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Chopstick Use Among Preschool Children in the Year Before School: Performance, Experience, Techniques, and Interest

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Abstract

This study examined chopstick performance among 77 senior-class Chinese preschool children at the beginning of the autumn semester using a standardized chopstick performance test. The relationships among chopstick performance and different chopstick experiences (home and kindergarten), chopstick techniques (action patterns, grip style, grip position), and children's interest levels were investigated. Results indicated that significant differences in chopstick performance existed across children of different ages, genders, chopstick experiences, and interest levels, whereas no significant main effects of chopstick grip style or grip position on performance were found. Both age and home chopstick experience within six months were significant predictors of performance. Based on these findings, we present recommendations for educators and families.

Keywords

Chopstick experience; Chopstick skill; Chopstick technique; Interest in chopstick use; Preschool year

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1. Introduction

The use of spoons, chopsticks, and pencils is fine motor skill involving tool use; in the process of motor acquisition, these three tasks progressively engage shoulder, elbow, wrist, palm, and finger joint movements and muscle control, creating a continuum that supports general transfer of motor learning. Chopstick use plays a critical bridging role in this sequence. Chopstick competence is not only significantly associated with children's self-feeding independence in China, but is also closely related to literacy achievements that rely on pencil manipulation [1,2].

Most studies indicate that age is a factor influencing chopstick skill: children begin to acquire the skill around age four and develop rapidly during the following year, with growth slowing from ages five to eight; by six or seven years old, they demonstrate relatively mature chopstick features [3,4]. Most children already begin to eat independently with chopsticks during the first semester of the senior preschool year [5]. However,

different kindergartens vary in when they introduce chopstick practice, and differences in in-kindergarten chopstick experience influence children's chopstick levels [6]. Moreover, action patterns and grip styles during chopstick use relate to stability, adaptability, and performance [7]. Adult performance with pincer-type grips often outperforms scissor-type grips [8,9]. While prior work has examined relationships between grip style and grip position, the effect of grip position on performance remains underexplored. Likewise, although some research explores individual preferences in chopstick use, literature focusing on children's intrinsic interest in chopstick activities is scarce.

Given this gap, the present study aims to examine characteristics of chopstick performance among senior preschool children at the start of the autumn term and to analyze relations between performance and chopstick experience, technique, and interest, providing evidence to inform implementation of the *Guidelines for Learning and Development for Children Aged 3–6 Years* and preparation for handwriting readiness.

2. Research design

2.1. Participants

To examine differences associated with in-kindergarten chopstick experience, 77 senior-class children were randomly selected from two public kindergartens in Xi'an China (39 boys, 38 girls). Chronological ages ranged from 59.37 to 72.47 months (mean = 66.27 months, SD = 4.08 months). Kindergarten 1 gradually introduced chopstick use beginning in the middle-class (mid-level preschool), with near-universal adoption by the later semester; Kindergarten 2 began full chopstick use at the start of the senior class. Both kindergartens provided chopstick meals 2–3 times daily. All children were right-handed, had normal or corrected vision, and no developmental disorders. Parents read and signed informed consent forms.

2.2. Instruments and procedure

2.2.1. Family chopstick experience questionnaire

A self-developed *Preschool Children's Family Chopstick Experience Questionnaire* was distributed to parents in the first week of the autumn semester (with the informed consent form). The questionnaire assessed the child's chopstick age at home (duration), and home chopstick frequency: "often uses chopsticks during meals" "occasionally uses chopsticks" or "never uses chopsticks."

2.2.2. Chopstick performance test

We developed a standardized chopstick performance test based on motor tasks in domestic and international child development scales and ergonomic research on chopstick dimensions. Wooden chopsticks were chosen (length 240 mm; tip diameter 4 mm; handle diameter 6 mm).

Before testing, children performed simple tasks (threading beads, drawing) to observe handedness and were asked verbally about their habitual chopstick hand. Each child sat at a table of appropriate height. Ten cereal rings and a small bottle (mouth diameter 28 mm; height 55 mm) were placed in front of the child; the bottle and cereal rings were 17 cm from the table edge, with cereal rings spaced 10–20 cm apart to avoid contact. Children were instructed to use chopsticks to pick up cereal rings one by one and place them into the bottle as quickly as possible. Timing started when the child picked up the first ring and ended when the tenth ring was placed into the bottle. The total time (in seconds) represented the child's chopstick performance.

The test was conducted one week after questionnaire distribution. We replaced peanuts (commonly used in earlier studies) with cereal rings because rings present a moderate challenge and allow weaker performers to utilize the hole in the ring (< 4 mm) during grasping, the material is less likely to break or roll away, easy to identify, and safe if moistened.

During testing, video recordings were taken from an angle of approximately 135° from the child's left side to right frontal area to capture finger characteristics, positions, and movement patterns (1080p, 30fps) for later coding.

2.2.3. Chopstick interest rating scale

After the performance test, children rated their interest in chopstick use on a five-point Likert scale (1 = strongly dislike using chopsticks; 5 = strongly like using chopsticks). To accommodate preschool cognition, each response option was accompanied by a cartoon facial

expression.

2.3. Data coding

Chopstick-use behavior during the performance test was coded along three aspects: action pattern, grip style, and grip position as outlined below:

(1) Action pattern: Based on Lin et al., ten action patterns (codes 1–10) were used. The first eight matched Lin's categories. Two additional patterns observed in this study were coded: Pattern 9 (full-palm grasp, where all five fingers fix chopsticks in the palm with little division of labor among digits; palm tilts about 90° relative to table; gripping tightness changes achieve clamping) and Pattern 10 (a bimanual cooperative mode originally classified as "undetermined hand form 2" by previous research, involving both hands cooperating to complete pick-up tasks) [10];

(2) Grip style: Coded as Scissor-type = 1; Pincer-type = 2;

(3) Grip position: The grip position was categorized by the ratio of the distance from the thumb–index web (tiger's mouth) to the chopstick tip relative to the total length, into six groups: 1 = between 1/3–1/2; 2 = approximately 1/2; 3 = between 1/2–2/3; 4 = approximately 2/3; 5 = between 2/3–3/4; 6 = ≥ 3/4.

Two raters independently coded the videos; inter-rater agreement reached 100%.

3. Results

3.1. Age differences in chopstick performance

Considering the age distribution of subjects, we divided participants into three groups by 5-month intervals:

(1) Low-aged group: 59–64 months (M = 61.73 months, SD = 1.14);

(2) Middle-aged group: 64–69 months (M = 66.46 months, SD = 1.44);

(3) High-aged group: 69–74 months (M = 70.99 months, SD = 1.04).

Chi-square tests indicated no significant gender differences among the groups ($\chi^2 = 1.83$, d.f. = 2, $P > 0.05$). As shown in **Table 1**, the two-way ANOVA with age group and gender as independent variables and chopstick test completion time as the dependent variable yielded:

(1) No significant age × gender interaction (F = 1.02, n.s.);

(2) Significant main effect of age group on performance (F = 6.12, $P < 0.01$);

(3) Significant main effect of gender: girls performed better than boys (F = 4.57, $P < 0.05$);

(4) Post-hoc comparisons showed significant improvement in performance from around 62 months to 66 months ($P < 0.01$), but changes from 66 months to 71 months were not significant ($P > 0.05$).

Table 1. Age and gender differences in chopstick performance

Age group	Gender	n	Mean (s)	SD
Low-aged (59–64 mo)	Male	15	66.85	50.66
	Female	13	39.77	46.34
Middle-aged (64–69 mo)	Male	9	40.45	16.74
	Female	14	24.42	6.97
High-aged (69–74 mo)	Male	15	26.11	8.58
	Female	11	23.27	14.63
ANOVA	Age group F = 6.12**			
	Gender F = 4.57*			
	Age × Gender F = 1.02 (n.s.)			

Note: *$P < 0.05$; **$P < 0.01$

3.2. Chopstick performance by experience

An independent-samples t-test comparing children with different kindergarten chopstick experience durations showed a significant difference (t = –3.38, $P < 0.01$): children with approximately one year of in-kindergarten chopstick experience performed significantly better than those with less than one month.

The one-way ANOVA examined home chopstick age and home chopstick frequency revealed that home chopstick age had a significant effect (F = 12.85, $P <$

0.001). Children with more than six months of home chopstick experience had significantly better mean performance than those with less than one month ($P < 0.001$). Differences between the 1–6 months group and other duration groups were not significant ($P > 0.05$). Improvement beyond six months plateaued ($P > 0.05$).

Home chopstick frequency had a significant main effect (F = 41.84, $P < 0.001$). Children who never used chopsticks at home performed significantly worse than those who used them regularly or occasionally ($P < 0.001$). There was no significant difference between regular and occasional users ($P > 0.05$).

3.3. Chopstick technique (action pattern, grip style, grip position)

The distribution and performance across action patterns, grip styles, and grip positions are given below.

Significant differences among the ten action patterns (F = 4.79, $P < 0.001$). However, after removing the two children using Pattern 10 (bimanual), the remaining nine patterns did not differ significantly (F = 1.21, $P > 0.05$) (**Table 2**).

Table 2. Frequency and performance by action pattern

Action pattern (code)	N (%)	Mean (s)	SD
1	22 (28.6)	27.16	11.76
2	3 (3.9)	30.18	12.09
3	9 (11.7)	41.26	34.28
4	29 (37.7)	33.84	32.02
5	1 (1.3)	32.28	-
6	4 (5.2)	58.71	30.20
7	2 (2.6)	35.34	3.77
8	3 (3.9)	18.00	1.41
9 (full-palm)	2 (2.6)	68.30	67.10
10 (bimanual)	2 (2.6)	152.16	67.98

Grip style had no main effect on performance (F = 0.10, $P > 0.05$) (**Table 3**).

Table 3. Frequency and performance by grip style

Grip style	N (%)	Mean (s)	SD
Scissor-type	73 (94.8)	37.61	34.78
Pincer-type	4 (5.2)	32.03	7.22

Grip position had no significant main effect (F = 1.70, $P > 0.05$) (**Table 4**).

Table 4. Frequency and performance by grip position

Grip position	N (%)	Mean (s)	SD
1/3–1/2	8 (10.4)	54.63	60.37
≈ 1/2	38 (49.4)	29.52	16.10
1/2–2/3	7 (9.1)	47.54	63.71
≈ 2/3	14 (18.2)	31.57	21.53
2/3–3/4	3 (3.9)	66.36	51.99
≥ 3/4	7 (9.1)	48.67	34.52

A significant interaction between action pattern and grip position was found. For Pattern 3, performance when grip position was 2/3–3/4 was significantly worse than when grip position was 1/2 or 2/3 ($P < 0.05$). For Pattern 4, performance at 1/2–2/3 was significantly worse than at 1/2 ($P < 0.05$).

3.4. Chopstick performance by interest levels

A one-way ANOVA with interest level as the independent variable and completion time as the dependent variable revealed a significant effect (F = 3.24, $P < 0.05$). Children who strongly disliked using chopsticks had significantly lower performance than children at other interest levels ($P < 0.05$). Differences among the other interest levels were not significant ($P > 0.05$).

3.5. Regression: Predicting chopstick performance

We performed a stepwise regression with chopstick performance as the dependent variable and predictors including kindergarten chopstick age, home chopstick age, home usage frequency, action pattern, interest level, age (months), and gender.

Three variables entered the final model:

(1) Age (standardized $\beta = -0.227$, $t = -2.58$, $P <$

0.05);

(2) Home chopstick age: < 1 month ($\beta = 0.587$, $t = 6.63$, $P < 0.001$);

(3) Home chopstick age: 1–6 months ($\beta = 0.208$, $t = 2.51$, $P < 0.05$).

These results indicate that age and home experience within the first six months are significant predictors of chopstick performance (adjusted $R^2 = 0.485$; $F = 24.82$; $P < 0.001$). Compared to technique, interest, and gender, experience, particularly early home experience, had the strongest influence on performance.

4. Discussion

This study found that at the beginning of the senior preschool year, after roughly one week in-class exposure to chopstick use, most children, regardless of prior experience, could complete the basic chopstick transfer task, though two children required bimanual cooperation to succeed. This finding aligns with prior research regarding the typical age range for acquiring chopstick skills [1]. However, marked individual, gender, and age-related differences were evident. A potential developmental inflection point may exist between 62 and 66 months, during which acquisition speed is highest. Girls displayed superior performance to boys, possibly due to earlier maturation of musculoskeletal structures, which confers physiological advantages for fine motor tasks.

A central discovery was the predictive significance of home experience within six months, implying a critical period for consolidating chopstick skills during the initial six months of practice. This aligns with literature showing rapid skill development during the first year of learning, followed by a plateau [4]. Skilled chopstick users, through repeated practice, accumulate sensorimotor experience that likely promotes functional cortical reorganization in motor-related brain regions; experienced users therefore require fewer attentional resources and show different neural activation patterns [11]. The initial months of practice may be particularly important for establishing these neural adaptations.

Except for the two bimanual users, we did not find significant associations between specific technique categories and performance. This differs from adults' findings, where pincer grips often lead to higher efficiency [8]. The discrepancy may reflect the early developmental stage: immature fine motor control and small hand size in young children may constrain the benefits of certain grip styles, making technique-related performance differences less apparent at this stage [12]. Finally, we observed that very low interest in chopstick use was associated with poorer performance, indicating that motivational factors influence engagement and motor coordination in early skill acquisition.

5. Conclusions

5.1. Attend to individual differences

During early chopstick learning phases, teachers should carefully attend to individual and gender differences. Children with less than six months of experience need sustained support and habit formation strategies. In kindergartens introducing chopsticks only in the senior class, teachers should especially monitor younger children in the group.

Meal durations should be assigned flexibly according to children's development; educators must avoid pressuring slower children based on faster peers' dining speeds. Where possible, kindergartens should adapt food size, shape, and texture to match children's chopstick proficiency, thereby creating a proximal zone of development for individualized motor skill advancement.

5.2. Strengthen home-school collaboration

Given compact daily schedules and fixed mealtimes in many kindergartens, initiating chopstick learning solely at school may burden teachers and produce discomfort for children who need more time. Home-school collaboration should extend chopstick exposure across time (introduce practice about six months before full implementation at school) and space (integrate practice into family mealtimes and play).

Parents should model proper chopstick use and encourage imitation. Introducing chopstick-related games at home and in classroom play centers can provide rich pre-practice experiences, ensuring children enter formal school mealtime practice better prepared.

5.3. Maintain interest and facilitate transfer to pencil use

Chopstick skill acquisition consolidates upper-limb coordination established by spoon use and improves palm muscle control and proximal phalange mobility, foundational components for fine finger movements in handwriting. Teachers should avoid rigid enforcement of a single grip style; since grip development is constrained by hand maturation, overly strict correction may reduce interest and hinder learning.

Targeted guidance should focus on children whose grip styles clearly impede performance. Practical methods include demonstrating efficient grips during shared meals, engaging children in chopstick games that show more efficient techniques, and using attractive child-friendly training chopsticks. These strategies foster gradual transition to more efficient grips and support transfer from chopstick use to pencil-based tasks.

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