

Investigation of Gross Motor Development of Children With Different Sociocultural Backgrounds: American vs. Chinese Preschoolers

Yuhua Li, Satomi Izumi-Taylor
University of Memphis, Memphis, USA
Kun Wang
Shandong Sport University, Jinan, China

Previous research suggested that child gross motor skill development is a critical component of early childhood and can be influenced by sociocultural circumstances. The purpose of the current study was to examine if there are any similarities and/or differences in the development of gross motor skills between American and Chinese children. Sixty children (three to five-year-old boys and girls) were recruited from each of the two countries: Memphis in the United States of America and Rizhao of Shandong in China. A total of 120 children were tested by using the Test of Gross Motor Development-3 (TGMD-3) standardized test protocol, including six locomotor skill items and seven object control skill items. The results from a 2 (country) $\times$ 3 (age) $\times$ 2 (gender) three-way ANOVA on the locomotor test showed a significant Country effect, $F_{(1, 108)} = 6.66, p < 0.05$, and an Age effect, $F_{(2, 108)} = 26.73, p < 0.01$. American children had a better performance in the test than Chinese children, and older children had higher scores than younger ones. The data analyses on the object control test revealed significant effects on country, age, and gender effects, $F_{(1, 108)} = 13.48, p < 0.01$; $F_{(2, 108)} = 10.39, p < 0.01$, and $F_{(1, 108)} = 9.08, p < 0.05$ respectively. An interaction was also found for Country by Gender and Country by Age, $F_{(1, 108)} = 5.54, p < 0.05$; $F_{(2, 108)} = 10.34, p < 0.01$. Further analyses revealed that American boys performed better than Chinese boys, and there were no significant differences between the girls of the two countries. American five-year-old children performed the best among the three age groups, but the best performance age group for Chinese children was among four-year-old. These findings confirmed the cross-cultural differences on gross motor development of children. Further investigations using a large-scale study may be needed before the conclusion regarding how sociocultural influences can affect children's gross motor development.

Keywords: early childhood, gross motor skills, TGMD-3

Introduction

Preschoolers are active learners who need to explore and learn by moving. They joyfully react to opportunities for dance, creative movements, physical play, and being outdoors where they can move without constraint. Educators can take advantage of children's innate nature of having active agility to promote their gross

Yuhua Li, Ph.D., Professor Emeritus, College of Health and Human Sciences, University of Memphis, Memphis, Tennessee, USA.
Satomi Izumi-Taylor, Ph.D., Professor Emeritus, Department of Instruction and Curriculum Leadership, University of Memphis, Memphis, Tennessee, USA.

Kun Wang, Lecturer, Wushu College, Shandong Sport University, Jinan, Shandong Province, People's Republic of China.

motor skills (Izumi-Taylor & Li, 2025). Gross motor skills refer to increased functional use of limbs for activities such as jumping, running, catching, and climbing (Bresson & King, 2022; Izumi-Taylor, Li, & Ro, 2023). Benefits of early development of gross motor skills through music and movement activities are well-known (Izumi-Taylor & Li, 2025; Izumi-Taylor et al., 2023), and these skills can foster cognitive development (August et al., 2023; Bresson & King, 2022; Ma et al., 2024; Pica, 2013). As educators, we need to remind ourselves how preschoolers' physical development is closely related to all of developmental areas, including social, emotional, and cognitive domains (August et al., 2023; Edwards et al., 2009; NAEYC, 2019).

Regular participation in activities that promote children's gross motor skills is essential for their overall health while inactivity is one of the biggest contributors to the development of obesity in young children (CDC, n.d.; Dow, 2010; Izumi-Taylor & Morris, 2007). However, physical maturation does not guarantee young children's development of physical skills (Epstein, 2014), and preschoolers are unlikely to learn physical skills through just playing (Gallahue, 1995; Manross, 2000). Teachers are ideally positioned to provide many opportunities for children to experience and practice their gross motor skills (Kostelink, Soderman, Whiren, & Rupiper, 2015; NAEYC, 2020). Yet, some preschool teachers tend to think that outdoor play time is just letting children play, and often they do not pay attention to what children are doing outdoors. For these reasons, they perceive physical activities as secondary to children's academic learning (August et al., 2023).

As previously mentioned, motor development is correlated with children's cognitive development (August et al., 2023; Diamond, 2000; Ratey, 2008; Rosenbaum, Carlson, & Gilmore, 2001; Scudddder et al., 2014). According to NAEYC's (the National Association of Education Young Children) Position Statement (2020), educators need to plan and implement developmentally appropriate learning experiences that foster all of children's developmental domains. Children's gross motor skills are associated with their executive function skills and resilience (Izumi-Taylor & Li, 2025; Ma et al., 2024). Also, children's physical fitness, parental support, and the quality of home and community physical environments are related to their gross motor skill development (Li et al., 2023). To illustrate, high population density is associated with children's lower motor competence, and various outdoor environments may foster such competence in them (Niemisto et al., 2019). Likewise, school environments and teachers' provision of structured physical activity opportunities are important in supporting children's motor development (Hardy et al., 2010). Fu and Burns (2018) find that older elementary school children with high social economic status demonstrate higher motor competence than children of a lower-social-economic status.

For their healthy development, young children should be physically active throughout the day, and 60 minutes of moving activities a day are highly important to their well-being (CDC, n.d.). As children's brains develop, their balance and perceptual skills improve, making it possible for them to control their own gross motor skills (Izumi-Taylor & Li, 2025). When preschoolers have well-developed motor skills, they find it easy to engage in physical activities. Such motor skills that involve movement of the entire body can encourage children to exercise (Bresson & King, 2022). Research evidence has shown that children's gross motor development is also impacted by environmental factors (He et al., 2024; Li et al., 2023; Niemisto et al., 2019; Sari & Izzah, 2021). Generally speaking, children are more physically active when they engage in school activities (NAEYC, 2019). Therefore, educators need to promote children's gross motor development during their early years by offering playful learning environments (NAEYC, 2019; 2020; Sari & Izzah, 2021; Zhou, 2024).

To broaden educators' perspectives regarding the importance of gross motor development, it would be beneficial to examine how American and Chinese preschoolers' gross motor skills develop. Education and childcare in Asian countries impact the everyday lives of people, including educational training, labour force

issues, cultural considerations, and societal values and attitudes (Maclean & Symaco, 2017). Thus, comparing preschoolers' gross motor development in China and the United States might provide educators with unique opportunities to see the dynamic change of physical education in these countries.

In spite of the differences in cultural, educational, and political systems, American and Chinese early childhood educators recognize the importance of early childhood education (Li et al., 2023; NAEYC, 2020). However, understanding children's gross motor skill development in one country may differ from that in other countries (Song, Lau, & Wang, 2022). People with different cultural backgrounds are more likely to focus on different characteristics of the same phenomena (Azuma, 1986), and this study provides a unique base for examining children's development of gross motor skills in two different nations. Although it is widely accepted that childhood motor development is greatly influenced by sociocultural circumstances (Bardid et al., 2016; dos Santos, Pacheco, Basso, & Tani, 2016; Downing, 2017; Li et al., 2023; NAEYC, 2020), reviewing different countries' teaching methods might provide all educators with opportunities to reflect on their own teaching practices. This article first outlines the contexts concerning the development of such skills of children in both countries. It is followed by a report on the study, analyses of findings, discussions, implications, and limitations.

Gross Motor Development of Preschoolers in China and the US

In China, kindergarten children need to spend about 40 hours each week with many opportunities for physical activities and physical education classes (Wang et al., 2022). Research studies reveal that children's physical education and activities are important for their development and learning (Le et al., 2024; Liu et al., 2024; Ma et al., 2024). One Chinese study regarding preschoolers' development of gross motor skills has demonstrated that when giving the structured physical activities, children's gross motor skills and physical fitness improved (Quan, Liao, Ji, & Zheng, 2024). *The Handbook of Standards* by the National Bureau of Sports and Physical Activities indicates that children need to engage in physical activities and play for their healthy development (The Standards, 2003). Likewise, the National Early Learning and Development Guidelines for Children aged three to six years recommend that young children need to engage in a total of two hours of daily outdoor activity (Ministry of Education of the People's Republic of China, 2012). However, Rao et al. (2023) have found that very few schools meet this requirement of two hours outdoor activities.

When comparing children's motor skills in China, Portugal, and the US, dos Santos et al. (2016) have found that basic Chinese curriculum on the development of fundamental motor skills focuses on the importance of sports learning and cultural games and activities. However, their study indicates that each country's popular sports do not necessarily promote children's mastering of motor skills and that children's development is associated with their cultures. The study by Liu et al. (2025) also has revealed that rural elementary schools children engaged in sports games in order to build their team-building skills and to develop positive mental health. According to this study, traditional Chinese physical education primarily focuses on sports skills and fitness development. Additionally, some studies have found that preschoolers with plenty of open space for play and structured physical activity lessons have performed better in gross motor skills development (Chow & Louie, 2013; Li et al., 2023). Others recommend that while assessing children's motor skills using the existing international tools, there is a need to develop appropriate assessment tools for Chinese preschoolers to accommodate their cultural differences (Song et al., 2022). Especially in China's past more than 20 years of early childhood education reform is influencing early childhood teachers' teaching and best practices greatly (Li, Park, & Chen, 2017). Such reform is changing how teachers gain knowledge of teaching young children in China.

There are no standards prescribed by the government in the US, but the National Association for the Education of Young Children's Position Statements clearly delineate that early childhood teachers must provide children with both indoor and outdoor environments that are conducive to their fine and gross motor development (NAEYC, 2019; 2020). All of children's domains of development, including physical, social, emotional, and cognitive aspects, are important, and they are closely interrelated. Because of the growing obesity problem in the US, early childhood educators are urged to provide many opportunities for children to engage in more physical activities every day (Bresson & King, 2022; CDC, n.d.). Bresson and King (2022) highly recommend that teachers offer play materials which support children's gross motor skills to promote their healthy development. Additionally, in the US, because of climate change, educators are concerned with environmental effects on children's well-being. Thus, a need for safe outdoor spaces is highly important, and such environments can support children's physical, emotional, social, and cognitive growth (Olsen, 2025).

One comparative study of American and Chinese preschoolers' gross motor development has found that when preschoolers have open spaces and freedom to explore outdoors, they tend to develop and improve their gross motor skills (Li et al., 2023). American children in this study have had access to ample spaces and physical activities more readily than their Chinese counterparts. School environments affect children's participation in gross motor development activities (Bresson & King, 2022; dos Santos et al., 2016; NAEYC, 2019; 2020; Zheng et al., 2022). Offering children safe and adequate physical outdoor environments to move and explore freely is one of the most salient factors in their gross motor development (Bresson & King, 2022; Izumi-Taylor et al., 2023; Pica, 2013).

The Purpose of the Study

One way to comprehend the complexities of educating young children is by reviewing the knowledge and practices of other cultures. Therefore, the purpose of the present study was to examine similarities and/or differences in the development of gross motor skills among American and Chinese preschoolers. The current study used the most updated standardized test battery, the Test of Gross Motor Development-Third Edition (TGMD-3), so the results can be compared with other studies in different locations and different cultural backgrounds (Ulrich, 2013; Webster & Ulrich, 2017). It may help us identify possible sociocultural influences that can affect children's motor development. It also would be beneficial to educators' universal understanding of the importance of early childhood physical education. This study was guided by the following two research questions:

1. Are there significant differences in the development of gross motor skills of American and Chinese preschoolers?
2. How are their gross motor skills similar or different?

Methods and Procedures

Participants

Sixty healthy children of three to five-year olds ($n = 20$ for each age group) with 30 girls and 30 boys were recruited from each of the following two locations: Rizhao, Shandong Province, China; Memphis, Tennessee State, United States. Both cities are medium-size cities. The preschools involved in the study are public schools in urban areas with similar school facilities (i.e., having outdoor playgrounds and physical education program curricula). American children had many opportunities to play and explore their spacious outdoor environments

because this school offered outdoors with play structures, sand play areas, trees, flowers, pond, and plants. They were able to go outside freely when teachers were there to supervise. These American children played and enjoyed unstructured physical activities. Although the Chinese preschool offered plenty of play space, its population density was high compared to that of their American counterparts. Before testing, in both countries a parent/guardian permission letter was signed for each of the children who participated in the study.

Materials and Equipment

A standardized test, Test of Gross Motor Development-3rd edition (TGMD-3) was used for the study. Specifically, all six skills in “Locomotor Subtest” and seven skills in “Object Control Subtest” were tested for all the children recruited for the study in the two countries.

The test items include:

Locomotor subtest:

- Run;
- Gallop;
- Hop;
- Skip;
- Horizontal jump;
- Slide.

Object control subtest:

- Striking a stationary ball;
- Forehand strike of self-bounced ball;
- One hand stationary dribble;
- Two hand catch;
- Kick a stationary ball;
- Overhand throw;
- Underhand throw.

A gym or playground with at least 60 feet by 40 feet was used in all the test locations. Four cones, two playground balls (one is about 8-in to 10-in diameter for dribbling and kicking test; another one is about 4-in for striking and catching test), and a tennis ball (for throw and roll test) were used. In addition, a plastic bat and batting tee was used.

Design and Test Procedure

In addition to the standard test protocol and scoring system specified in TGMD-3 that were followed, all the test locations also used the following test guideline:

- (1) Measure the height and weight for each child before the testing.
- (2) Children were tested in a small group of two or four.
- (3) One demonstration trial with brief instructions was followed by two test trials (the best score of the two test trials was used for the data analyses). Sixty-seconds or longer time interval was used between the test trials.
- (4) The test results were scored by one or two trained judges. If using two judges, the average score of the two was used for data analyses.
- (5) Before the testing, all judges were trained by using the same video clips specifically made for the training purpose by the investigators.

Data Analysis

Descriptive statistics were conducted based on all test scores of TGMD-3. A three-way ANOVA 2 (country) $\times$ 3 (age) $\times$ 2 (gender) was conducted on each of the two subtest scores. Counterpart post-hoc test was conducted as necessary. Significance was set at an alpha level of 0.05.

Results

Descriptive statistics are reported in Table 1, including the group means and standard deviations from both countries for boys and girls in three age groups. The results from a 2 (country) $\times$ 3 (age) $\times$ 2 (gender) three-way ANOVA on the locomotor test showed a significant Country effect, $F_{(1, 108)} = 6.66, p < 0.05$, and an Age effect, $F_{(2, 108)} = 26.73, p < 0.01$. American children had a better performance in the test than Chinese children, and older children had higher scores than younger ones. No gender effect and interaction between factors were detected in the analysis.

The data analysis on the ball skill test revealed significant effects on Country, Age and Gender effects, $F_{(1, 108)} = 13.48, p < 0.01$; $F_{(2, 108)} = 10.39, p < 0.01$, and $F_{(1, 108)} = 9.08, p < 0.05$ respectively. Specifically, USA children performed better than Chinese children again in the ball skill test. Boys did better than girls in general. Moreover, older children had a higher score than younger ones, with the four-year-old the best among the three age groups. An interaction was found for Country by Gender and Country by Age, $F_{(1, 108)} = 5.54, p < 0.05$; $F_{(2, 108)} = 10.34, p < 0.01$. Further analyses revealed that American boys performed better than Chinese boys, and no significant difference between the girls of the two countries. Moreover, American five-year-old performed the best among the three age groups, but the best performance age group for Chinese children was four-year-old.

Table 1

Descriptive Statistics for the Children in the Two Countries and Within Each Sex Groups (Means and Standard Deviations)

Test skills	Gender	America			China		
		3 years	4 years	5 years	3 years	4 years	5 years
LM skills (Max: 46 pts)	Boys	27.6 (8.76)*	34.9 (7.36)	33.1 (8.02)	21.4 (4.99)	25.4 (4.09)	34.3 (5.70)
	Girls	23.6 (5.13)	33.0 (6.33)	34.5 (7.80)	24.1 (2.38)	30.3 (2.58)	33.9 (6.37)
	Total	25.6 (7.28)	33.95 (6.75)	33.8 (7.73)	22.75 (4.05)	27.85 (4.17)	34.10 (6.63)
OC skills (Max: 54 pts)	Boys	34.0 (8.22)	33.1 (6.94)	37.4 (8.95)	24.0 (3.09)	34.1 (2.81)	27.2 (5.12)
	Girls	24.4 (5.87)	30.50 (6.42)	32.5 (6.77)	25.6 (4.06)	34.0 (2.94)	23.6 (4.50)
	Total	29.2 (8.52)	31.8 (6.64)	34.95 (8.12)	24.8 (3.61)	34.05 (2.8)	25.4 (5.04)
Total TGMD Scores (1-100 pts)	Boys	61.6 (14.95)	68.0 (13.21)	70.50 (13.67)	45.4 (6.35)	59.5 (3.72)	61.5 (7.38)
	Girls	48.0 (7.53)	63.5 (11.22)	67.0 (13.02)	49.7 (3.71)	64.3 (4.24)	57.5 (9.03)
	Total	54.8 (13.47)	65.75 (12.15)	68.75 (13.11)	47.55 (5.52)	61.9 (4.60)	59.50 (8.29)

Note: * — Group mean (standard deviation).

Discussion

The present study attempted to examine if there would be any similarities and/or differences in the gross motor skill development for American and Chinese preschoolers by using a most recently updated standardized test batteries (TGMD-3), which includes six locomotor skills and seven object control skills. If so, how are their gross motor skills similar or different? First, the results of the test performances in locomotor skills demonstrated that the older children were better than the younger children, and no differences were revealed between boys and

girls. As expected, children between three to five-year-old developed at similar levels in locomotor skills among boys and girls, with older children performing better than younger ones (NAEYC, 2020). Moreover, American children had better performance scores than their Chinese counterparts. This finding confirmed with the previous report that American preschoolers showed better locomotor skills than Chinese preschoolers (Li et al., 2023). It might be partially related to the fact that children with ample open spaces and opportunities to play freely have better gross motor development (NAEYC, 2019; 2020). Additionally, these results could be related to the fact that in spite of the Chinese government recommendations of offering two hours of physical activities a day for preschoolers (Ministry of Education, 2012), not many schools followed such recommendations (Rao et al., 2023). Another reason for this finding could be associated with the fact that Chinese traditional physical education tended to focus on children's sports skills and fitness development (Liu et al., 2025; dos Santos et al., 2016). Although children can play and learn in any environment, they learn and develop fully when they have freedom to engage in physical activities of their choice (Izumi-Taylor & Li, 2025). Children should be encouraged to play freely in larger open and safe areas, which should positively promote their developmentally appropriate motor skills (NAEYC, 2020; Olsen, 2025). Preschools in the US are generally less crowded as the relative lower population than those schools in China (Li et al., 2023). Also, children with regular physical activities might perform better on gross motor development (Ma et al., 2024; NAEYC, 2020).

The results of ball skill test performance revealed that American boys performed better than their Chinese counterparts, but no such a difference among girls. Again, older children generally performed ball skill test better than younger children, with an exception that four-year-old group of Chinese children showed the best performance among the three age groups. The possible reasons for these findings could be related to the following two factors: (1) The ball skill test items involve a high degree of eye-hand coordination which is still in the early developmental stage for these three age groups (NAEYC 2019; 2020; Sari & Izzah, 2021; Wang & Zhou, 2024). Therefore, the performance levels are not stabilized. (2) The relatively small sample size in each of age groups ($n = 20$ with 10 in each gender) might have influenced the results. Overall, the current study confirmed great influences of sociocultural backgrounds for early childhood gross motor development (NAEYC, 2020; Niemisto et al., 2019; Song et al., 2022). Our results along with previous studies indicated that it is important for all professionals in early childhood education to understand the importance of promoting gross motor development at such a critical period for children (Bresson & King, 2022; Izumi-Taylor & Li, 2025; Le et al., 2024; Ma et al., 2024; NAEYC, 2020).

Implications and Limitations

The implications of this study may be both theoretical and practical as regards preschoolers' gross motor development. In theory, when we study such development in children from different cultures, we can understand how cultural conditions influence their physical development. By recognizing that preschoolers' gross motor development is related to their cultures, educators can gain more knowledge about how to implement physical education in children's everyday schedules. In a practical sense, sociocultural situations mediate how teachers perceive the ways in which they support children's gross motor development. For these reasons, parents, educators, and others involved with children's care need to work together to support such development in children.

Limitations of this study are threefold. First, sampling procedures show this study's limitations. Since this study was conducted among children to whom we had access in these countries, other children from major cities in China and the United States were excluded. Future studies should include more locations and additional

different age groups to diversify representations of the samples. Second, more information regarding each school environment should be included. As such information can determine how these preschool children's physical activities affected their motor development. Finally, it would be beneficial to collect demographic data (e.g. socio-economic status, blended families) and to include children with special needs from different sociocultural backgrounds. Further investigations are needed to confirm the results.

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