Early Years Physical Development Research Paper

Forward

Dr Vanessa King

Having spent over a decade working with both educational and health practitioners in Early Years settings observing children's movement, it is clear that the early foundations of rudimental movement and the integration of primitive reflexes are essential for children to be able to engage with physical activity. When children start school, there is a major discrepancy in their rudimentary and fundamental movement skills, influenced by a myriad of factors affecting their early physical development. The number of enriching opportunities children have been offered in their environment throughout infancy and early childhood differ greatly on an individual basis depending on varying factors including socio economic status. It is imperative that we draw on both health and educational knowledge of children's physical development to ensure that children are well equipped to make the most of the movement offers at school, the only place where it is guaranteed that ALL children have an opportunity to receive high quality PE.

Dr Kristy Howells

I have been researching within the field of young children's movement and health for almost two decades. I have always been an advocate for early movement and the importance of early years physical development, play, motor competency and physical activity. This research paper draws on and shares the most up to date research and highlights the importance of space, place, and time that is early years learning and how powerful movement can be for children's holistic learning. It is the responsibility of us all to promote active lifestyles to ensure every child has life long and life wide access, through ensuring children have access and opportunities to move every day. By aligning educational and public health policy and practice supported by research, this paper shows the importance of prioritising holistic physical development play-based approaches to improve children's physical, cognitive, and emotional outcomes, whilst reducing long-term health issues and costs.

Introduction

This paper presents national and international research evidence on early years physical development, motor competency, play and physical activity. It highlights the importance of early years settings as the key place to support early movement, and of early years practitioners who are critical to enabling movement opportunities as part of children's learning. Children can spend half of their waking hours within early years settings, therefore early years education is a key place to enable habit forming behaviour and develop excitement for movement. The paper also shares a novel evidence-based approach of connecting primitive reflexes to early years physical development and demonstrates how this can help children progress in their physical development.

Key language

Physical development

Physical development is a term used mainly in early years, preschool, nursery, kindergarten and childminder settings and also primary aged educational settings. Physical development is one of three prime areas of learning within the early years foundation stage statutory framework, the other two being communication and language, and personal, social and emotional development. The non-prime areas of learning include: literacy; mathematics; understanding the world; and expressive arts and design (Department for Education, 2023).

Jess (2019) highlights that babies and toddlers should achieve levels of physical development that will act as the foundation for future, more complicated movement. Providing these physical development foundations are in place, young children should gradually begin to demonstrate better balance, travel through space in a range of different ways and manipulate objects with different parts of their bodies, particularly their hands and feet. However, while a child's increased size, shape and strength act as a platform to support the emergence of most movements, the fundamental movement skills efficiency, adaptability and creativity that is so important for current and future participation does not 'just happen', it needs opportunity and appropriate teaching. Howells et al. (2018) suggested thinking about physical development in the early years in terms of the '3cs – control; coordination and confidence' (p.6); this can be used when planning for physical development within structured and unstructured learning, involving the use of small and/or large equipment in both indoor and outdoor environments.

Motor competency

Motor competency is a similar term to physical development which is often used more in international settings. According to Malina (2014), motor competency is defined as the development of capability and proficiency in body movement activities. It refers to children's ability to perform fundamental functional movement skills required for day-to-day living such as locomotion skills, stability skills and object control skills (Stodden et al., 2008). Motor competency is the term often used when discussing physical activity interventions implemented by practitioners and teachers to support children's motor/movement skills. Morley et al. (2015) investigated the relationship between socioeconomic levels and the development of motor skills and found that children living in more deprived areas had lower levels of motor competency and physical development.

Play

Play is defined by the World Health Organisation (WHO) (2019) as 'being for its own sake (without a specific goal), voluntary, enjoyed by participants and imaginative. It can be solitary or social, and with or without objects. Young children acquire and consolidate developmental skills through playful interactions with people' (p.v). The WHO (2019) identified different types of play including: energetic play; floor-based play; interactive play; active play; and quiet play (which is not sedentary).

Age specific movement opportunities

The Early Years Special Interest Group for the International Association of Physical Education in Higher Education (IAPEHE) analysed twelve countries' early years physical play and physical activity policies and practices and found variation in language with phrases such as play, outdoor play, free play, purposeful structured play, unstructured play, risky play and active play often used interchangeably (Howells & Sääkslahti, 2019). One of our key recommendations is awareness of the variation in language used within different settings across different countries and the need to embrace this in order to plan, observe and enhance movement opportunities for all children.

The IAPEHE offered the following age-specific examples of movement opportunities that could support physical activity within educational settings:

0-12months

- At least 30 minutes of tummy time, to include sensory and motor stimulation through free movement, while the infant is awake, throughout the day.
- No more than 1 hour restrained (e.g. in an infant carrier) in order to take part in free, locomotor movements such as crawling, rolling, standing and walking.

1-3 years

- First steps towards basic movement skills (rolling, crawling, climbing, walking, running, jumping) in different environments. Focus on motor development and curiosity to encourage children to move in and around their environments.
- Starting around 1 year of age, the recommendation moves towards 180 minutes a day of movement, at varying intensities, with a limitation of no more than 1 hour restrained (e.g. in a high chair). The importance of free play in a versatile environment is underlined.
- As the child grows and develops into 2-3 years old, 180 minutes a day of physical activity is recommended, made up of approximately 60 minutes of moderate to vigorous movement and free play and 120 minutes of light to moderate physical activity through play.

3-5 years

- Mastering basic skills in varied environments (e.g. walking, running, jumping, skipping, hopping, climbing, throwing and catching).
- Free play with different equipment encouraged, playing outside during all seasons, and experiencing versatile environments with naturally increasing challenges.
- 180 minutes of physical activity per day is recommended, made up of approximately 60 minutes of moderate to vigorous movement and 120 minutes of light to moderate and vigorous physical activity through play.

Previously, Howells (2012, p.119) emphasised the importance of health and physical development and highlighted that 'physical education should encompass individual physical development, health and wellbeing' and plays a crucial role in the holistic development of children.

Language used within the curriculum

A wide range of language is used when describing how early years children learn physically, including physical development, play, physical activity and movements skills. An analysis of the national curricula across the four countries in the United Kingdom reveal the following:

The Scottish curriculum focuses on physical development within the broader curriculum of health and wellbeing, and then within the substructure of physical education, physical activity and sport. It provides details about movement skills, competencies and concepts and a clear focus on 'improvements in quality of life through play, with outcomes of outdoor play leading to physical activity and healthy weight' and highlights that the experiences that children have from an early age can impact their life long and life wide undertaking of physical activities. The curriculum also proposes the aim of establishing a pattern of daily physical activity which is most likely to then lead to physical activity being sustained into adult life (Education Scotland, 2020).

The Welsh curriculum is similar to the Scottish curriculum in that physical development is situated within the broader curriculum area of health and wellbeing. There is an emphasis on developing confidence, motivation and physical competence, as well as an understanding of how these help children lead a healthy and active lifestyle. These competencies are similar to those presented in the English curriculum, as there is a focus in the early phases and progressions of learning gross and fine motor skills (Welsh Government, 2022).

Within the Northern Ireland curriculum, physical development also has a focus on health and 'is about experiencing and developing a range of fundamental movement skills that will improve coordination, locomotion control, balance and manipulation'. There is an emphasis on nurturing the development of fundamental movement skills as they are not only 'important for the child's long-term health and well-being but also because they support the child's physical development' (Council for the Curriculum, Examinations and Assessment, 2007, p.1).

The English curriculum has early learning goals used to describe the level of development children should be expected to have reached by the end of EYFS which is when they reach the end of the first year of primary school (Department for Education, 2013). There are two main early learning goals for physical development which are gross motor skills and fine motor skills, the same as within the Welsh curriculum.

All four home countries in the UK highlight that physical development and fundamental movement skills are not just limited to one part of the curriculum, but have more of a holistic approach to inspire, challenge and motivate the children.

This can be achieved through:

- teacher/practitioner/adult led activities
- child initiated activities (but the teacher/practitioner needs to provide the resources and movement opportunities)
- learning through play, including play in the outdoors
- playground activities
- home link activities
- community links.

The importance of the learning setting

Child motor development is a complex phenomenon, changing through an interactive process between the individual's biological constraints and the environment (Rudd et al., 2021), which implicates an array of diverse developmental experiences for each individual child (Adolph, 2019). Fundamental movement skill (FMS) proficiency is an essential component of young children's overall growth and development (Gallahue et al., 2012; Stodden et al., 2008). As motor skills develop over time, more complex patterns of coordination evolve (Clark, 2007). It is the quality of the environmental interactions that have the potential to shape a child's individual development in the very early years of life. This may differ diversely depending upon the capacity of the parent or guardian to provide rich movement experiences affected by factors such as socio-economic status (Draper et al., 2012).

Primary schools and early years settings play a vital role in influencing the early attitudes and experiences of children towards being active and developing motor competency (Bailey et al., 2009) through exposure to a range of activities (Adab et al., 2018). Children improve their movement capabilities through physical education lessons (Kirk, 1992; Smith & Leech, 2010). The acquisition of movement skills, which can be facilitated through physical education in primary schools are important to enable children to engage confidently in physical activity across their lifespan (Barnett et al., 2016). The association between the development of FMS and physical activity levels amongst children is an important consideration, as engagement in physical activity serves to strengthen the continuous cycles of action and perception as children develop mastery of fine and gross motor skills (Rudd et al., 2021).

Educational settings that provide a platform for early experiences of the acquisition of motor competencies are influenced by the culture and ethos of the school that a child attends and the interpersonal interactions with key role models such as teachers (Clark, 2007). As Jess (2019, p.2) highlights, 'traditional physical education and sports programmes have unfortunately been designed as if children are complicated systems whose body parts are pre-programmed to connect in an order that leads to predictable movement outcomes…'. Children's movement development is therefore viewed as a 'one-size-fits-all' phenomenon: a view that ignores two key points. Firstly, it ignores the individual differences between each child: their previous experiences and their current physical, cognitive, social and emotional development. Secondly, it ignores the fact that while children, young people and adults need to develop some degree of movement efficiency, they also need to be adaptable and creative in their movement behaviours to take part in most physical activity contexts (Jess, Keay & Carse, 2016; Sandford et al., 2015).

From Physical Development to Physical Education

The complex nature of young children's mastery of fundamental movement skills (e.g. running, throwing, catching, jumping) assumes that children's physical development needs were adequately met when they were babies and toddlers. However, the reality is that the experiences that children face beyond the school setting are diverse, affected by the home environment (Clark, 2007), the local community (Terrón Pérez et al., 2021) and the wider political landscape (Lindsey, 2020).

School PE therefore should become the 'connective catalyst' for the lifelong and life-wide physical education for life (PEL) journeys of all children and young people (Jess et al., 2023). If school PE is to help all young people develop the holistic foundations that support their PEL journeys, teachers' adaptive practice is key to the successful enactment of this vision. Therefore, as teachers seek to help all children and young people develop their holistic foundations, school PE cannot be delivered as a one-size-fits-all, quick fix package but needs to become a long-term undertaking that purposefully seeks to support the life-wide physical activity pathways of each child and young person (Jess et al., 2024).

Current national trends in physical development

Nationwide, schools are reporting that children are starting school with lower motor competency and physical development levels than they should be due to a myriad of factors including overuse of screen time, lack of exposure to physical activity in the early years and over reliance on prams, cots and buggies (King, 2022). The impact of this sedentary period in children is not only seen in the lack of motor competency, but in the subsequent impact on neurodiversity conditions such as ADHD and autism. There has also been a negative impact from the COVID-19 pandemic. This has been especially evident in those from low-income families with reduced movement opportunities due to lack of outdoor play and physical activity provision (Snyder et al., 2022).

Huggett and Howells' (2022, 2024) found that 4-5 year old children's motor competency had been impacted due to a lack of movement opportunities. The children they studied appeared clumsy and struggled with negotiating space and coordinating arms and legs within gross motor skills. The children also found one legged balances and hopping forwards in a straight line particularly difficult. In terms of fine motor skills, the majority of the children studied could not use a tripod grip, which meant they found it difficult to hold pencils and to use scissors and cutlery effectively.

The potential place for interventions

Fundamental movement proficiency is an essential component of children's growth and development, an integral part of learning to move, as the acquisition of rudimentary and fundamental movement skills provides the initial patterns necessary for the mastery of more complex motor skills required for sporting activities later in life (King, 2022). If appropriate interventions are not put in place to aid those children who do not have the initial rudimentary and fundamental movement skills, this will place them at a disadvantage in comparison to their peers (King, 2022).

Optimal physical development begins at the embryonic stage, as the neonatal child's nervous system evolves, starting with primitive reflexes being integrated, continuing through infancy (Pecuch et al., 2021.) If experiences do not provide stimulating developmental processes, a detrimental effect on motor competency occurs (Clark, 2007).

Data from the Active Lives Survey (Sport England, 2023) has shown consistent differences in the physical activity of children aged 6-11 across variables such as age, gender, ethnicity, family affluence and disability. Unfortunately, the survey begins at the age of 6 so does not provide information about the physical activity levels of the early years age range.

There is a lack of knowledge about the physical activity and motor competency levels of children in the early years. Within the NHS, children who face issues with motor competency are often referred for therapeutic interventions, designed to ensure the integration of primitive reflexes and further development of rudimentary and fundamental movement skills. However, waiting lists for these interventions can be more than four years, depending on where a child is situated geographically in the country. Furthermore, there is a lack of knowledge amongst practitioners in early years settings to help them understand the key steps to build motor competency from the beginning stages of the integration of primitive reflexes to rudimentary and then fundamental movement skills.

The solution could be to integrate the understanding of practitioners in the NHS with those in early years educational settings by utilising a screening tool followed by targeted age-appropriate interventions to optimise children's physical development.

Intervention Research Example

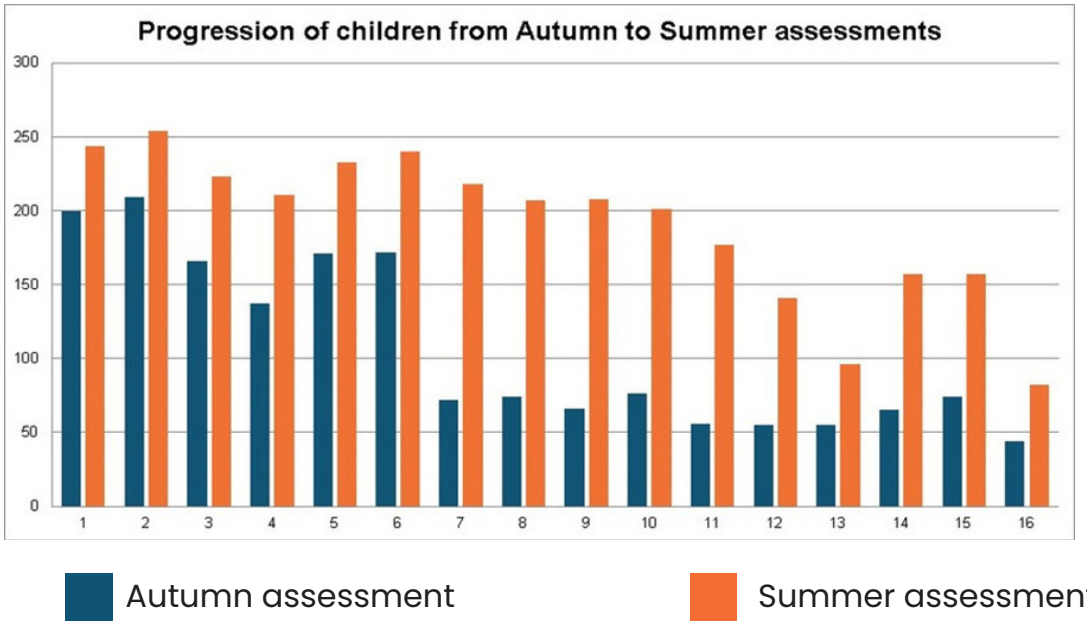
The Association for Physical Education supported the development of a diagnostic tool to assess early years children's motor skills during 2023-24. This was based on an initial tool created in 2015 by Solent NHS which was rolled out in Hampshire schools. The development involved refining it for use in Year R with further implementation of progressive physical interventions to address the presence of active primitive reflexes (APRs) which can indicate neuromotor immaturity (Hazzaa et al., 2021).

Research on the implementation and impact of the new diagnostic tool and interventions included data from 300 children aged 4-5 years attending schools from a range of socio-economic backgrounds (top 10% - bottom 10% indices of deprivation (IMD). The IMD were calculated from school postcodes using the Government measurements of socioeconomic inequality.

The results demonstrate improvements in the children's movement skills. Children were exposed to over 100 movements that stimulated the integration of primitive reflexes including symmetric tonic neck reflex, asymmetric tonic neck reflex, tonic labyrinthine reflex, moro reflex, rudimentary locomotor skills that control the head, neck and trunk muscles in addition to reaching and grasping skills, locomotor skills, object control skills, agility and fundamental sport skills (Gallahue et al., 2012.) The diagnostic tool was used to assess progression throughout the course of the interventions from Autumn to Summer.

Progression in each of these skills is shown in the table below:

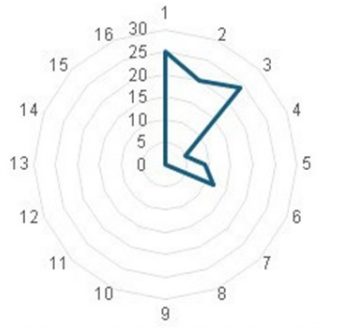
1. Total flexion 2. Total extension 3. Static table 4. Full body roll in extension 5. Half kneel 6. One leg balance 7. Extended flexion 8. Extended extension 9. Extended table 10. Half kneel with turn clockwise and anticlockwise 10. Alternate hopping 11. Active flexion 12. Active extension 13. Moving table 14. Bottom lifts 15. Bottom walking 16. Skipping



School based analysis was also undertaken (see below). School 1 is situated in the bottom 10% IMD and School 2 is situated in the top 30% IMD. This assessment was completed in the Summer term with Year R showing motor competency in accessing the 16 skills in the diagnostic criteria. The following figures show school-specific improvements and the significant impact the intervention had for children within more disadvantaged areas who may lack movement opportunities outside of school and rely on early years settings to support their physical development.

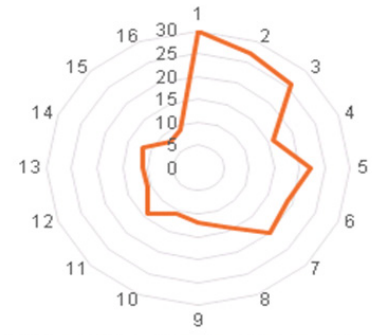
Many children enter school in Year R with low motor competency which can affect their engagement with physical activity and physical education opportunities within school.Furthermore, a lack of motor competency can result from the lack of integration of primitive reflexes which impact on the development of rudimentary and fundamental movement skills.

School 1 Autumn

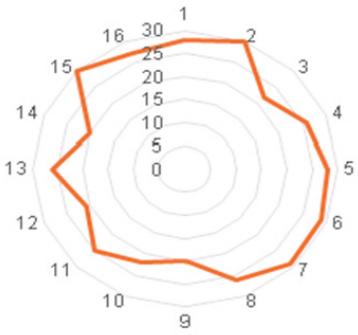


School 2 Autumn

School 1 - Summer



School 2 - Summer



Currently, the NHS offers therapeutic interventions for children who have been referred because of issues with motor competency. However, the impact of this varies, depending on where children are situated within the UK as waiting lists can be up to 4 years. Furthermore, some children may not be deemed severe enough to be referred and, due to a lack of knowledge and understanding of physical development amongst early years practitioners and parents/carers, many may not receive access to any therapeutic interventions to aid their motor competence.

A proposed solution to this problem is to use a diagnostic tool to assess physical development on entry to Year R and to put in place targeted physical activity interventions within the school setting. Research demonstrates the positive impact of this approach on 300 children aged 4-5 years across schools situated in the north of England. Findings from the school in the bottom 10% IMD indicate the need for earlier intervention so that children have time to develop. Furthermore, more research needs to be undertaken to determine whether diagnostics and interventions should be adopted within early years settings prior to entry to school.

Conclusion

Overall, this paper has identified that early years educational settings are ideal places for the enhancement of children's physical development and motor competency. It recognises that some children are not receiving enough movement opportunities outside of educational settings to develop the foundations for more complex movements. It highlights that children have been negatively impacted by the pandemic and need more support in developing their physical development. It also highlights that all children have the potential to benefit from relatively short physical activity interventions in educational settings, especially children from disadvantaged backgrounds.

Recommendations

1. Recognise and embrace the wide range of terminology associated with early years movement development.
2. Increase the time spent on movement opportunities within early years settings.
3. Understand the importance of evidence-based interventions to support children's physical development.
4. Make use of an early years diagnostic tool followed by targeted physical activity interventions to enhance children's movement skills.
5. Use research-informed guidance such as international recommendations to support physical development through physical activity.
6. Develop early years practitioners' knowledge and understanding of physical development within teacher education and professional development.

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