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Chapter

Jack Be Nimble and Jack Be Quick: Increasing Movement Competence in Early Childhood Settings

Michelle Hamilton and Jennifer Ahrens

Abstract

Increasingly, child caregivers have been tasked with assuring that young children are academically prepared for school. As a result, many childcare settings are focusing exclusively on academic content. The narrow curricular focus has resulted in the exclusion of offering physical activity and structured motor skill lessons. Consequently, many children do not receive adequate physical activity to maintain a healthy weight and lack movement competence to actively engage in physical activity with peers or thrive in academic settings. Providing young children with structured movement opportunities, including body management concepts and movement, fundamental motor skill instruction, and directed opportunities to learn fine motor skills, is critical to movement competence. Finally, it is important for early childhood researchers, caregivers, educators, and policy makers to understand the relationship of movement competence in early childhood to later movement and academic success.

Keywords: early childhood movement competence, physical activity, obesity, fundamental motor skills, body management concepts, fine motor skills

1. Introduction

Jack be nimble,

Jack be quick.

Jack jumped over, The candlestick.

The lyrics to a popular early childhood rhyme that originated in the eighteenth century began with the chant, "Jack be nimble, Jack be quick." However, many educators working with young children will quickly tell you that all too often Jack is overweight, Jack is slow, and Jack lacks the necessary skills to jump over anything, much less a candlestick! Moreover, many early educators and child caregivers might also be quick to add physical activity and motor skills are not part of the early childhood curriculum, and there is not enough time to address anything not related to school readiness in the curriculum.

Over the past three decades, K-12 educational reform efforts in the United States have undoubtedly influenced early education curriculum. Early reform efforts introduced in 1989 by the Federal government, such as National Goals 2000,

identified the goal of all children being ready upon entering school by 2000. These goals highlighted specifically the need for children to be academically prepared upon entering school or "school ready" [1]. Consequently, the emphasis on academic preparedness has resulted in "pushing down curriculum." Essentially, this has resulted in the academic curriculum once taught in primary grades now taught in early childhood preschool programs and childcare settings. Why does this really matter? After all, our early education programs are supposed to focus on preparing children to be academically ready or kindergarten. Correct?

Unfortunately, by focusing on a narrowly defined academic curriculum, policy makers, educators, and childcare providers are compromising critical areas of child functioning and development. From a developmental perspective, focusing exclusively on academic performance at a young age is akin to building the walls of a house before the foundation has been poured. Arguably, critical needs of children are being ignored for a cookie-cutter school readiness checklist.

For young children, it is important to have a strong foundation to promote positive health, physical activity, and the motor skills eventually leading to school success. Many caretakers and teachers erroneously assume children will naturally develop motor skills and are physically active through play. Unfortunately, positive outcomes will not occur without careful planning. By taking a close look at the early education programming, curriculum, and physical environment, more deliberative decisions can be made. By systemically addressing these needs through thoughtful planning, curriculum, and policy changes, it is possible to create a clear pathway for outcomes for children.

2. Reversing the trajectory of adverse childhood outcomes

Currently, millions of young children attend early childcare settings on a regular basis. These childcare settings include Head Start, public preschools, and private day care settings. It is not estimated that approximately 58% of children in the United States from 0 to 5 years attend a childcare setting outside the home [2]. This places public preschools and daycare providers in a unique position to address children's health and developmental needs.

Early childhood obesity has become more prevalent in the United States. In 2014, the Centers for Disease Control (CDC) reported that obesity rates of children between 2 and 5 years of age are 13.9% [3]. Obesity and overweight status is defined as children at 95 and 85th percentile of body mass index, respectively, taking into account age and height. However, the rates of obesity in early childhood appear at higher rates among Latino, African-American, and low SES populations of children [3, 4].

Childhood obesity is related to a myriad of health problems with long-term and short-term health consequences. Consequences for health can include increased risk for asthma [5, 6], diabetes [7, 8], mental health issues [9–11], and muscular, skeletal, and growth-related problems. In addition, children who enter kindergarten overweight are four times more likely to remain overweight or obese as an adolescent and into adulthood [12]. Without intervention, health-related obesity is one of the factors related to poor health consequences in adulthood.

Moreover, childhood obesity is likely to have long-term adverse impact on social development. For instance, obese children were more likely to experience depression, be more socially isolated, and have difficulties making friends with other children. Additionally, overweight children of all ages are much more likely to be targets for unwanted bullying by peers and other children.

Furthermore, childhood obesity affects important areas of children's development. Specifically, children's motor development is likely to be impacted. Young

children with increased body mass index (BMI) are more likely to have difficulties in performing fundamental motor skills (FMS) that are important in early childhood activities [13, 14]. As a result, children who lack FMS are more likely to refrain from activities that require these skills.

Likewise, obesity can lead to poor academic performance for young children and adolescents. In younger grades, obese children are much more likely to perform poorly on standardized tests. A large-scale longitudinal study involving 11,192 kindergarten and first-grade children analyzed the standardized math and reading scores of children who were overweight and normal weight. In this study, overweight children performed more poorly on both math and reading scores [15]. Additionally, obese children and adolescents are more likely to dislike school and to consider negative long-term solutions such as dropping out of school [16].

2.1 Promoting physical activity in childcare settings

Participation in regular physical activity is one of the leading strategies recognized by public health officials to address early childhood obesity and is considered an essential part of the early childhood curriculum. The benefits of regular participation in physical activity for young children include maintenance of a healthy weight, increased academic skills, increased social-emotional development, and increased motor development. These benefits are important to the overall development of young children.

Physical activity and sedentary behaviors are among two of the contributing factors for early childhood obesity. The Society for Health and Physical Educators (SHAPE) and the American Academy of Pediatrics (AAP) have indicated children need to have a minimum of 60 accumulated minutes each of structured and unstructured physical activity [17, 18]. Structured physical activity can include movement instruction to increase knowledge and skills related to fundamental movement concepts and knowledge related to spatial awareness and movement skills. Often, structured activity is taught by a movement specialist who is knowledgeable in physical education and movement skills for early childhood. Unstructured physical activity is unplanned movement time in which children are allowed to make their own movement choices.

Unfortunately, many young children do not accumulate the necessary and recommended number of minutes of unstructured or structured physical activity each day to maintain a healthy weight [19, 20]. Schools and day care settings can play an important role in increasing the physical activity levels for young children by adapting curriculum, adopting policies, and supporting changes in the daily routines and practices to increase physical activity. The Health and Medicine Division (HMD) of the National Academies, formerly referred to as Institutes of Medicine (IOM), has provided specific and concrete recommendations for increasing physical activity and decreasing sedentary time for preschool and daycare settings [20]. Among the recommendations of the HMD are the provision of structured and unstructured physical activity, daily outdoor physical activity, and 15 minutes per hour of light to moderate and vigorous physical activity.

To increase structured activity, it is necessary to have a knowledgeable instructor or movement teacher who understands movement skills and concepts to provide young children with the foundation for an active lifestyle. For young children, a qualified instructor would include someone who is well-versed in providing developmentally appropriate physical education for young children. The availability of a movement instructor helps to ensure children are learning skills that allow them to learn to move efficiently to actively participate in childhood activities.

Obviously, one barrier for increasing the opportunities for structured physical activity in childcare settings is the lack of availability of qualified instructors. Often, teacher training and background may be a barrier to increase structured physical activity. In addition, certified physical education teachers may lack appropriate early childhood field experiences [21]. When consider hiring a movement teacher or physical education teacher, it is important to consider their background in working with young children. A background and understanding of developmentally appropriate movement for young children are essential for early childhood movement instruction.

Most often, the responsibility of teaching physical education or structured lessons falls upon childcare providers and teachers. Unfortunately, many childcare providers have little to no training in their teacher preparation or background to teach movement lessons to young children. This lack of training limits the ability to plan lesson content, including developmentally appropriate content that covers knowledge and skills to encourage movement competence in early childhood. However, it is possible to learn curriculum and concepts necessary to teach young children movement competency through purposeful professional development and workshops.

Likewise, many children also do not receive the recommended 60 minutes of unstructured physical activity time in childcare settings. The amount of unstructured physical activity time children receive is dependent upon factors such as environmental and facility factors, staff-related factors, and policies that encourage daily physical activity and movement [22–24]. A closer look at the physical outdoor and indoor space can provide valuable information on the opportunities children have to engage in physical activity in a school or day care setting. For instance, the availability of indoor and outdoor spaces in the school or day care is essential for physical activity for children to move. Likewise, a space for indoor movement such as multipurpose room or gymnasium is also important to encourage movement.

Additionally, an obstacle to providing unstructured physical activity is the involvement and participation of childcare providers in physical activity. Teachers and staff members can unknowingly undermine children's participation in physical activity. To be able to promote unstructured physical activity, it is important for teachers to encourage movement by modeling involvement in physical activity [23–25]. Teachers and staff members influence the amount, types, and levels of involvement of children in physical activity.

Unquestionably, the most significant barrier for physical activity in many childcare settings is the available time in the curriculum to devote to regular physical activity. Many childcare providers will claim there is not enough time in the curriculum for children to participate in regular physical activity. However, this is an example of a narrow lens in which physical activity is being viewed. Specifically, there is an ample body of research that demonstrates physical activity can enhance academic performance and behaviors including increased cognitive skills, academic performance, and attentiveness [26–28].

To successfully increase physical activity in the young children's daily activity, it may be important to address time constraints in the curriculum. Childcare providers may accomplish this by using an integrated curricular approach. An integrated curricular approach uses a more active approach to teaching content. By integrating physical activity with academic content, it is possible to increase the amount of physical activity time. In fact, there are a small number of studies demonstrating positive outcomes of integrating academic core concepts with physical activity on both academic performance and physical activity [29–31]. Recently, researchers demonstrated increases in literacy skills in an intervention study involving physical activity with preschool children. In this study, the experimental group of children who received an integrated curriculum demonstrated greater phonological awareness, letter recognition, and print awareness than the control group [29].

In addition, preschool children receiving the intervention were able accumulate 60 minutes per day of physical activity.

Additionally, a proven strategy to accumulate physical activity in the curriculum for children is to provide "movement breaks," throughout the daily routine or schedule for young children. These planned breaks can be 5–10 minutes in length and scheduled throughout the day in the classroom for young children. Researchers have indicated that movement breaks can be an effective way to introduce daily physical activity into young children's schedule [32, 33]. In addition, movement breaks may also help in increasing young children's attentiveness and time on task.

Finally, one strategy to improve children's physical activity levels is to use children's free time to provide instructions of motor skills. Children who are skillful are more likely to become involved in physical activity, demonstrate health-related physical fitness, and participate in physical activity opportunities that are available to them [34–36]. Conversely, young children who lack skills and movement proficiency are more likely to shy away from these activities and not accrue health-related benefits.

3. Increasing movement competence in early childhood

Over the past two decades, motor competence has been viewed as an important goal in reducing childhood obesity and increasing physical activity for children, adolescents, and adults. Children and adolescents who demonstrate motor competence are more likely to be physically active, have lower BMI, and demonstrate higher levels of physical fitness. The recognition of motor competence to the aforementioned outcomes has highlighted the importance of motor development in early childhood.

However, there is a lack of a consistent definition of the components of motor competence in the literature. A definition proposed nearly three decades ago declared motor competency is the ability to perform gross and fine motor skills with proficiency [37]. More recently, a definition presented motor competence as a theoretical construct divided into three areas including locomotor skills (e.g., running, galloping, skipping), manipulative movement, and stability or balance movements [38]. Other researchers have equated motor competence exclusively by children's ability to perform fundamental motor skills [39–41]. From a developmental perspective, it is unclear as to whether either of these definitions provides a comprehensive view of movement competence in early childhood.

Likewise, physical educators have deliberated on what it means to be proficient in movement. Physical literacy is a term that has been gaining momentum in the United States over the last several years. However, various institutions, international organizations, and individuals have applied vastly different perspectives and meanings to the term, "physical literacy" [42–45]. It is clear that various meanings, explanations, and interpretations have been assigned to the term, "physical literacy."

Consequently, National Standards in the United States were introduced in 2013 by the Society for Health and Physical Educators (SHAPE) to better define what it means to be a physically literate person [46]. The SHAPE definition implies to be a physically literate individual, a person who has the requisite knowledge, movement competence, values, and attitudes to move and participate in physical activity in a variety of contexts.

Specifically, the standards state the following:

> *(1) A physically literate individual demonstrates competency in a variety of movement skills and patterns. (2) A physically literate individual applies knowledge of concepts, principles, strategies, and tactics related to movement and performance. (3) A physically literate individual demonstrates the knowledge and skills to*

> *achieve and maintain a health-enhancing level of physical activity and fitness. (4) A physically literate person who respects self and others exhibits responsible personal and social behaviors. (5) The physically literate individual recognizes the value of physical activity for health, enjoyment, challenge, self-expression, and social interaction.* [46]

Although the standards provide a comprehensive view of the ultimate goal for "physical literacy," it is not entirely clear how the standards can be applied for early childhood movement competencies. From a developmental perspective, it is imperative that children acquire a large repertoire of movement competencies including knowledge of and application of movement concepts, fundamental motor skills, and fine motor skills. Movement competence in early childhood is important for participation in physical activity and future academic success.

3.1 Movement competence curriculum for early childhood care providers

Arguably, an early childhood framework for movement competence in early childhood is necessary to provide a conceptual understanding of movement competencies required during the early childhood years. A conceptual framework may provide childcare providers with an important tool to evaluate and plan developmentally appropriate movement curriculum and instruction to address children's movement needs. In **Figure 1**, movement competence in early childhood and key components for movement competence are depicted. These competencies include children learning body management concepts, fundamental motor skills including object control skills and locomotor skills, and fine motor skills that are necessary for participation in physical activity and future academic success.

3.1.1 Body management concepts and movements and movement principles

To learn to move with proficiency, it is first essential to have an understanding of basic movements and concepts. For child caregivers, it is helpful to understand terminology that is common to all movement. Rudolf Laban, born in 1879, is most

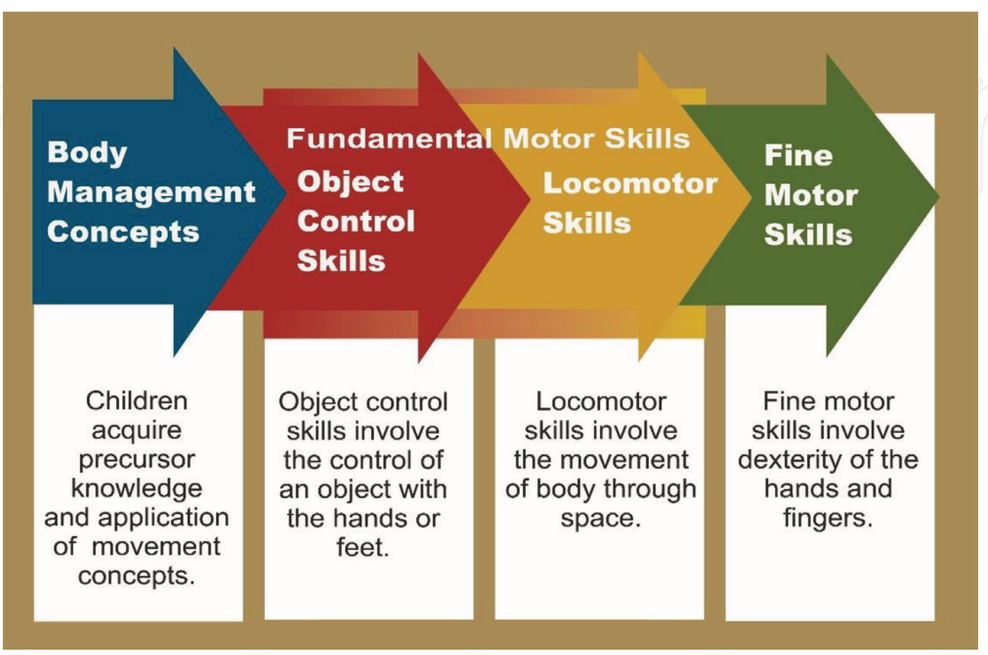


Figure 1.
Movement competence in early childhood. Key components of movement competence for young children.

often credited for his work in the notation of dance. More significantly, Laban's work has had a lasting impression on movement scientists for several decades. In the 1960s, Laban created a notational system to better understand movement, which is now known as the Laban movement analysis (LMA). However, what Laban is best known for is helping movement scientists to understand the most basic elements of movement including body, space, shape, and effort [46–48].

Much of Laban's work was popular in the latter half of the twentieth century. In fact, many Physical Education Teacher Education (PETE) programs have adapted Laban's work as part of a movement education curriculum. Laban's work has been the basis for many physical education textbooks for teacher preparation programs for the past three decades, although many movement educators and physical educators dismiss the importance of the work, citing that it is "out-of-date." However, the impact of Laban's work should not be underestimated in developing early childhood curriculum and instruction for movement competence in young children.

One of Laban's essential components of movement included an understanding of the body [47]. For young children, an understanding of the body includes an awareness of their bodies and how their bodies move. Body awareness provides the foundation for learning new movement skills. Child caregivers can start by asking children to point to body parts such as shoulders, hips, knees, wrists, elbows, back, and ankles and assisting children in more complex movements. Many teachers employ popular songs and activities to help young children learn their body parts.

Furthermore, an understanding of the body includes the application and exploration of non-locomotor movements. Specifically non-locomotor movements are movements that are performed while stationary. Learning how to shake, twist, bend, wave, sway, and swing are all examples of non-locomotor movements. Children can learn how to shake an arm or shake their entire body. Lessons exploring non-locomotor movements can be designed for children in the classroom or other space.

Moreover, shape is the form that the body occupies in space. Many of the movements children learn in movement require an understanding of the various shapes and forms the body can produce. When children are first introduced to a movement, one of the first movement qualities that they are introduced to is the body form or shape. To understand shape, it is essential to understand the various planes of movement including the horizontal plane, the vertical plane, and the sagittal planes of movement [47–50]. Within a horizontal plane, children can explore movements including expansion, contraction, wide, and thin. In the vertical plane, children can experiment with movements that include tall, short, high, or low. Also, in the sagittal plane, children can explore movements with their body including curved movements such as concave and convex shapes.

Additionally, an understanding of spatial concepts is necessary for young children in both the classroom and physical activity settings. Two of the spatial concepts which children struggle with in the classroom include personal and general space. It is not uncommon to observe children standing or sitting too close to one other or running into one another as they move about the classroom. Child caregivers can work with young children to understand spatial movements such as personal space to allow children to understand the boundaries of their own personal space through guided learning experiences. In addition, children can learn to move around the classroom and physical activity settings through planned movement instruction.

Moreover, one of the more challenging spatial concepts includes the use of locatives in both the classroom and physical activity settings. Locatives include relationships to objects and persons. Young children struggle with classroom directions when terms such as "in front, behind, toward, away, around, on top, and below," are provided. Often, even more difficulties arise when directions such as left and right

are included. Providing planned movement experiences to allow children to practice these concepts can prove to be valuable to children in both classroom and physical activity settings.

Finally, the last of the important body management concepts includes an understanding of effort. Within Laban's movement analysis framework, concepts include direct or indirect movement, weight, and time [47, 50]. An example of direct movement would include running from point A to point B. Indirect movement would include moving in a zig-zagged or curvilinear pathway. Within the movement quality of weight, children can learn to explore the use of force. For instance, movements using force or energy including soft vs. hard or light vs. heavy may be implemented in the classrooms or physical activity settings. Likewise, movement activities focusing on the quality of time of movement can also be implemented. Structured lessons including quick vs. slow movements can be explored.

3.1.2 Fundamental motor skills

Fundamental motor skills (FMS) constitute an important component of movement competence in early childhood. FMS play a vital role in promoting children's health, physical activity, cognitive, and social development during the early childhood years [39, 51, 52]. In addition, a lack of FMS is related to higher BMI and lower rates of physical activity for children and adolescents. Ideally, it is important young children begin learning these skills so they have the requisite skills for a healthy lifestyle.

FMS generally involve the large muscles of the body and fall into one of two categories. The first category of these skills includes the manipulation, reception, or projection of objects. These skills are known as object control skills. The second category of skills involves the transport of the body through spaces. These skills are known as locomotor skills (i.e., hopping, jumping, running, skipping, galloping, leaping). Both object control and locomotor skills play an important role in achieving movement competence during the early childhood years.

Often, many child caregivers have misconceptions on the ways in which young children learn motor skills. One common perception is that children learn motor skills as part of the maturation process and that children will learn them when they are ready. A second myth is that children who learn motor skills at an early age are athletically gifted. In reality, the only way for young children to become skillful and proficient in motor skills is by receiving instruction, opportunity to practice, and feedback during the learning process. Without purposeful instruction, it is unlikely that children will learn to execute object or locomotor skills.

The absence of FMS can limit a child's movement participation experiences throughout their childhood years. Lack of FMS can lead children to withdrawal from social opportunities or to avoid participation in physical activities in which these skills are required. Ideally, it is important young children begin learning these skills so they have the requisite skills for a healthy lifestyle.

The absence of fundamental skills can limit a child's movement participation experiences throughout their childhood years. Lack of fundamental motor skills can lead children to withdrawal from social opportunities or avoid participation in physical activities in which these skills are required. In addition, young children who have difficulty with FMS generally find themselves socially isolated from their peers in physical activities.

Moreover, providing young children with modest amounts of instruction can provide positive gains in motor skill proficiency. Several researchers have demonstrated the efficacy of teaching children fundamental motor skills in a relatively short period of time. One researcher demonstrated that parents could effectively teach object control skills to preschool children who were at risk for academic delay in an 8 week

motor skill intervention [52]. Similarly, in a separate intervention, comparable gains were demonstrated by child caregivers in a 9 week motor skill intervention teaching object control skills to young children [53]. Also, one researcher demonstrated that paraprofessionals could effectively provide direct instruction for both object control and locomotor skills to children in a 12 week motor skill intervention for preschool-aged children who were considered at risk for academic delay [54].

3.1.3 Fine motor skills

One of the most overlooked areas of movement competence in early childhood is the development of fine motor skills. Specifically, fine motor skills are used in many classroom activities in early childhood and primary grades. Consequently, children

Skill/Concept	Essential towards	Activities include
Body Concepts: Body	Understands and identifies body parts and relationship of parts. Can apply non-locomotor movements in various movement combinations.	Early childhood songs and dances. Simon Says, Head, Shoulders, Knees and Toes. Shaking, twisting, stretching, flexing, swinging, swaying, turning.
Body Concepts: Space	Understands space and application of spatial concepts such as general and personal space. Understands how to move in relationship to persons or objects using locatives.	Standing in line, sitting in a classroom circle, running games and activities. Moves to directions in classroom or physical activities that include in front, behind, around, next to, on top of, over and under.
Body Management: Shape	Understands how to shape the body in space by creatively selecting body movements or combinations.	Can shape body in curved, angular, symmetrical or non-symmetrical arrangements. Can apply knowledge of shape to form numbers or letters with body in classroom and physical activity games.
Body Management: Effort	Understands how to use concept of weight, space, time, and flow to produce movement.	Can produce movements that include light or strong; direct, or indirect, quick vs. slow, and bound vs. flowing.
Object control skills	Knowledge of basic biomechanics to control objects.	Throwing, catching, kicking, rolling, striking, bouncing a ball.
Locomotor skills	Learning to travel through space in different ways.	Galloping, skipping, running, hopping, jumping, leaping, sliding.
Fine motor movements	Learning to use the hands to support school readiness activities.	Dynamic tripod for writing and coloring, pincer grasp for picking up small objects, visual motor integration for copying letters/numbers.

Table 1.
Essential movement components and activities for early childhood.

who successfully develop fine motor skills are more likely to have success in classroom activities involving coloring, writing, and cutting with scissors.

More significantly, the development of fine motor skills is also related to later academic achievement in young children. Results from a large-scale study using data from two longitudinal databases demonstrate the importance of fine motor skills in academic performance [55]. Specifically, data from the National Longitudinal Youth Study (NLYS) and the British Birth Cohort Study (BCS) examined the relationship on early fine motor skill tasks and later performance in math and reading. The authors from this study concluded children's fine motor performance was positively correlated with future performance on both math and reading.

To explain the relationship between academic performance and fine motor skills, it may be first of all important to identify specific fine motor skills that support academic achievement (**Table 1**). For instance, visual motor integration is the ability to coordinate motor actions in response to visual stimuli. When children copy letters, numbers, or print from a chalkboard, they are using visual motor integration. If a child has poor visual motor integration, they will have a difficult time with this skill. Since the learning of math and many other subjects are still highly dependent upon these skills, it is somewhat easy to understand the significance of these skills [56].

Also, the dynamic tripod is a fine motor skill position required for handwriting in children. This is often a difficult skill for children to learn as it takes practice and instruction. In some cases, this is a skill that many public schools in the United States are no longer teaching to young children. If a child struggles with this foundational skill, the ability to perform homework or other writing tasks in class will become more difficult. Fortunately, these skills can be learned with structured lessons that provide children with an understanding of the necessary techniques to excel in handwriting.

4. Conclusion

In summary, it is important for early childhood educators and caretakers to address current practices and views on how best to prepare young children for school success. Academic preparation, while important, should not drive all curriculum and programmatic decisions. The lack of focus on fundamental children's needs including physical activity and development of motor skills is detrimental to the health and future success of young children.

Early childhood educators and caretakers hold the key to changing the course of potentially lifelong negative health consequences which have their origins in early childhood. From a public health perspective, early childhood is a critical time in which habits for physical activity and motor skills are developed. Examining barriers to physical activity such as space, professional preparation, and available time are important first steps for caretakers and providers. In addition, childcare administrators can assist in ensuring opportunities for unstructured and structured physical activity with guided instruction to learn movement concepts, gross motor skills, and fine motor skills. Finally, looking at opportunities to increase movement through curricular integration can increase movement competence and academic success in early childhood.

Recommendations for policy makers include increasing policies to support physical activity in schools and private day care settings. In addition, policy makers could shape public opinion on the importance of movement to young children by highlighting the issues in their respective communities. Providing clear guidelines through policy for physical activity time in accordance with the suggested amounts of physical activity times provided by the Society of Health and Physical Educators (SHAPE) can increase opportunities for children.

Future researchers can also explore the impact of physical activity and movement interventions on the school readiness of young children. Although preliminary evidence suggests that more active children have better academic outcomes, more evidence-based research is needed. Additionally, further research needs to explore the effects of integrated physical activity and preschool curriculum on both the physical activity levels and the academic outcomes of children. Finally, curriculum development research needs to be conducted to develop, refine, and implement movement lessons for teachers and caretakers without a movement background.

By introducing physical activity and movement competence into the early childhood curriculum, the narrative for the future of many children can be rewritten. The narrative may include a brighter future where children have attained a healthy weight status, have developed the motor skills to participate freely in physical activities, and have acquired the necessary fine motor skills to support academic success. However, this future cannot happen without changes to many of our childcare settings as well as revisions to the curriculum and programs.

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