self-efficacy [23] and a preference for indoor activities [42] were identified as cognitive and psychological barriers that influenced regular PA and rating perceived exertion of PA participation among children and adolescents with ID. At the interpersonal level, lack of a social network (e.g., have fewer friends) was identified as a barrier that influenced regular PA among children and adolescents with ID [23]. At the environmental level, teacher and classroom-related factors were examined in previous studies. The results of the study found that lesson contexts organized by PE teachers (e.g., allocating the substantial amount of lesson time for management) and teaching behaviors (e.g.,

spending considerably more time transmitting physical education (PE) knowledge), which reduced opportunities for students to participate in MVPA, were identified as barriers [36].

Mixed-Method Studies

Lack of parental support [39] and lack of public transportation [39] were, respectively, identified as barriers at the interpersonal and environmental levels that influence MPA among children and adolescents with ID in one study using mixed methods.

2.3.2. Facilitators of Participating in PA

Qualitative Studies

Facilitators of PA participation among children and adolescents with ID reported by the included qualitative studies were also identified from perceptions of parents, teachers, and adolescents with ID. At the individual level, physical skills were identified as facilitators of participating in PA among children and adolescents with ID [31]. Cognitive and psychological factors, such as high self-efficacy [18], enjoyment of PA [28][29], and personality traits (e.g., enthusiastic and determined) [31] were also facilitators. At the interpersonal level, sufficient parental support (e.g., parents' positive role model, parental company and logistic supports) [18][28][29][31][37], positive role of siblings [31][37], and positive social interactions with peers [18][29][31][37] were identified as facilitators of participating in PA among children and adolescents with ID. At the environmental level, PA programs available in the community adapted for children and adolescents with ID were identified as social environment facilitators of participating in PA among children and adolescents with ID [31]. Attending PE classes [18], teaching methods, and a strong home-school link [28] were identified as school environment factors of participating in PA among children and adolescents with ID.

Quantitative Studies

At the individual level, physical skills (e.g., riding a bicycle) were identified as physical ability factors that influence MVPA among children and adolescents with ID [33]. Wanting to lose weight [20], high self-efficacy [23], and enjoyment of PA [23][24] were identified as cognitive and psychological facilitators that influence PA frequency, regular PA, LPA, and MPA among children and adolescents with ID. In addition, caregiver's higher educational level was another individual facilitator that influenced regular PA among children and adolescents with ID [34]. At the interpersonal level, sufficient parental support (e.g., parents' company) [17] and positive parental beliefs of the benefits of PA for their child [21] were identified as family factors that influence PA frequency among children and adolescents with ID. In addition, positive social interactions with peers [11][32] and positive relationships with the coach [17] were identified as social network facilitators that influence PA frequency among children and adolescents with ID. At the environmental level, an exergaming context implemented at home or at school was identified as a facilitator that influenced MVPA among children and adolescents with ID [14]. Adequacy and availability of environmental resources (e.g., access to transportation) were identified as social environment factors that influenced PA frequency among children and adolescents with ID [17]. PA programs available in the community adapted for children and adolescents with ID were also identified as facilitators that influenced LPA and MVPA

among children and adolescents with ID [30][33]. In terms of school factors, attending PE classes and participating in physical activities during school recess [20][22][25][27][35][38][40][41] were identified as key facilitators that influenced MVPA or number of steps per day among children and adolescents with ID. Inclusive PE programs (e.g., a peer-tutored PE program) [15] were also identified as school facilitators that influenced the LPA and PA frequency of children and adolescents with ID. In addition, high autonomy-supportive instructional climates [16] and PE lesson contexts focused on skill practice [36] were identified as facilitators that influenced MVPA among children and adolescents with ID.

Mixed-Method Studies

An adapted PA program using group video conferencing for the promotion of PA [19] was identified as a facilitator that influenced MVPA among children and adolescents with ID at the environmental level.

Qualitative studies help to explore and understand full-breadth issues in relation to the PA participation experienced by a specific population [45]. Therefore, it would be best suited to the profound exploration of the specific barriers and facilitators of PA participation among children and adolescents with ID [46]. However, only 19% (n = 6) of the studies included in this research employed a qualitative research design. Qualitative studies are needed to address how children and adolescents with ID participate in PA and why their PA levels are lower than their peers without disabilities [27][47]. Theoretical frameworks were designed to help comprehensively understand the relationship between factors and the mechanisms by which they affect behavior [48]. However, only 19% (n = 6) of the research used a theoretical framework to guide their studies. Studies using the behavioral theoretical frameworks are urgently needed to better understand healthy behavioral patterns and guide the development of effective interventions to promote PA among children and adolescents with ID [48][49].

Based on the social ecological model, the researchers' synthesis of the studies identified 34 factors primarily related to individual, interpersonal, and environmental elements at several levels of influence.

3. Conclusions

Based on the social ecological model, the researchers' synthesis of the studies identified 34 factors primarily related to individual, interpersonal, and environmental elements at several levels of influence. Disability-specific factors, low self-efficacy, lack of parental support, inadequate or inac-cessible facilities, and lack of appropriate programs were the most commonly reported barriers. High self-efficacy, enjoyment of PA, sufficient parental support, social interaction with peers, attending school PE classes, and adapted PA programs were the most commonly reported facilitators. Given the findings from this scoping review, there is a need for continued exploration of the barriers and facilitators of PA participation among children and adolescents with ID by more qualitative, longitudinal, and interventional studies. By understanding the relationships between barriers and facilitators and the different dimensions of PA, interventions can be better designed and adapted to en-courage greater PA participation for children and adolescents. Such work may be vital to improve this population’s health and growth.

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