


# Barriers and facilitators of physical activity in adolescents with intellectual disabilities: An analysis informed by the COM-B model

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## Abstract

**Background:** Adolescents with intellectual disabilities are insufficiently physically active. Where interventions have been developed and delivered, these have had limited effectiveness, and often lack a theoretical underpinning.

**Aim:** Through application of the COM-B model, our aim is to explore the factors influencing adolescent physical activity within schools.

**Methods:** A qualitative methodology, using focus groups with students who have mild/moderate intellectual disabilities, their parents'/carers' and teachers'. The COM-B model provided the lens through which the data were collected and analysed.

**Results:** We identified a range of individual, interpersonal, and environmental factors influencing physical activity, across all six COM-B constructs, within the context of the 'school-system'.

**Conclusion:** This is the first study to use the COM-B model to explore school-based physical activity behaviour, for adolescents with intellectual disabilities. Identification of such physical activity behavioural determinants can support the development of effective and sustainable interventions.

## KEYWORDS

adolescent, barriers, COM-B, facilitators, intellectual disability, physical activity

## 1 | INTRODUCTION

### 1.1 | Physical activity and intellectual disability

In childhood and adolescence physical activity (PA) can improve, physical fitness, cardiometabolic health, bone health, cognitive outcomes, mental health and reduce adiposity (WHO, 2020). Interestingly, many of these health benefits often track into adulthood (Gunter et al., 2012; Oh et al., 2021). Current guidelines recommend that

children and adolescents (aged 5–17 years) should do at least 60 min of moderate-to-vigorous intensity PA per day (WHO, 2020). However, reports suggest that 81% of adolescents globally, do not meet these guidelines (Guthold et al., 2020). Critically, youth with intellectual disabilities are less physically active (Healy et al., 2019; Segal et al., 2016) than their non-intellectually disabled peers. Within this population studies have identified a multitude of individual, interpersonal, and environmental barriers to, and facilitators of PA (Table 1).

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**TABLE 1** Barriers to, and facilitators of physical activity for adolescents with intellectual disabilities, identified from existing literature (barriers non-italic and facilitators italics)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
2020	McGarty et al.	Parental experiences of promoting PA	Socioecological model	Additional support needs schools and Sports Clubs.	Parents of children/adolescents with ID.	Face to face interviews	Communication and emotional levels negatively impacted children with intellectual disabilities integrating into sport and play.	Importance of social support. Parents faced high levels of social exclusion due to having a child with intellectual disabilities which impacted ability to promote and find suitable PA opportunities.	Finding inclusive opportunities. Many inclusive clubs and programmes were closing due to a lack of funding.
							<i>The benefits of inclusive clubs encouraged parents to promote PA, with improvements in confidence being consistently noted.</i>	Lack of informational support left parents feeling unequipped to find PA opportunities.	Many inclusive clubs required travel outside of the local area, which was not an option for all parents.
								Parental fears about the safety and bullying.	Parents felt that their children were excluded from mainstream clubs due to a lack of knowledge and understanding from coaches.
								Putting the child first meant parents sacrificing relationships, jobs and their own free-time.	
								<i>Parental fears about long-term health of child made them promote PA.</i>	
2019	Cleary et al.	Explore the barriers to and facilitators of all physical activity across the school day, as well as the perceptions, knowledge, and priority levels of physical activity in specialist schools for young people with cerebral palsy.	None reported	Special school	Young people with cerebral palsy, their parents, teachers and therapists.	Focus groups	<i>Four key reasons why PA was important for young people with cerebral palsy (1) health benefits; (2) cognitive development and learning; (3) their right to participate; and (4) developing independence.</i>	Positive staff-student relationships facilitated PA.	<i>School priorities—PA was promoted when academic work and PA were equally important. Importance of creating the culture to promote PA, ensuring the structures were in place including timetabling and formal goal-setting.</i>
							Physical impairments made it more challenging to engage in and sustain PA. This included: physical disabilities, poor health and illness.	Parents acknowledged the importance of physical activity for their children, and encouraged it, although they expressed a desire	School priorities could also become a barrier whenever these priorities were unclear or conflicting for example, academic

(Continues)

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
							<p>Motivation was described as complex, including changing body perceptions and group peer influences. All groups discussed the need to know what motivated each student, so that physical activity could be targeted, appealing and empowering.</p>	<p>Travel time and medical appointments meant parents placed importance on the provision of physical activity at school.</p>	<p>Staffing and environmental resources. All groups recognised the therapists as the experts and promoters of PA within the school. Teachers were implementers of PA within the school curriculum.</p>
								<p>to have fun at home, rather than focusing on therapy during family hours.</p>	<p>work taking preference over PA.</p>
								<p>Insufficient staff limited opportunities for students to be physically active.</p>	
								<p>Participants believed the schools were well resourced with specialist equipment to facilitate physical activity (e.g., including walking frames, modified bicycles, hoists, tracking systems).</p>	
2017	Stevens et al.	Understand the determinants of and factors influencing PA and diet in this population during the transition from school to adulthood	Self-determination theory	Additional support need schools.	Students with intellectual disabilities.	Interviews	<p>Motivation was described as intrinsic motivation and increased interest to participate in activities for which they have high self-efficacy and perceive themselves to be good.</p>	<p>Enjoyment of PE can be subjective. Some students did not enjoy it due to having a difficult relationship with their teacher.</p>	<p>PE offered opportunity to try different sports and for some this was their only chance to engage in PA.</p>
							<p>Providing opportunities for autonomy through leadership can encourage some students, whilst others may feel anxious and nervous if tasked with leading their peers.</p>	<p>A lack of social support can prevent students from engaging in the PA they enjoy.</p>	<p>Some participants described their lack of choice in the activities they participate in. For many participants, home life acted as a barrier to their engagement in PA.</p>
							<p>Developing competence through skill development can enhance motivation to engage in PA.</p>		<p>A lack of local facilities and transport can act as a barrier to PA.</p>

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators	Environmental/contextual
							Individual	Interpersonal
							Participants described their dislike of activities for which they have low self-efficacy, with feelings that they lack the necessary skills required of them for the activity.	The weather impacts upon ability to engage in PA.
							Identified regulation also has the potential to foster increased self-efficacy in this population. For example, watching YouTube videos on the benefits of weightlifting.	Personal finances may mean some PA is not accessible for some people.
							Teamwork and competitiveness in PA encouraged many to participate.	
							Developing social connectedness through teamwork and building a sense of belonging.	
							Students enjoy participating in PA that they find fun and enjoyable.	
2017	Melbøe & Ytterhus	Examination of the leisure participation of Norwegian youth with intellectual disabilities.	None reported	Educational and psychological counselling services and schools.	Youths with intellectual disabilities and their parents.	Interviews	Communication difficulties can act as a barrier to PA.	Leisure time PA involved mainly informal activities, very few engaged in formal activities.
							A lack of social support from peers can limit PA opportunities.	Participation in team sports was rare.
							Rely heavily upon their parents to enable them to engage in leisure time PA.	At home, many leisure time activities involved sedentary pursuits (computer).
							Social exclusion from peers whereby they do not let them participate alongside them can prevent PA.	Often rely on transport and assistance to engage in PA, which is not always readily available.
							Having relatives and friends of the family living nearby seemed to increase opportunities for PA.	Living remotely can negatively impact upon opportunities for PA.

(Continues)

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
2016	Conchar et al.	The lived experiences of a group of South African adolescents with cerebral palsy, to better understand their experience of PA and contextual factors that hinder and promote their participation.	None reported	Special needs school.	Adolescent students with intellectual disabilities.	Semi-structured interviews	Physical limitations: strength, ROM, agility and fitness, inability to perform certain tasks or lacking control over their body.	Relationships with peers, family and significant others mediated the type and level of PA they engaged in.	Many of the participants described how their participation in physical activity programmes were constrained by physical realities such as living far away from school, practical problems with transport and constraints imposed by the structure of the school day.
							Physical discomfort during PA can reduce PA participation.	Some viewed PA as an opportunity to develop relationships and feel part of a group.	Participants also described resource limitations such as a lack of sporting facilities and a shortage of staff members willing and competent to supervise physical activity programmes for individuals with motor impairments.
							Desirable changes to their body can promote PA for example, body shape and mass.	Parents' willingness and ability to expend time and resources on physical activities thus acted to enable their child's participation.	Lack of options to engage in PA that is tailored to the needs of those with disabilities.
							Understanding the health benefits of PA can promote participation.		
							Changes in body function (for example improved endurance, increased muscle strength, agility and flexibility) which enables greater mobility.		
							Mastery of the body (overcoming physical limitations).		

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
							Perceived competence over ability to perform certain types of PA can prevent participation.		
							Positive emotions in response to engaging in PA promote PA participation. Fun, play, enhances mood.		
							PA helps to release stress and release of emotions such as frustration and anger.		
							Some participants reported uncomfortable emotions relating to PA participation, especially when being observed by spectators. These emotions included disappointment at being excluded, vulnerability, embarrassment and shame at appearing physically inept and incompetent and anxiety.		
							Sense of making progress and achievement, competition and prizes aided PA participation.		
2015	Njelesani et al.	Explore the barriers perceived by parents of children with developmental disabilities to their children's engagement in physical activity.	An occupational perspective	Trinidad and Tobago working group at the International Center for Disability and Rehabilitation within.	Parents of children with intellectual disabilities.	Interviews	Programmes needed to be individually tailored to meet the needs and abilities of each child.	Families had their own personal priorities, essential routines, or concerns that they felt took precedence over physical activity and hence were a barrier to their child's engagement in physical activities. For example, work, chores and/or other siblings' needs and time.	Lack of convenient physical activity facilities in their neighbourhoods. Or when they are available, they are not accessible.
							Communication demands within a team environment was a barrier to participation.	Parents did not prioritise physical activities in comparison to other aspects of their child's development. Including vocational pursuits.	Long drives and lack of resources nearby to carry out physical activity.

(Continues)

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
							Parents expressed attitudes and beliefs about the lack of adequate skills and confidence in their children, which generated the perception that their child could not participate in physical activity due to their child's impairments.	The weather during certain times of the day can be too hot for PA. Heat can also leave children feeling tired.	
							Parents had health and safety concerns regarding their child's ability to engage in PA.	Parents believed their children engaged in very little physical activity during the school day because of barriers such as a lack of staff knowledge on ways to adapt programs for their child.	
							Parents regarded same aged peers, without a developmental disability, as generally not interested in the same physical activity pursuits as their child, thus prompting more solitary and inactive activities.	Financial resources within schools was identified as another barrier as many are unable to afford additional specialised staff.	
2013	Shimmell et al.	To gather information from youth, parents, therapists, service providers, and community partners about facilitators and barriers to being physically active.	International Classification of Functioning	Children's treatment centers in Ontario.	Adolescents with cerebral palsy and their parents.	Focus groups	Youth and parent participants explained that perceived health benefits alone do not motivate youth to be physically active. Most reported non-health reasons as their motivation for being PA: fun, freedom, time with friends, independence.	Environmental (individual and societal) can be barriers or facilitators depending on the individual and context within they take place.	
							Personal factors such as self-perception, identity and nervousness influenced PA. Embarrassment or fear of teasing, lack of confidence prevented PA.	Parental involvement in managing PA opportunities could either be helpful or act as a barrier to more risky or adventurous activities.	The availability of adaptive equipment and mobility devices.

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators	
							Individual	Environmental/contextual
							Individual	Environmental/contextual
							Fatigue was a barrier to PA, especially when having to travel long distances to PA opportunities whilst having to transfer in and out of adaptive equipment.	Having knowledgeable and supportive staff (teachers, parents, coaches and support staff) facilitated PA.
							Some youth reported liking delivery of PA to be competitive, with team or group work, whilst others preferred more personalised activities.	Systemic barriers and facilitators such as the cost of programming and availability of funding, transportation, accessibility of facilities and programs, and long waiting lists. Depending upon access to each.
							Pain associated with performing PA was a barrier to participation.	
							PA that created opportunities for socialisation, learning and the development of life skills were important.	
							Programmes that enabled participants to take it at their own pace facilitated engagement.	
2013	Downs et al.	To explore PA of children and young people with DS from birth, specifically exploring the opportunities available to young people with DS and perceived barriers to PA.	The Youth Physical Activity Promotion Model	Down Syndrome Liverpool	Children with Down Syndrome and their parents.	Interviews	Some parents noted that their children enjoyed music and dancing particularly within unstructured and perhaps somewhat unplanned settings, i.e., at social events such as parties or weddings.	Bad weather can impact upon ability to engage in PA.
							Activity that generally involved socialising playing with friends or family and was an activity that the participants enjoyed doing and chose if given choice.	Reinforcing PA support and influences are necessary from different sources, i.e., coaches, peers, parents, etc., and in special populations (i.e., children with DS), care providers and schools can also play an important role.

(Continues)



TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
							<p>A lack of independence was described as a barrier to their child's PA participation.</p> <p>Walking and running were noted as activities disliked as they were difficult and tiring.</p> <p>Difficulties following instructions and rules, and a lack of comprehension made it difficult to engage in PA.</p> <p>Parents had physical concerns such as ear problems and poor balance affecting their child's ability to engage in PA.</p>	<p>Parents felt that there was a lack of information about the PA opportunities that are available and suitable for people with DS.</p>	<p>Educating the school staff about the importance of PA can act as a facilitator.</p>
2012	Grandisson et al.	Document adolescents' and parents' perceptions about the out-comes of sports participation for adolescents with intellectual disability including, but not limited to, involvement in integrated sports, and (ii) to gain a better understanding of the facilitators and barriers to the integration of adolescents with intellectual disability in sports with their non-disabled peers.	The Disability Creation Process (DCP) theoretical model	Centre de readaptation en deficiences intellectuelle (CRDI) of Quebec City and through Special Olympics Quebec.	Adolescents with intellectual disabilities and their parents.	Semi-structured interviews	<p>Parents and children spoke of the health benefits of PA being a motivator for participation.</p> <p>Provides children with the opportunity for social inclusion enabling them to build relationships and feel valued within their community.</p> <p>Sociocultural attitudes towards individuals with ID can act as a barrier to PA.</p>	<p>PA helps to improve the parent-child relationship.</p> <p>PA helps to develop self-esteem by giving them the opportunity to experience a favourable feeling about oneself.</p> <p>Athletic coaches' knowledge of intellectual disability had an important impact on the success of the integration of adolescents with intellectual disability in sports.</p>	

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
						Provides children with opportunity to develop motor, social and cognitive abilities.	Family members can positively influence the PA behaviour of their child/sibling with intellectual disabilities.	The availability of practical support is important to integrate children with intellectual disabilities into sports.	
						PA is seen as providing opportunities to have fun.	Parents need support and information to help their child to engage in PA.	Sports clubs should have procedures in place to help integrate intellectually disabled members into the club.	
						Children may not have the behavioural capability to engage appropriately in PA.	Costs and transportation required to attend PA programmes were barriers to participation noted by parents.	The availability of adapted equipment may facilitate the participation in sports of individuals with intellectual disability.	
						The capabilities of the person to accomplish motor and intellectual tasks and to interact and communicate also have an impact on integration in sports.			
						Participants pointed out that the degree to which the adolescent with intellectual disability had participated in meaningful life habits in the past, as well as his or her current level of independence in activities related to mobility in the community, have an impact on his or her participation.			
2012	Verschuren et al.	To examine the factors that influence participation in physical activity and sports by children and adolescents with cerebral palsy.	None reported	Special education schools	Children with cerebral palsy and their parents.	Semi-structured interviews	Parents perceived that their children were vulnerable to injury, which made them hesitant to engage in sports programs. The	An environmental barrier identified by both parents and children was a dearth of opportunities for physical activity and a lack of information regarding available options in their community.	

(Continues)

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
							<p>Not being afraid of a challenge, acceptance of the disability by the child and parents, perseverance, confidence, and having a positive attitude towards physical activity were mentioned as facilitators.</p> <p>Physical characteristics of the child were noted as barriers to physical activity due to the inability of the sport to accommodate for individual differences.</p> <p>A lack of energy and fatigue were noted as barriers to PA.</p>	<p>Social exclusion experienced by child and parents made it more difficult to engage in PA.</p> <p>Some parents were not interested in being involved in PA and their children did not want to ask them to help.</p> <p>Parental awareness of the benefits of physical activity, perseverance, assertiveness and a positive attitude were mentioned as qualities that facilitated their child's participation.</p>	<p>Lack of PA opportunities suited to the needs and abilities of each child.</p> <p>Clubs were unaware of the complex needs of children with disabilities and are not open to working with these children.</p>
							<p>Secondary impairments such as seizure disorders or vision impairment made PA more difficult.</p> <p>Being bullied, taunted and disparaged by opponents can prevent children from taking part in PA.</p>	<p>Access to information about physical activity opportunities enhanced awareness of options for families.</p> <p>Having a good, understanding trainer/coach and good communication skills were mentioned as beneficial factors.</p> <p>Time, finances and PA schedules were also noted as barriers by parents.</p>	
2011	Barr & Shields	To explore the barriers and facilitators to physical activity for children with Down syndrome living in Victoria, Australia.	None reported	Through a not-for-profit, association that advocates for people with Down Syndrome.	Parents of a child with Down Syndrome.	Interviews	<p>When children had the physical skills, coordination and cognitive ability to understand rules, they were more likely to participate in formal activities.</p>	<p>Parents identified themselves as having a positive influence on their child's participation in physical activity. When parents enjoyed sport, recognised the importance of fitness, and were actively</p>	<p>Structured accessible programmes that make adaptations for children with Down syndrome were important facilitators.</p>

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators		
							Individual	Interpersonal	Environmental/contextual
							involved, their child was more inclined to participate in physical activity.		
					Parents noticed that when their child enjoyed an activity, they rarely needed external encouragement to participate.		Siblings have an important role to play in promoting PA, often encouraging informal daily activities.	Instructors who make PA fun and enjoyable act as a facilitator to PA participation.	
					Rewards and praise were important for some children when participating in PA.		Social interaction and peers were powerful facilitators of PA.	Parents feel that there is a lack of mainstream clubs willing to enrol children with Down Syndrome. They believed that a lack of staff, time restraints and a lack of education were reasons that prevented their child from being included.	
					Health complications associated with Down Syndrome including hypotonia, obesity, congenital heart defects and communication impairments.		Parents acknowledged that sometimes they can become a barrier to PA. If children require a lot of one to one supervision, they may encourage their child to engage in more sedentary activities.	Negative attitudes within the community relating to disability can act as a barrier to participation.	
					Increased risk of overweight and obesity, and the impact this can have on PA participation.		The time and finances involved in raising a child with a disability whilst trying to manage the responsibilities of home and work often meant that their child's PA needs were not a priority.		
					Communication and comprehension difficulties can act as a barrier to PA.		Parents were sometimes overprotective and decided against PA opportunities if they felt their child would be vulnerable.		
					Other medical concerns included chest and ear infections, asthma,				

(Continues)

TABLE 1 (Continued)

Year	Authors	Aims/objectives	Theory of behaviour	Recruitment	Participants	Data collection	Barriers and facilitators	Individual	Interpersonal	Environmental/contextual
								vision impairments, hearing deficits, continence, arthritis, spinal problems and leukaemia.		
								Parents indicated that children with poorer motor skills and a lack of coordination were less likely to engage in physical activity.		
								Behavioural issues such as non-compliance were also highlighted by parents as a barrier to participation in formal activities.		
								If a child did not enjoy an activity, they would not initiate it or participate in it.		

Existing PA interventions often lack consideration for the unique challenges faced by individuals with intellectual disabilities (Bartlo & Klein, 2011). Such interventions have primarily focused on targeting individual-level variables, whereby the individual is the sole agent of PA behaviour change. However, this does not encompass the full range of possible behavioural influences (Michie et al., 2011). Namely, facilitators of and barriers to change (Eccles et al., 2005), how and where (contexts) interventions are effective (Michie et al., 2008) and ecological influences (e.g., cultural beliefs and values) (McLeroy et al., 1988). For example, young people with intellectual disabilities experience decreased autonomy and independence (Salt & Jahoda, 2020). Consequently, parents/guardians play an influential role in supporting PA participation (Downs et al., 2013; Sterman et al., 2016). Indeed, the PA level of children with intellectual disabilities correlates with their parent's participation and attitudes towards PA (Izquierdo-Gomez et al., 2015; Lin et al., 2010). Additionally, children with intellectual disabilities rely on their school (Einarsson et al., 2016) and teachers (Cleary et al., 2019), to help them achieve their daily recommended PA. Crucially, children spend a large portion of their weekdays within a school environment, yet remain sedentary for around 40% of their waking time (4–8 h) (Pate et al., 2011; Syväoja et al., 2013).

## 1.2 | Physical activity interventions

There is limited data available on the efficacy of PA interventions in children and adolescents with intellectual disabilities (Ginis et al., 2021). However, school-based interventions within the wider children and adolescent population, have had minimal impact on PA levels (Jones et al., 2020). This may be due to poor programme implementation (Gorely et al., 2019), and a 'top-down' approach to the research process, whereby researchers develop the intervention with limited input from the targeted end-users (Heaton et al., 2015). There is a need for researchers to move beyond such approaches, towards co-producing interventions, with multiple stakeholders, from the beginning (Rütten et al., 2017).

Theoretical frameworks can support researchers to explain behaviour and develop strategies to promote behaviour change (Glanz et al., 2008). In addition, they enable researchers to clearly replicate and evaluate their utility in changing behaviour (Hackman & Knowlden, 2014). Complex interventions are strengthened through utilisation of both individual and system changes theories, and by working in co-production with key stakeholders, to develop and refine such programmes (Moore et al., 2019; Taggart et al., 2021). Historically, a noted limitation within health behaviour research, is that interventions often do not explicitly state the application of a theoretical framework guiding development (Michie et al., 2009). Notably, in a recent review of PA-related obesity interventions in youth with intellectual disabilities, none of the studies explicitly stated the implementation of a theoretical framework (Conrad & Knowlden, 2020).

### 1.3 | Using the COM-B model to underpin theory-based PA interventions

The behaviour change wheel (BCW) (Michie et al., 2011) is a theory-based intervention development framework, providing a systematic way of characterising interventions that enables their outcomes to be linked to mechanisms of action. One of the first stages of the BCW is a process of behavioural diagnosis—identifying what needs to change for the behaviour to shift in the desired direction. Whilst other intervention development frameworks are available, the BCW is the only one that contains a model of behaviour, termed COM-B (Figure 1), deemed sufficiently broad to cover the full range of possible behavioural influences (Michie et al., 2014). The model suggests that for behaviour to occur, individuals need to possess the capability (C), opportunity (O) and motivation (M) to perform the target behaviour (B). Previously, studies have reported on the PA behavioural influences in youth with intellectual disabilities (Table 1). However, these studies often lacked a theoretical underpinning (e.g., Conchar et al., 2016; Cleary et al., 2019; Verschuren et al., 2012), or explored PA behavioural influences, through the lens of an individual-level theory of behaviour change (e.g., Self-Determination Theory; Stevens et al., 2017). Such theories lack consideration for the contextual/environmental influences of PA behaviour.

Schools offer a contextually relevant environment within which to promote PA behaviour for adolescents with intellectual disabilities (Cleary et al., 2019; Hyndman et al., 2014). Within this context teachers and parents/guardians have an important role to play in supporting PA (Cleary et al., 2019). Therefore, an exploration of contextually relevant school-based barriers to, and facilitators of PA, as perceived by key stakeholders (teachers, parents/guardians and adolescents with intellectual disabilities), is needed (Bossink et al., 2017). This will facilitate researchers and end-users working collaboratively to create ‘systems change’ (Fullan, 2005). Increasingly, the COM-B model has demonstrated utility for eliciting behavioural influences across various health behaviours, including healthy eating (Beck et al., 2019), sedentary behaviour (Ojo et al., 2019) and PA (Murtagh et al., 2018). Interestingly, these studies were conducted across various age groups (adolescents and adults) and within different contexts (primary care clinics, offices and community settings).

### 1.4 | Aims and objectives

To date, the COM-B model has not been utilised to explore PA behavioural influences in adolescents with intellectual disabilities. Hence, through application of the COM-B model, the aim of our study is to explore the barriers to, and facilitators of PA, for adolescents in schools for children with intellectual disabilities. Additionally, we aim to establish the generalisability of this theory for health behaviour research within adolescents with intellectual disabilities.

## 2 | METHODS

### 2.1 | Study design

This study adopted a qualitative methodology in the form of focus groups. The COM-B model informed the study design, data collection and analysis. This study is reported in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (for an overview of the checklist, see Supporting Information) (Tong et al., 2007).

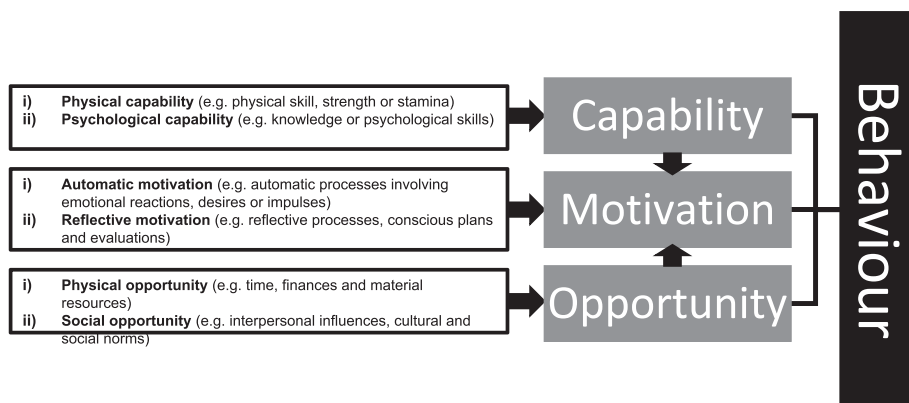
### 2.2 | Ontological and epistemological orientation

Our study was underpinned firstly by ontological relativism—suggesting reality is multiple, created and mind-dependent (Smith et al., 2016). Secondly, epistemological constructivism—individuals are not conceived of as discovering or finding truths about external reality; instead, people build or make knowledge. People construct concepts, models and schemas to understand the world and their experiences (Schwandt, 2007).

### 2.3 | Sampling and recruitment

The research team met with the principals of two schools for children with intellectual disabilities, in Northern Ireland. We used purposive sampling to recruit participants from three stakeholder groups (i) students with intellectual disabilities, (ii) their parents/guardians and (iii) teachers. Purposive sampling does not require a set number of participants (Etikan et al., 2016) but instead aims to include information-rich cases, with shared experiences, for an in-depth study (Green & Thorogood, 2014). Instead of seeking to generalise our findings to the wider population, our constructivist approach employs purposive sampling to focus on the idiosyncrasies of individual cases, across stakeholder groups.

Students were eligible if they were aged 11–17 with mild/moderate intellectual disabilities and had good communication skills. The level of intellectual disability was not examined individually, but all participants had to be able to follow verbal instructions in English and understand basic information about the study, enabling them to decide upon participation. The PA status of each student was not assessed prior to taking part in the focus group. However, all students were engaging in one 60-min form of PA per week. This was delivered by their classroom teacher through their physical education (PE) curriculum. Teachers helped ensure the recruitment of participants who met the eligibility criteria. Parents of these students, and teachers (who regularly deliver PA programmes via the school PE curriculum and other initiatives) were eligible to participate in the study. Written consent and assent (students) was obtained from all participants. Five focus groups were conducted, one student group ( $n = 7$ ; 2 female and 5 male), two parent/carer groups ( $n = 12$ ; 12 female) and two teacher groups ( $n = 9$ ; 3 female and 6 male). One student dropped out of the study due to an illness absence. Due to the impact



**FIGURE 1** The COM-B model of behaviour. Source: Adapted from Michie et al. (2014)

of COVID-19, a second focus group with additional student participants was unable to proceed in one of the schools.

## 2.4 | Interview schedules and data collection

Prior to data collection, relationships had been established between the research team and one teacher from each school. At the request of the teaching staff, the first author, a male PhD student with training in qualitative research methods, met with student participants prior to their focus group. This was to develop an understanding of the various needs and capabilities within the group. Focus groups were conducted within respective schools during the school day and facilitated by the first author. Separate interview schedules were developed through COM-B constructs, for each stakeholder group (Table 2). Table 2 is not an exhaustive list of the questions posed, instead a selection have been included, to highlight the type of questions asked. The questions within the interview schedule served as a starting point to steer the discussion, follow-up questions and prompts were utilised to encourage richer discussion.

Reasonable adjustments were made for students to ensure accessibility, including having teachers/classroom assistants present to assist them in expressing their opinions. Supplementary resources and materials were developed to facilitate discussion, including pictograms, YouTube videos and practical handouts for students to complete. Resources prompted students to consider specific aspects of their PA, enabling the facilitator to probe further with questions. Supplementary resources were piloted in advance with teachers and students from the specialist schools. Focus group discussions were audio recorded for post-analysis. The average focus group durations per stakeholder group were, teacher's 76.5 min (13,965 average words) and parent's 47.5 min (16,098 average words). The student focus group duration was 70 min (8896 words).

## 2.5 | Data analysis

Using Braun and Clarke (2006) six phases of thematic analysis (TA), a deductive, reflexive TA of the data was conducted. The COM-B model provided the lens through which we deductively interpreted

and analysed the data. The first step required the first author to become familiar with and immerse themselves in the data. Focus groups were transcribed verbatim by an independent transcriber. The first author checked the accuracy of each transcript by comparing the recordings to the transcription. Transcripts were imported into NVivo (QSR International Pty Ltd. Version 12.1.90) to organise and assist with analysis. The first author iteratively coded the data, with codes discarded or developed as the coding process was conducted. The first author then grouped coded data into high-order latent themes based upon COM-B constructs and developed a thematic map. Subsequently, a comprehensive analysis of each theme was conducted by the first author. Finally, the last phase in TA required the production of a report, through selection of vivid, compelling extract samples, which accurately represent generated themes, and relating the analysis to the research question and literature.

## 2.6 | Rigour

Our methodological processes were underpinned by Braun and Clarke's (2020) guide to assessing TA research quality. Generalisability and bias are two concepts associated with research rigour (Varpio et al., 2021). Research with a subjective orientation can aim to demonstrate rigour through analytical and theoretical generalisability (Polit & Beck, 2010). Prioritising subjectivity refutes any expectation of bias-free research (Clarke & Braun, 2013). Constructivists acknowledge that their subjectivities influence the research design, data collection and analysis (Varpio et al., 2021). Quality practice within reflexive TA relies upon the researcher's depth of data engagement and reflexivity, as opposed to consensus building or inter-rater reliability (Braun & Clarke, 2020). The four co-authors adopted the role of being 'critical friends', through regular meetings during analysis. The role of a critical friend is not to reach consensus agreement but to encourage reflexive practice, by reflecting upon and exploring multiple and alternative explanations of the interpreted data (Smith & McGannon, 2018). The first author was challenged to consider how his subjectivities were shaping data analysis and interpretation, and to reflect upon whether the generated themes told a convincing and accurate story of the data.

**TABLE 2** COM-B informed interview schedule. Example questions for each stakeholder group

COM-B construct	COM-B model component	Eliciting questions		
		Student	Teacher	Parent
Capability	Physical	What things stop you from taking part in PA?	What stops your students from taking part in PA?	How can/does PA help your child physically?
	Psychological	Do you know what physical activity is and how much you should do?	Does being physically active have any academic benefits for your students?	Does being physically active have any social benefits for your child?
Opportunity	Physical	What types of physical activity do you do at school?	What prevents the provision of additional physical activity during the school day?	Within school, what can help your child to become more physically active?
	Social	Do you take part in any physical activity with family or friends?	How do your students' peers influence their physical activity?	How do you support your child to be physically active?
Motivation	Reflective	Are you confident that you can meet the current physical activity recommendations?	Are your students aware of the health benefits of being physically active?	Do you think physical activity is important to your child?
	Automatic	What activities do you like to do in your free time?	What things encourage your students to take part in physical activity?	What discourages your child from taking part in physical activity?

## 2.7 | Ethical considerations

Ethical approval was granted from the University School of Sport Filter Committee and the University Research Ethics Committee. Anonymity was provided through use of alphanumeric codes for participants.

## 3 | RESULTS

Focus groups were conducted between October 2019 and February 2020. Generated themes demonstrated barriers to, and facilitators of PA across all six COM-B constructs (Figure 1). Data is presented using a combination of illustrative extracts (Table 3) and corresponding interpretative analysis.

### 3.1 | Capability

#### 3.1.1 | Physical abilities

'The main issue in my class would be their physical capabilities and being able to do certain (activities)' (S1T1). Parents and teachers described medical concerns such as respiratory and cardiac conditions, and physical limitations such as reduced mobility, low-muscle tone, fatigue and lower levels of cardiorespiratory fitness, as barriers to PA participation amongst the students. In support of these findings, students tended to dislike running activities as they find it 'hard to breathe' (S1S5). Many students were said to have difficulties developing gross motor skills, resulting in reduced balance and coordination, limiting their ability to engage in PA. As one parent described, 'they don't have that co-ordination or balance, or (they have) a lot of physical restriction. Now, my daughter couldn't do any of those (types of PA) because her feet can't leave the ground, she can't jump or hop' (S1P5).

Some students experienced communication difficulties, such as having a speech impediment. This impacted their ability to make meaningful connections with their peers and engage in group-based PA, 'there are children in our area his age and he will go out with them, but it is getting them to be able to understand him, because his speech isn't the best' (S1P2). Parents and teachers reported increasing rates of overweight and obesity within this population, exacerbated by increasingly sedentary lifestyles.

'What are we doing for our children with learning difficulties? It's something that needs a lot of work at the minute I feel in this country, but it is massively important because the evidence is there to suggest that there is a higher risk of obesity.' (S2T4)

PA behaviour change facilitators included students seeking physical bodily changes, such as improved body composition. Students said PA helped them to improve their flexibility, increase muscle mass and strengthen their bones, 'I like it (PA), because it gives my muscles a bit more strength' (S1S3). Teaching staff reported important physiological adaptations in students who engage in regular PA such as, developing gross motor skills, improving strength and fitness and weight loss. After engaging in a period of increased PA participation at school, one parent described how PA helped to improve their child's sleeping pattern, 'she is a (very) bad sleeper, but she has slept every night over the last past 2 weeks' (S2P2).

#### 3.1.2 | Psychological abilities

Various comprehension abilities were noted amongst the student cohort. As such, some students found it difficult to understand and



TABLE 3 Illustrative extracts of barriers to, and facilitators of physical activity for adolescents with intellectual disabilities

COM-B component	Definition	Theme	Barriers to PA	Illustrative quotes	Facilitators of PA	Illustrative quotes
Physical capability	Physical skill, strength, or stamina	Physical abilities	Medical conditions	<p>'Medical (conditions)? It depends. Asthma. Depends on hearts, depends what is going on in the kids.' (S1P1)</p> <p>'From my point of view, my child, he has got low muscle tone that would badly affect his balance.' (S1P2)</p>	Improvements in body composition	<p>'We introduced a programme of swim and gym on Mondays. I am seeing lots of benefits like loss of weight in some, and they are really happy about it.' (S1T3)</p>
			Physical limitations	<p>'In response to being asked why they do not like activities that involve lots of running: 'I can't, it's hard to breathe after.' (S1S5) 'Be out of breath, like running too fast, (makes them) take a panic attack.' (S1S7)</p>	Improvements in strength	<p>'For some of the boys who are into their fitness, they do weight training part of the sessions. And they are just really happy that they are doing bigger weights and more repetitions and things like that. So, they did ten last week and now they can do twelve this week or whatever.' (S1T3)</p>
			Communication difficulties	<p>'Sometimes it depends on the wee one's ability to communicate as well. You know, whereas my wee boy wouldn't have the best speech.' (S1P2)</p>	General health benefits	<p>In response to being asked why they take part in PA and what benefits they get: 'Keeps me healthier, more alert.' (S1S3)</p>
			Comprehension limitations	<p>'A year later I had a different group, and the level of understanding and comprehension was a lot, lot lower, even in the space of a year. So, I wasn't able to do that (HIIT exercise) because that is not the PE they would want to engage with. They weren't going to, not that they weren't going to try it, but they weren't going to understand why they were doing it.' (S2T4)</p>	Skill development	<p>'Giving the children the opportunity to go outside and develop their gross motor skills.' (S2T5)</p>
Psychological capability	Knowledge or psychological skills, strength, or stamina to engage in necessary mental processes	Psychological abilities	Psychological difficulties	<p>'16 hours.' (S1S1) '16 hours? That's half the day! (I think) 3 hours?' (S1S2) 'An hour and a half I'd say. Because every day whenever I am indoors, I do yoga and cardio. That's the most I do it.' (S1S3).</p>	Improvements in academic performance	<p>'(After PA) they are ready then to start their work. Straight into work then for half an hour before assembly. And that half hour then they really do work hard. It is great you can see the benefits of it.' (S2T1)</p>
			Difficulties following instruction	<p>In response to being asked if they knew what the recommended PA guidelines were per day: '16 hours.' (S1S1) '16 hours? That's half the day! (I think) 3 hours?' (S1S2) 'An hour and a half I'd say. Because every day whenever I am indoors, I do yoga and cardio. That's the most I do it.' (S1S3).</p>	Promoting social skills through PA	<p>'PA helps their students to develop social skills where there is turn taking, there is different sharing, there are certain aspects that way as well.' (S2T3)</p>
			Difficulties following instruction	<p>'He can't follow instruction, I think is the main factor affecting their child from performing activities). Definitely wouldn't do two things at the one time.' (S2P7)</p>	Behavioural regulation	<p>'Like our classes normally cap at about 8, 9, 10. So, to have 17 even in one room in general and have no issues, is phenomenal. But, because they were engaged in PE and the gym, all doing something, we had no issues. We do, well I find I don't get a lot of the other challenging behaviour that some of the other teachers would experience in some other subjects.' (S1T4)</p>

**TABLE 3** (Continued)

COM-B component	Definition	Theme	Barriers to PA	Illustrative quotes	Facilitators of PA	Illustrative quotes
Physical opportunity	Opportunity afforded by the environment involving time, resources, locations, cues, physical 'affordance'	School environment and resources	Staffing levels and access to support staff can restrict the types of PA available to students	'It's not every child in here has access to a physio or an OT...Even within my class, I would have extreme cases and I might see them once a month (OT). So, it would be hard for my children to find PE activities accessible.' (S1T4)	Using the existing infrastructure to promote PA	'But there is surrounding pathway that if someone measured it out at one stage, if you walk around it eight times, it is a mile. But you know there was encouragement there for the pupils to do a mile, the mile a day walk or whatever.' (S2T3)
			Lack of provision of PA opportunities through after school clubs/societies.	'We don't have any after school groups or clubs (S1P1) 'There is no extra-curricular (PA opportunities offered after school hours) that we are involved in. As far as I know.... there is nothing for our kids.' (S1P2)	Creating the opportunities to be physically active during the school day	'We provide them (with) a varied programme, there is horse-riding, there is swimming, there is PE. There are coaches come in from outside agencies into school and they provide then the physical activities that can go on in school.' (S2T3)
			Reliance on school to engage in PA	'I don't really do it (any types of PA) when I go home.' (S1S1)	Creating the culture and policies to mandate additional PA	'See for that kind of project or programme as well, you would need to liaise with the principal to get it noted somewhere within the school development plan. Then when it is noted on the school development plan there should be accountability from each teacher and member of staff that they are working towards that goal. So that it is not something that, it was a good idea when it worked but they are gone now so we will not (do the PA programme any longer).' (S2T2)
			Timetabling & a lack of free time	'We have got the hall, but if everybody is looking for it, it is a timetable minefield.' (S2T4)	Introducing cross curricular PA initiatives	'A lot of the big boys that are coming to talk to us and a lot of the research is stating how well kids are benefitting from sport and PE. They are always trying to introduce physical activity in all subjects, like cross-curricular. Yes, it can be done, but I don't know if it is done.' (S1T4)
			Friend/peers have power to influence and discourage PA participation	'You'll get ones (children) just standing there (during PA) and then it might trigger other ones as well not to do it because their mate is not doing it.' (S1P1)	The school has been proposed as the ideal setting in which to promote PA	'Every one of them (students) has an individual plan of what they can do anyway. So, if it was going to be run, I'd say the school would be the best place to run it.' (S2P3)
Social Opportunity	Opportunity afforded by the interpersonal influences, social cues and cultural norms that influence the way we think about things	Interpersonal relationships (parents, teachers, friends, and support staff)	Lack of social connections	'Some of our children don't go out, they don't socialise, they don't go out into the street to play games.' (S1T2)	Students want to be perceived as cool, fitting in with their peers	'It is also a thing they like to go to (gym) because their peers are going to it and it is seen as a trendy place to be at the gym.' (S1T3)
					Social connectedness	'And when they go to the wee clubs, they meet different people. She is expanding her relationship circle when she goes to the other wee clubs.' (S2P6)

(Continues)

TABLE 3 (Continued)

COM-B component	Definition	Theme	Barriers to PA	Illustrative quotes	Facilitators of PA	Illustrative quotes
			Parental influence	<p>'I know my wee guy, he does have a wee friend within school but when he comes home, he has nobody. When I say go out and play (he can't because) he never had the wee close friend and stuff.' (S1P1)</p> <p>'Parents maybe aren't able to cope with behaviours at home so maybe the handiest thing is to hand (their child) an iPad or put on a tv and let them sit in front of that. It is probably a case then that they won't get outdoors after that.' (S2T3)</p>	Parental influence	<p>'You can't just send them one week (to PA programmes) and then the next week, oh he can't be bothered today...a wee bit of commitment (from parents to continue to encourage PA).' (S1P2)</p>
Reflective motivation	Reflective processes involving plans (self-conscious intentions) and evaluations (beliefs about what is good and bad)	Conscious motivation	Lack of variety in PA opportunities	<p>In response to being asked what they think about doing the same activity each week: 'You might get bored of it and then doing the same thing you might get bored.' (S1S2)</p>	Understanding the psychological benefits of PA	<p>'We are going to do this (PA) because it is going to wake us all up and get us ready for doing our work and it is going to feed our brain or whatever. You know it might engage them that way.' (S1P2)</p> <p>'Looks fun...makes you release endorphins.' (S1S5)</p> <p>'It's an escape for the children...they are able to be themselves and all them stresses in life, just put them to the back (of their mind) and enjoy themselves.' (S1T2)</p> <p>'It is good for you, and it build up your muscles in your arms and legs...Make you stronger.' (S1S7)</p>
			Low self-image	<p>'Some of the kids will have issues with how they look and how they are doing as well. Some of them would feel silly doing it (PA).' (S1P1)</p>	Understanding the physiological benefits of PA	<p>'It will also build up their confidence levels as well. When they see that three weeks ago, I needed help to do a squat, now I am doing it by myself, and I don't need help.' (S1P2)</p>
			Lack confidence in their ability to perform certain activities	<p>'Because I am crappy at it... Just don't like doing it (dance) as well in general.' (S1S3)</p>	Enabling students to experience progression and competence within PA	<p>'If there are incentives at the end of it that would encourage them to take part more as well.' (S1P2)</p>
Automatic motivation	Automatic processes involving emotional reactions, desires (wants and needs), impulses, inhibitions, drive state and reflex responses	Sub-conscious motivation	Pairing/group work can result in negative behaviour if the wrong children are placed together	<p>'You have to be careful of teamwork because it only takes two of the wrong people to be in a team or a group and that will just cause mayhem for that group, for that lesson, for that situation.' (S1T4)</p>	Incentivising and rewarding PA participation	
			Being instructed to take part in PA can make it seem like a chore	<p>'But I wouldn't say to them we are going for a 30-minute session. I wouldn't mention the time, I would say we are going to have some fun or we are going to do some games. I wouldn't tell them it's exercise, you know. Even myself if you say to me right, we are going down here to do something, yes that's grand. We're going</p>	Participating with family, friends and peers can have a positive effect on PA participation	<p>'It helps to have fun...have fun helping your friends.' (S1S4)</p>

TABLE 3 (Continued)

COM-B component	Definition	Theme	Barriers to PA	Illustrative quotes	Facilitators of PA	Illustrative quotes
				<p>down here to do 30 minutes exercise, no I'm away home, do you know what I mean?' (S1P2)</p> <p>'But that is the difficulties you would have with the senior pupils. It is getting them to buy into it and understand it and being able to do it. And getting past that mindset that...it's just PE I don't want to do it. Or it is I'm not doing that.' (S2T1)</p>		<p>They preferred activities (with family/friends) because it makes them feel "happy". (S1S7)</p>
			<p>Competitive elements to PA</p> <p>'I don't know about being competitive if it would always work.' (S1 Parent 2)</p> <p>'I'm thinking more about the older ones (competition will motivate).' (S1 Parent 3)</p> <p>'Yes, but even again not every kid, because everybody's abilities is different. And if they feel they are not doing it right or they are not winning they will not want to come back, they will not want to do it.' (S1 Parent 2)</p>		<p>Providing stimuli to promote engagement</p>	<p>'Although most children with special needs do like music and lights, there is something about them where they do focus better with music.' (S2P4)</p>
			<p>Preference for sedentary activities</p> <p>'They are very prone to playing Xboxes and that, so they are sitting all the time.' (S1T2)</p>		<p>The correct environment will motivate students to engage in PA</p>	<p>'What I am quite happy about, is that they seem very positive about doing their exercises. They seem really keen to go to the gym and to look forward to it.' (S1T3)</p>
				<p>When asked what PA they do at home, one of the students responded:</p> <p>'None, I just sit and play my game...sometimes we would go outside but I would rather sit in.' (S1S5)</p>		

Note: Themes are mapped to the COM-B constructs. To ensure anonymity, alphanumeric codes were assigned to reflect the school and stakeholder group from which the illustrative quote derives. Codes are as follows: School 1 (S1), School 2 (S2), Teachers (T), Parents (P) and Students (S), n = their individual participant number within that focus group.

follow instructions. This often limited their understanding of the importance of PA, towards supporting a healthy lifestyle.

'You are trying to have a learning outcome to everything that you do within teaching. You've to bring that across as clear as possible. But that doesn't sometimes cognitively get to our children. They don't (often) understand that there are health benefits around exercise.' (S2T2)

Students themselves lacked understanding of the current PA guidelines and were unable to determine the amount of PA they engaged in daily, with estimates ranging between 'an hour and a half' (S1S1) to 'sixteen hours' (S1S3). Teachers indicated that students have short attention spans, which can pose problems for longer duration PA, 'there is very few of our students that could maintain their focus for thirty minutes' (S1T3). However, PA programmes delivered in short bursts, with a range of activities, were said to help maintain focus and promote engagement.

Teachers suggested that PA aided improvements in academic performance, concentration levels and increased productivity amongst students. Parents and teachers reported that PA supported students to develop their socialisation skills, equipping them with the confidence and skills, to make meaningful connections with their peers. In addition, they noted that PA was a powerful tool for behaviour regulation within school and at home, '(PA) supports behaviour and some challenges we have about self-regulation' (S2T5).

## 3.2 | Opportunity

### 3.2.1 | School environment and resources

Due to various needs and capabilities of their students, teachers required support staff to assist them whilst delivering PA. However, with limited funding available, access to additional support such as, occupational therapists and physiotherapists, was restricted. Teachers felt their ability deliver PA programmes, adapted to the individual needs of their students, was determined by, 'how many adults you have in the room one time' (S1T). When less support was available, one teacher described it like having to 'divide myself in ten ways to deliver this one (activity)' (S1T2). Extremely busy workloads made it difficult for teachers to find time during school, to offer additional PA opportunities, beyond the PE curriculum. Demand for the PA facilities within each school was high, meaning availability was limited. Whilst limited financial resources meant access external facilities was restricted. Parents expressed concern regarding a lack of provision of PA opportunities within schools, through initiatives such as, after school clubs and societies. Teachers indicated this was primarily due to limited provision of transportation, outside of regular school hours. During break and lunch times, students reported that they do not go outside, preferring instead to sit in the classroom. Teaching staff suggested that this may be an opportunistic time during which to promote PA.

To overcome these barriers to PA within the school environment, teachers recommended a range of practical strategies such as, creating the culture and policies to support PA, introducing cross curricular PA initiatives, making better use of the existing infrastructure, and providing the necessary resources and equipment to deliver a range of PA programmes. Parents and teachers alike viewed the school environment as an ideal location for children to take part in PA. There appeared to be an overreliance on schools to support students in obtaining most of their PA during the school day. Students reported that they did not take part in much PA at home, whilst one parent said: 'I'd say the school would be the best place to run it. Because as you say when the wee ones come home from school, (he) doesn't want to do anything. He is just completely and utterly exhausted' (S2P7). Teaching staff felt that they were best placed to deliver PA programmes to their students, as they were acutely aware of their needs and capabilities, 'I always feel there is nobody knows the kids better than the teacher' (S1T4). Indeed, it was suggested that external PA instructors may struggle, as they will require time to develop relationships with the students and understand their individual needs.

### 3.2.2 | Interpersonal relationships

Parents were said to be powerful influencers of their children's PA behaviour, serving to either support or hinder participation. Teachers noted that some parents saw their child's disability first, making them apprehensive about their ability to engage in PA. Some parents regularly provided their children with permission slips to be excused from PE lessons. Additionally, teachers felt that challenging behaviour at home was corrected by parents, through provision of devices that facilitated sedentary behaviour, 'parents maybe aren't able to cope with behaviours at home so maybe the handiest thing is to hand them an iPad or put on a tv or whatever and let them sit in front of that' (S2T3). Indeed, parents reported that some of their counterparts tend not to take an active interest in school programmes or activities. For any new PA initiative to be successful, it was said that 'you need parents onboard' (S1P1) and that they must demonstrate, 'a wee bit of commitment' (S1P2), by consistently encouraging their child to participate. Contrastingly, motivated parents demonstrated a willingness to seek out PA opportunities and actively supported their participation.

Parents and teachers noted that many students lack friendships with other children their age outside of school, resulting in decreased opportunities to engage in PA at home. Within school, some students preferred group-based PA, particularly when their friends were involved. Whilst others preferred to work on their own and would be discouraged by paired or group-based activities. One teacher noted:

'You have to be careful of teamwork because it only takes two of the wrong people to be in a team or a group and that will just cause mayhem for that group, for that lesson, for that situation. So, we do need to be very careful with who you are putting in a team. It is just the nature of the children that we are dealing with.' (S1T4)

Some students were powerful behavioural influencers within the classroom, if they did not want to engage in an activity, this could dissuade the entire group. Students wanted to be thought of as being cool and to fit in, so tended to engage in PA that was perceived as such, 'it's the physical fact that they are going to the gym and the gym is a socially cool place and they all go, and they engage' (S1T3).

### 3.3 | Motivation

#### 3.3.1 | Conscious motivation

Teachers and parents noted that some students displayed a lack of confidence and self-esteem, which prevented them from engaging in PA. For example, many students said they would not take part in activities such as dancing, as it was 'embarrassing'. Students did however, place value on the physical and psychological benefits obtained from engaging in regular PA and by understanding these benefits, it increased their motivation to take part in PA. In response to being asked why they take part in PA, some students responded, 'it helps (with) stress' (S1S6). 'Yes, it takes your mind off things' (S1S5). This was supported by the teaching staff who said PA gave their students an opportunity to enjoy themselves and let go of the daily stresses of life. Teachers indicated that achievement was a powerful motivator for PA. It was said that achievement could be experienced through skill development, physical improvements and activity progression. To enable students to experience achievement, teachers suggested it was best not to change activities too often, instead provide students with sufficient time to develop competency in new activities. Contrastingly, students indicated a preference for different activities each week as 'you get bored doing the same thing every week' (S1S3). Indeed, they liked it when their teacher provided them with the autonomy to choose their activities.

#### 3.3.2 | Sub-conscious motivation

Teaching staff noted that students often have a predisposition for sedentary type activities such as, gaming and watching television. Indeed, one teacher expressed concern about the lasting consequences of establishing such negative health behaviours at an early age:

'I think it is a vicious circle too because kids obviously are young, very young, if they are getting into that mindset of iPads, getting snacks, getting treated. What happens is your natural fitness, your natural enthusiasm as a child starts to regress and then when they get into a certain age because they are not fit, they are knackered, they get sweaty, they get tired, their legs get sore. And then they associate PE with being too hard. And then they just switch off on you.' (S2T4)

Parents and teachers proposed a range of motivational strategies to encourage and engage the students in PA, including rewards, positive

feedback and competition. Incentives such as certificates and stickers encouraged PA participation for some, whilst other students required regular praise and positive reinforcement. Competition was very important for some students, whilst others had a fear of failure. Parents also suggested that giving students responsibilities such as helping others, timekeeping or setting up the equipment, engaged them and increased their motivation to participate. Stimuli such as music, lighting and visual aids may also encourage students to participate in PA. Teaching staff highlighted the importance of having experienced PA instructors, who help to create the environment and conditions, for a fun and inclusive programme, that students will want to participate in. Finally, students said they like taking part in PA with their family and friends as it makes them feel happy.

## 4 | DISCUSSION

### 4.1 | Capability

Consistent with the literature, we report that adolescents within this population have a range of medical conditions (Bossink et al., 2017) that may pose additional health and safety risks, particularly for those who are not currently physically active. Prospective participants, or parents/guardians could be instructed to complete a Physical Activity Readiness Questionnaire (PAR-Q), to determine the child's readiness to engage in activity. The range of physical limitations reported here and elsewhere (Barr & Shields, 2011; Cleary et al., 2019; Conchar et al., 2016; Downs et al., 2013), requires school-based PA programmes to be tailored and individualised. A Canadian study by Grandisson et al. (2012) suggested that adapted equipment helps to make PA more accessible. Whilst increasing the number of programme instructors can enhance PA participation, through greater provision of one-to-one support (Cleary et al., 2019). As previously reported by Melbøe and Ytterhus (2017), we described how communication difficulties within this population can make it difficult for some individuals, with limited communication skills, to build relationships. The developmental benefits of PA are said to be dependent upon establishing positive relationships with peers and instructors (McGarty et al., 2020). Consequently, some within this population may require teachers and classroom assistants to be present, to support them in developing these relationships (Melbøe & Ytterhus, 2017).

Corresponding with previous findings, our study outlines a range of psychological barriers to PA including comprehension limitations (Downs et al., 2013), low self-image and a lack of confidence (Shimmell et al., 2013). This highlights the need for teachers and classroom assistants, equipped with the knowledge and skills, to support and instruct PA engagement (Conchar et al., 2016). A qualitative study by Stevens et al. (2017) conducted in Glasgow, indicated that confidence in adolescents with intellectual disabilities, can be improved through skill development. This can lead to high self-efficacy, described as an individual's belief about their capabilities to succeed in a task (Bandura, 1997), towards PA. Within our study, students who understood the physical and psychological benefits of PA were motivated to take part in activity, whilst parents/teachers said the

health benefits encouraged them to promote and support PA participation. Educational material can help to raise awareness of these PA health benefits throughout the 'school system' (Downs et al., 2013).

## 4.2 | Opportunity

PA opportunities in school are often restricted by limited financial resources, restricting access to external resources or additional support staff (Njelesani et al., 2015). Adapting the existing infrastructure within the school environment, for example, creating walking routes, can help to overcome accessibility issues. Whilst upskilling classroom assistants in the delivery of PA, can help to overcome staffing issues. Schools may offer many students their only opportunity to be physically active each day. As such, it is important to provide them with options to be physically active during the school day. Stevens et al. (2017) highlighted the importance of providing students with a variety of activities during PE lessons, enabling them to develop their interest and disinterest for activities. Teachers within our study outlined the need for senior school staff to create policies and a culture which supports PA initiatives. For example, creating space within the timetable and introducing cross-curricular PA initiatives. Barr and Shields (2011) in Australia outlined that a regulated, evidenced-based requirement for PA, supported by senior school leaders, can help to ensure that PA remains a necessity within school.

Teachers are implementers of PA within school. Teachers who are equipped with the skills and knowledge, will work resourcefully to ensure PA opportunities are provided (Cleary et al., 2019). However, within the United Kingdom and Ireland, schools for children with intellectual disabilities often do not have a designated PE teacher. For those staff who are inexperienced in PA delivery, or who have not got a PE background, they will require additional support including training, mentorship, resources and equipment, to empower them in providing additional PA opportunities for their students.

Within this population the transition from childhood to adolescence is marked by a change in the parental role in supporting their child's PA. A study in Norway by Melbøe and Ytterhus (2017) reported that parents tend to have a more practical hands-on approach in childhood, however, during adolescence they become more of a driver and financial supporter. During the intervention development process, it is crucial to have buy-in from parents, as they will ultimately be responsible for supporting and encouraging their child to take part. Social interactions with peers has been described as a primary reason for taking part in PA within this population. Taking part in PA with peers can make it purposeful, meaningful and enjoyable (Barr & Shields, 2011). Fostering social interaction amongst participants such as paired or group-based activities, may help to increase PA participation.

## 4.3 | Motivation

We found that motivation is highly individualised; what encourages one student to engage in PA may have the opposite effect for another. This underlines the need for individualised motivational strategies to enhance

PA participation. Corresponding with existing literature, we noted how motivation to engage in PA increases when activities are fun and enjoyable (Shimmell et al., 2013; Stevens et al., 2017). When an individual has high self-efficacy towards an activity, they tend to enjoy it and are more likely to engage. Conversely, low self-efficacy results in a dislike and avoidance of activities. Intervention developers should consider ways to enable participants to develop competence, this includes tailoring tasks to meet individual capabilities and providing opportunities for them to successfully develop skills (Stevens et al., 2017).

Incentives and rewards are frequently cited as PA motivators. This is an example of a form of extrinsic motivation termed external regulation. External regulation is associated with decreased autonomy. Individuals who lack autonomy are less likely to engage in behaviour (Ryan & Deci, 2007; Vasconcellos et al., 2020). Therefore, incentive and rewards should not be used as primary drivers for PA adherence. Praise, exercising with friends, stimuli such as music and lights, can enhance motivation to engage in PA. Whilst factors such as competition, team activities and the atmosphere created by the PA instructor can serve to encourage or discourage PA. Many students are motivated by team-based activities and competition (Conchar et al., 2016; Stevens et al., 2017). The enjoyment and desire to win associated with these types of activities are factors which enhance motivation. However, it is important to note that these types of activities are not universally acceptable (Shimmell et al., 2013). Parents and teachers within this study reported that competition and a fear of failure would prevent some students from engaging. With such a diverse range of motivational factors to consider, a highly skilled PA instructor is required. Understanding these complex motivational influences can support schools and PA instructors, to develop individualised motivational strategies, for adolescents with intellectual disabilities.

## 4.4 | Limitations

Despite the innovation of our study, in using of the COM-B model to explore factors influencing PA behaviour, within schools for children with intellectual disabilities, we did not explicitly explore the impact of other confounding factors on PA, such as gender, age and socioeconomic status. The range of communicative abilities within the student focus group may have resulted in some students being unable to express their opinion, or indeed it may have prevented a richer discussion between the participants. The need for advocates assisting students may have unintentionally resulted in miscommunication. As with all focus group methodologies and purposive sampling, we are unable to treat individual contributions contained within our findings as representative of the wider population. Whilst we obtained rich descriptive data from two schools for children with intellectual disabilities in Northern Ireland, these findings may not be applicable in other similar schools.

## 4.5 | Strengths and implications for practice

This was the first qualitative study conducted using components of the BCW, specifically the COM-B model to investigate adolescent PA



behaviour in schools for children with intellectual disabilities. Our study supports the theoretical generalisability of the COM-B model within the field of intellectual disabilities, to explore PA behavioural influences. The COM-B model provided a systematic method for the identification of a range of individual, interpersonal, and environmental factors influencing PA, across all six COM-B constructs, within the context of the 'school system'. As outlined, findings from our study align closely with existing international research within this population. Triangulation of the data across three stakeholder groups is a strength of our study. This enabled us to explore the factors influencing PA within this population, from the individual's perspective, and those who support them to become physically active.

The behavioural influences described have implications for developing and testing PA interventions within complex 'school systems'. Through application of the subsequent steps within the BCW, intervention developers will work in co-production with end-users to identify appropriate BCT's, to overcome and provide consideration for, the barriers and facilitators of PA outlined. Inclusion of end-users throughout the intervention development process, alongside the application of individual and systems change theories, resonates with the current Medical Research Councils' (MRC) guidance for the development and evaluation of complex interventions (Moore et al., 2019). This will support the development of a tailored, sustainable and contextually relevant school-based PA intervention. Whilst our study was conducted within a school context, future research should aim to establish the similarities and differences of PA behavioural influences in adolescents with intellectual disabilities, across multiple contexts. In addition, research should aim to apply the COM-B model to explore health behaviour more widely, within adolescents with intellectual disabilities.

## 5 | CONCLUSION

Globally, adolescents with intellectual disabilities are impacted by a range of individual, interpersonal and contextual/environmental factors which influence their PA behaviour. The COM-B model has demonstrated applicability for eliciting these behavioural influences within the school context. We recommend the BCW for health behaviour research and intervention development, within the adolescent with intellectual disability population, and more broadly within populations with cognitive disabilities. An important first step in the intervention development process is to establish what needs to change. The COM-B model is deemed sufficiently comprehensive to explore the full range of potential health behaviour influences and can be applied across a range of contexts.

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## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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