BMC Public Health

RESEARCH

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The impact of different family background on children's fundamental movement skills proficiency

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Abstract

Purpose This study was to explore the impact of different family background on children's physical activity. Whether the parents' age, educational level, exercise habits, number of siblings, affect differences in the development of children's fundamental motor skills [FMS].

Methods A sample of 6200 parents participated in this study, with the age of the children ranging between 2 and 6 years. The questionnaires were mostly filled out by mothers, the parents were between 30 and 45 years old, and most of them had a college degree or above. The research was based on the self-compiled questionnaire "2–6 years young children's fundamental motor skills questionnaire". The questionnaire consisted of 3 dimensions (stability motor skills, locomotor motor skills, manipulative motor skills.) Each participant completed the information, in addition subjectively completing the questionnaire according to the child's FMS performance. The data were analyzed with descriptive statistics and single-factor analysis of variation.

Results The results of this study revealed that different family background variables had significantly different effects on children's FMS development. Children who had an older parent, high school or college education, a household monthly income of more than 2,200 US dollars, lived in rural areas, had siblings at home, and who maintained moderate intensity for more than 30 min once a week had better FMS performance.

Conclusion Parents' exercise habits, as well as parents' age and education had a positive effect on children's FMS. In addition to requiring parents to accompany activities, arranging an environment suitable for exercise and having more interactive games with older peers could help FMS performance in children.

Keywords Young children, Parental attitudes, FMS, Physical activities, Physical education

Background

Fundamental motor skills [FMS] have an important impact on children's development, such as cognition [1–4] and social interaction [5]. FMS affects the development of children's motor skills in the future, and even influences the development of exercise habits and has a considerable impact on healthy behaviors. The preschool stage is the best time to teach FMS to children [6]. The ability to improve performance through practice, guidance and encouragement [7]. In order to lay a good foundation for learning various sports in the future when entering elementary school [8]. Therefore, it has been confirmed that a good FMS led to better and more diverse physical activities [9–11].

The family is the living environment that most children are familiar with, which depends on the living habits of their parents to influence their activities [12]. Therefore, the family environment affects children's daily physical

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activities. The parents are the children's closest caregivers. Since children are still young, they are unable to arrange activities independently. Therefore, most physical activities are arranged by parents [13]. They also coordinate their activities with their parents' daily lives. Therefore, parents have a significant influence on children's physical activity. Many parents may believe that the development of children's movements will naturally affect their performance level as they grow older. If parents are not aware of the importance of their role, they are less likely to take steps to promote their children's FMS [14].

Therefore, family background is the key to affecting children's physical activity. Family background includes parents' level, age, exercise habits, household monthly income and residential area, etc. In terms of parents' education level, related research [15–18] has shown that parents with higher education levels were more likely to have children with better motor development. Many studies [19–23] have confirmed that parental socioeconomic status increases the likelihood that children participated in physical activity. Parents' exercise habits are also very important in promoting children's physical activity, because active parents are more likely to actively arrange physical activities for their children [14, 24, 25], who are good at sports, and their children's health and fitness performance are better.

In many health behavior models, the family is generalized as an important mediator in the socialization learning process. Social learning theory provides an effective basis for brothers and sisters to influence health behaviors [26]. The physical activity of children was positively correlated with the physical activity of older siblings and parents [27]. Opportunities to play with older children and increased physical activity help children develop FMS. More opportunities for physical activity led to better motor skill development. In addition, preschool children living in urban areas had advantages in motor ability [20, 28].

Traditionally, tests and instruments were mostly used to assess children's motor skills performance. This study attempted to assess children's motor skills performance in a faster and more convenient way from the perspective of children's parents. The findings support the use of a top-down assessment approach from a variety of sources when assessing children's motor abilities [29]. The family environment has a key influence and changes in multiple ways. Therefore, the main objectives of the study were to use parent questionnaires to collect data on the current FMS of preschool children aged 2–6 years in Taiwan, as well as the impact of family background on children's FMS.

Our hypotheses were as follows: different parental, family background variables and exercise habits would demonstrate significantly impact on children's motor development.

Methods

Study flowchart

The flowchart of this study are displayed in Fig. 1:

Participants

This study adopted a convenience sampling questionnaire survey method and used social media (Facebook, Line, Messenger) related to child education to invite parents. A sample of 6386 parents participated in the study. The data presented here were collected within the Hsin-Yi Foundation. Eliminate incomplete information and children under the age of two and over seven years old. A total of 6200 valid questionnaires were received and the recovery rate of valid samples was 97.09%. Before completing the survey, all study participants were given information about the link to read more details about the study and were invited online to participate in the study anonymously. The study was conducted according to the provisions of the Research Ethic Committee of the University of Taipei expressed its approval (Decision No.: IRB-2022–093).

Questionnaire

The research was based on the self-compiled questionnaire "2–6 years young children's fundamental motor skills questionnaire". This questionnaire was a new tool that was completed by parents of children. Each participant provided the information about their children and parents, in addition completing the questionnaire subjectively, according to the children's fundamental motor skills performance. Response options on a 5-point Likert-type scale included 1 (not yet), 2 (not skilled), 3 (pretty skilled), 4 (skilled), and 5 (very skilled). Each participant completed the questionnaire in approximately 10 min. The questionnaire comprised 3 Sects. (32questions):

1. Sociodemographic characteristics: There were eight questions in this section.

The variables included parental age, parental educational level, exercise habits (exercise frequency, time, intensity), household monthly income, residential area, and number of siblings.

2. Fundamental motor skills questions: The fundamental motor skills questions has 24 items. Principal component analysis (PCA) with varimax rotation was used to extract factors. Before factor analysis, Kaiser–Meyer–Olkin (KMO) Measure and Bartlett tests were performed. The KMO measure of sampling adequacy of 0.96 ($p < 0.01$) and the Bartlett sphericity test value was 5784.09 ($p < 0.01$), reaching a significant level, indicating that factor analysis was appropriate for this data set. We used

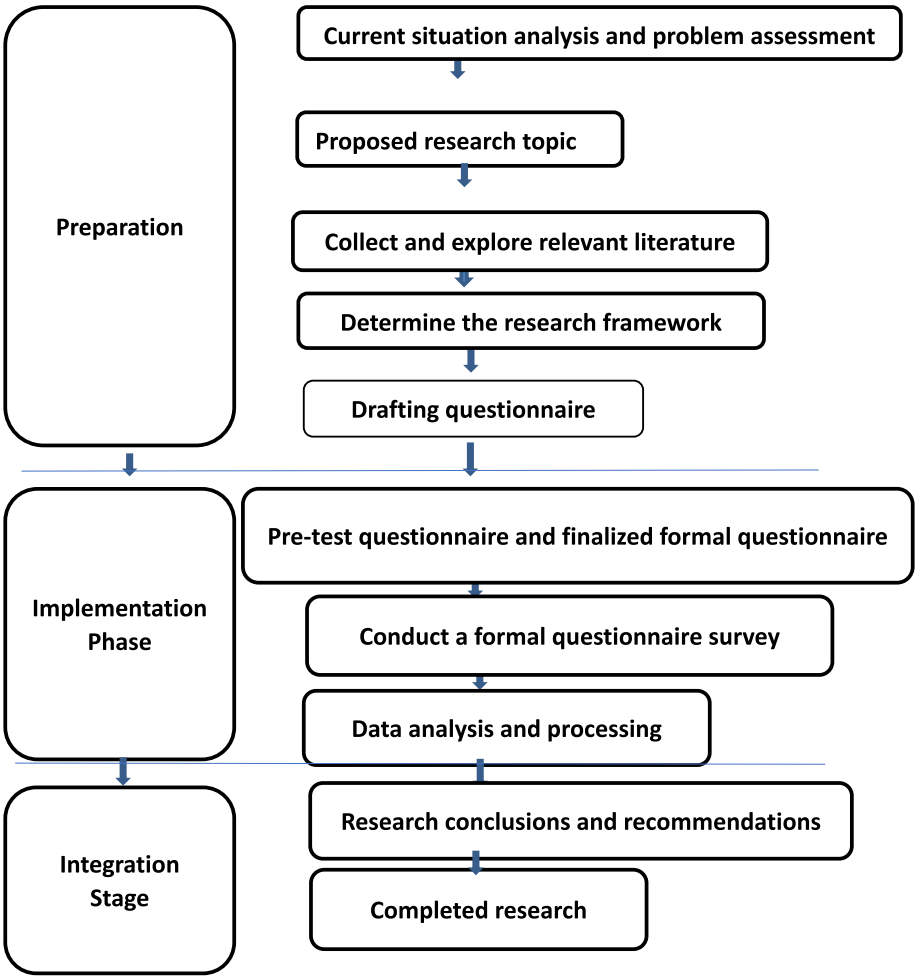

Fig. 1 Study flowchart

an eigenvalue ≥ 1 and a scree plot to determine the number of factors to be extracted. Factor analysis of the fundamental motor skills questions yielded 3 components as follows: stability motor skills, locomotor motor skills, and manipulative motor skills that explained 68.13% of the variance. Variables were included in the factor analysis if they had a communality value ≥ 0.5 and had no complex structure (loading ≥ 0.4 on more than one factor). The Cronbach's α coefficient was 0.90 in the study, indicating that the reliability and validity of the questionnaire were good. It contains five questions on stability motor skills, eight questions on locomotor motor skills, and eleven questions on manipulative motor skills. The KMO, Bartlett and Cronbach's Alpha tests are displayed in Table 1.The questions are displayed in Table 2.

Statistical analysis

Analysis participants with complete data for all sections were included in the analysis. Descriptive data are expressed as the means (standard deviations, SDs) for continuous variables. One-way analysis of variance was used to explore the differences among different family background variables. Scheffe's post hoc comparison method was used for post hoc comparisons. Statistical

Table 1 KMO, Bartlett and Cronbach's Alpha tests

Type of test	Value
Kaiser–Meyer–Olkin measure of sampling adequacy	0.96
Bartlett's Test of Sphericity Approx. Chi Sqaure	5784.09
df	276
Sig	0.00
Cronbach's Alpha	0.90

Table 2 Fundamental motor skills questions

Components	Questions	Skilled degree				
manipulative motor skills	1. Children can kick balls falling from the air	1	2	3	4	5
	2. Children can run and dribble at the same time	1	2	3	4	5
	3. Children can control the ball to move forward with both feet	1	2	3	4	5
	4. The child can swing the bat and hit the ball	1	2	3	4	5
	5. Children can jump rope continuously	1	2	3	4	5
	6. Children can use their feet accurately to kick the ball	1	2	3	4	5
	7. Children can catch balls with their palms	1	2	3	4	5
	8. Children can dribble continuously with his hands	1	2	3	4	5
	9. Children can throw the ball forward smoothly	1	2	3	4	5
	10. Children can toss the balloons floating in the air with both hands	1	2	3	4	5
	11. Children can roll the ball forward with their palms	1	2	3	4	5
stability motor skills	12. Children can stretch their body	1	2	3	4	5
	13. Children can curl their body like a ball	1	2	3	4	5
	14. Children can swim their arms	1	2	3	4	5
	15. Children can rotate their body 360 degrees	1	2	3	4	5
	16. Children can twist their body	1	2	3	4	5
locomotor motor skills	17. Children can climb up the climbing frame	1	2	3	4	5
	18. Children can go up and down stairs	1	2	3	4	5
	19. Children can continuously hop	1	2	3	4	5
	20. Children can jump forward with both feet at the same time	1	2	3	4	5
	21. Children can run and leap	1	2	3	4	5
	22. Children can gallop forward	1	2	3	4	5
	23. Children can run and stop smoothly	1	2	3	4	5
	24. Children can slide to move sideways	1	2	3	4	5

significance was set at $p < 0.05$. All analyses were performed using IBM SPSS Statistics for Windows version 25.0 (IBM Corp., Armonk, New York, NY, USA).

Results

As can be seen from Table 3, Most parents who participated were 35 to under 40 years old; and had a university degree. Parents' exercise habits were less than once a week, within 30 min each time, and mostly included light or fewer activities. Over half of parents live in northern areas (urban areas). More than half of the parents had a household monthly income of less than 1,500. Over 80% of parents reported single-child families.

Different family background variables

The background variables "parental age", "parental education", " household monthly income ", "number of siblings", "residential area" and "exercise habits" were used as independent variables, and an independent sample single-factor analysis of variance was performed, to explore whether families with different background variables have differences in the three aspects of children's physical activity.

There were significant differences in the physical activity factors of children whose parents were different ages. Parents aged 40 to 50 years had better FMS performance of their children than parents aged 30 to under 40 years. The influence of parents with different educational backgrounds on children's " manipulative movements" skills was that parents with "high school, college" education had better FMS performance of their children than parents with "university, graduate school" education. In terms of the impact on children's locomotor skills, parents with a "college" education had better children's FMS performance than parents with a "university or graduate school" education.

Parents with different household monthly incomes had significant differences in their children's "stability movements" and " locomotor movements". Children whose families' incomes ranged from "2200 to less than 3100 " and "more than 3100" had significantly better FMS performance than children whose household monthly income was "less than 1500 " and "1500 to less than 2200". All information is presented in Table 4

Different exercise habits

As can be seen from Table 5, Parents with different exercise habits had significant differences in their children's FMS development. Parents who exercise "more

Table 3 Summary of the statistical characteristics of the effective samples

Demographics		Item	Number ($N=6200$)	percentage %
Parental age	Under 25 years old		23	0.4
	25 ~ Under 30 years old		201	3.2
	30 ~ Under 35 years old		1457	23.5
	35 ~ Under 40 years old		2567	41.4
	40 ~ Under 45 years old		1600	25.8
	45 ~ Under 50 years old		271	4.4
	Over 50 years old		81	1.3
Educational level	Below high school		352	5.7
	Junior college		430	6.9
	University		3755	60.6
	Above graduate school		1663	26.8
Exercise frequency	Never exercise		575	9.3
	Less than once		1926	31.1
	Once a week		1616	26.1
	Twice a week		1254	20.2
	More than three times /week		829	13.4
Exercise time	Within 30 min		3143	50.7
	30 min-1 h		2457	39.6
	1–2 h		538	8.7
	More than 2 h		62	1.0
Exercise intensity	Never exercise		498	8.0
	Light activity		2754	44.4
	Moderate activity		2496	40.3
	Vigorous activity		452	7.3
Residential area	North		3678	59.3
	Central		1148	18.5
	South		1217	19.6
	East		157	2.5
Household income	Less than 1,500		3172	51.2
	1,500 ~ less than 2,200		1583	25.5
	2,200 ~ less than 3,100		856	13.8
	More than 3,100		589	9.5
Siblings	0		4984	80.4
	1		1059	17.1
	2		157	2.5

than once a week" have better FMS performance in their children than parents who exercise "less than once a week" or "never exercise". Parents who exercised for "more than 30 min" had better FMS performance of their children than parents who exercised for "less than 30 min". Parents whose exercise intensity was "moderate or above" had better FMS performance of their children than parents whose exercise intensity was " light " or "never exercise".

Different residential areas and numbers of siblings

The influence of different residential areas on the FMS development of children was that the FMS performance of children living in "East" Taiwan was better than that of children living in "North, Central and South Taiwan ". The FMS performance of children living in the "South" was better than that of children living in the "North". The eastern area is predominantly rural, the southern and central area are exclusively rural, and the northern region is urban. The results revealed that children living in rural

Table 4 One-way analysis of variance of parents' age, education, and household monthly income with children's FMS performance

Characteristic	n	stability		locomotor		manipulative	
		Mean ± SD	F *p*-Value (post)	Mean ± SD	F *p*-Value (post)	Mean ± SD	F *p*-Value (post)
Age(Years)							
(a) < 25	23	3.59 ± 1.55	4.17* < 0.001 d、e、f > c e、f > a、b	3.40 ± 1.30	16.21* < 0.001 e、f > d > b、c f > a ,g > b	2.60 ± 1.18	14.50* < 0.001 e、f > b e、 f > d > c g > c
(b)25 ~ 30	201	3.89 ± 1.05		3.41 ± 1.02		2.44 ± 0.99	
(c)30 ~ 35	1457	3.90 ± 1.00		3.46 ± 1.04		2.45 ± 0.99	
(d)35 ~ 40	2567	3.98 ± 0.96		3.63 ± 1.02		2.57 ± 1.00	
(e)40 ~ 45	1600	4.03 ± 0.90		3.77 ± 0.95		2.74 ± 0.99	
(f)45 ~ 50	271	4.08 ± 0.88		3.86 ± 0.93		2.84 ± 1.00	
(g) > 50	81	3.83 ± 0.88		3.67 ± 0.75		2.69 ± 0.88	
Educational level							
(a) < High school	352	4.01 ± 0.99	0.76 0.516	3.72 ± 0.97	2.93* < 0.032 b > c、d	2.73 ± 1.01	5.34* < 0.001 a、b > c、d
(b)junior college	430	4.02 ± 0.94		3.73 ± 0.96		2.73 ± 0.99	
(c)University	3755	3.96 ± 0.96		3.61 ± 1.01		2.58 ± 0.99	
(d) > graduate School	1663	3.99 ± 0.95		3.62 ± 1.02		2.57 ± 1.01	
Household monthly income							
(a) < 1500	3172	3.95 ± 0.97	5.79* < 0.001 c、d > a、b	3.62 ± 1.01	3.91* < 0.008 d > a、b c > b	2.58 ± 1.00	1.64 0.179
(b)1500 ~ 2200	1583	3.94 ± 0.96		3.59 ± 1.00		2.58 ± 0.99	
(c)2200–3100	856	4.04 ± 0.92		3.68 ± 1.02		2.61 ± 0.98	
(d) > 3100	589	4.09 ± 0.91		3.73 ± 1.01		2.68 ± 1.03	

* $p < 0.05$

Table 5 One-way analysis of variance of parents' exercise habits with children's FMS performance

Characteristic	n	stability		locomotor		manipulative	
		Mean ± SD	F *p*-Value (post)	Mean ± SD	F *p*-Value (post)	Mean ± SD	F *p*-Value (post)
Frequency of exercise							
(a)Never exercise	575	3.83 ± 1.03	11.90* < 0.001 c、d、e > b、a	3.41 ± 1.08	22.94* < 0.001 c、d、e > b > a	2.34 ± 0.95	29.21* < 0.001 d > c > b > a e > b > a
(b) < once a week	1926	3.90 ± 0.99		3.51 ± 1.03		2.47 ± 0.97	
(c)once a week	1616	4.02 ± 0.92		3.70 ± 0.97		2.66 ± 0.98	
(d)twice a week	1254	4.07 ± 0.91		3.75 ± 0.96		2.74 ± 1.02	
(e) > three times a week	829	4.03 ± 0.94		3.74 ± 1.00		2.72 ± 1.06	
Exercise time							
(a) < 30 min	3143	3.92 ± 0.99	7.55* < 0.001 b、c > a	3.56 ± 1.02	12.60* < 0.001 b、c、d > a	2.52 ± 0.98	13.25* < 0.001 b、c、d > a
(b)30 min-1 h	2457	4.03 ± 0.93		3.70 ± 0.99		2.66 ± 1.01	
(c)1–2 h	538	4.02 ± 0.93		3.71 ± 0.99		2.69 ± 1.02	
(d) > 2 h	62	4.14 ± 0.82		3.89 ± 0.84		2.89 ± 0.97	
Exercise intensity							
(a)Never exercise	498	3.76 ± 1.04	22.21* < 0.001 c、d > b > a	3.32 ± 1.07	29.37* < 0.001 c、d > b > a	2.28 ± 0.92	25.29* < 0.001 c、d > b > a
(b)light exercise	2754	3.91 ± 0.97		3.58 ± 1.01		2.56 ± 1.00	
(c)moderate exercise	2496	4.06 ± 0.92		3.72 ± 0.97		2.68 ± 1.00	
(d)heavy exercise	452	4.11 ± 0.94		3.78 ± 1.02		2.71 ± 1.05	

* $p < 0.05$

areas had better FMS performance than children living in urban areas. See Table 6 for detailed data.

The difference in the FMS development of children from families with different numbers of siblings were that the FMS performance of children in families with siblings was better than that of children in single-child families.

Discussion

The results of this study revealed that children with parents who had exercise habits, families with more children, families living in rural areas, parents with higher household monthly income, parents with lower education, and families with older parents had better FMS development in their children.

Different family background variables

The results of this study revealed that the physical activities of children with older parents were better than those of children with younger parents. The results were the same as the previous research [30]. Children of older parents had higher health behavior and physical activity scores. The reason for this is that with increasing age and the acquisition of knowledge and experience, older parents may pay more attention to sports and fitness, and then lead their children to engage in sports and physical activities to increase their opportunities to practice physical activity and promote their children's development of FMS performance.

The results of this study are consistent with those of previous research [15–18] on the differences in children's FMS performance across parents with different educational backgrounds. The activities were positively correlated and the results were different. However, the results were the same as those of other studies [31, 32] which reported that parents' educational level was negatively related to their children's physical activity, and that parents with high education levels had lower support for their children's physical activity. Parents with higher education may pay more attention to the academic performance of their children, thus reducing the time for active games, thereby affecting the opportunities for practice needed for FMS development.

Parents' higher socioeconomic status may increase children's opportunities to participate in physical activities and had relatively greater opportunities to have active play equipment or courses, increasing opportunities to practice physical activities and thereby promoting FMS development. The results consistent with the research results [19–24],

Different exercise habits

The results of this study revealed that parents' exercise habits were positively related to the development of children's FMS. Research has also shown that having parents with exercise habits was very important in promoting children's physical activity [14]. Another study confirmed that as parents' level of moderate to vigorous physical activity (MVPA) increases, their children's level of moderate to vigorous physical activity increases [25]. Research has shown that parents who were good at sports had better health and fitness performance in their children [26]. Parents who had exercise may also actively lead their children to participate in physical activities, or actively arrange to participate in physical classes, thereby

Table 6 One-way analysis of variance of parents' residential area, and number of siblings of the child with children's FMS performance

Characteristic	n	stability		locomotor		manipulative	
		Mean ± SD	F *p*-Value (post)	Mean ± SD	F *p*-Value (post)	Mean ± SD	F *p*-Value (post)
Residential area							
(a)northern	3678	3.96 ± 0.96	3.44* < 0.016 d > c、b、a	3.60 ± 1.01	5.96* < 0.001 d > c、b、a c > a	2.56 ± 0.99	4.84* < 0.002 c、d > a
(b)central	1148	3.98 ± 0.97		3.63 ± 1.01		2.62 ± 1.01	
(c)southern	1217	4.00 ± 0.96		3.68 ± 1.01		2.66 ± 1.02	
(d)eastern	157	4.19 ± 0.87		3.91 ± 0.86		2.77 ± 0.97	
Number of siblings							
(a)0	3200	3.82 ± 1.01	60.46* < 0.001 b、c、d > a	3.43 ± 1.03	92.88* < 0.001 b、c、d > a c > b	2.44 ± 0.98	57.73* < 0.001 b、c、d > a c > b
(b)1	2648	4.14 ± 0.87		3.83 ± 0.94		2.74 ± 0.99	
(c)2	317	4.19 ± 0.88		3.98 ± 0.93		2.93 ± 1.04	
(d)3	35	4.20 ± 0.81		3.81 ± 0.90		2.99 ± 1.06	

* $p < 0.05$

promoting the development of their children's FMS. However, some studies have noted that parents' exercise habits had not related to children's FMS development. The research results revealed no direct relationship [33, 34].

Different residential areas and numbers of siblings

The results of this study revealed that children living in rural areas with FMS performed better than children living in urban areas. The results were the same [35]. The standing long jump performance of children in rural areas was better than that of their urban peers. However, these findings were different from previous research results [2, 29], which indicated that preschool children living in urban areas had advantages in terms of movement ability. In fact, living in rural areas, the range of activities is wider, parks and green spaces can be found everywhere, and children have more opportunities to freely play physical games around the home, which can promote the development of FMS and practice more frequently than those living in the city. The children come more frequently.

The results of this study revealed that the number of siblings was positively related to children's FMS performance. Research has shown that children were not accompanied by brothers or sisters at home, lack supportive peer effects, and lack the ability to learn movement skills in interactive games [32]. Another study reported that young children living with children aged 6–17 years were more likely to have higher object control scores [36]. The findings revealed that people with more siblings had better sports and fitness performance and a less sedentary lifestyle [26, 33]. If you are accompanied by brothers and sisters at home, you are more likely to have better FMS performance under the peer effect and learn FMS in interactive game opportunities.

Practical implications

The results of this study on the impact of parents and family environment on children's FMS and PA can provide parents and related personnel with important references, and have the opportunity to promote parent–child activities, such as writing about physical games that parents can do with their children at home, setting up relevant websites to provide simple and feasible parent–child games, holding parent–child sports games or parent-related education work, so that parents have more opportunities to interact with their children, and through the fun of game activities and more activity opportunities, they can realize the importance of exercise to parents themselves and their children.

limitations and future research directions

Although the importance of this study and its outcomes, several limitations of this study should be noted. Most of the respondents to this questionnaire were mothers. They may be major variations between parents at the level of certain variables (Examples: frequency of exercise, exercise time, exercise intensity, educational level…). As such, future studies could benefit from comparing children from different parent gender. In this study presented the separate influence of different variables on the FMS level. As such, future studies should analyze the interaction of different independent variables (For example Age*Educational level or Residential area*Household monthly income….). In addition, this study provides another alternative option for actual measurement. Parents can know more clearly about their children's motor development through filling out the questionnaire and give their children more assistance to promote comprehensive motor development. However, whether the content of the questionnaires filled out by parents can reflect the actual measurement results remains to be explored in future studies.

Conclusion

Parents and the family environment had a positive effect on the physical development of children aged 2–6 years. In addition to requiring parents to accompany activities, the home environment is also suitable for providing children with space to exercise freely and interact with older peers. Therefore, it is crucial to provide effective support to parents by educating them on the importance of FMS and guiding them through curriculum and related sports activities for the motor development of children. By increasing parents' correct physical activity concepts, enjoying the fun of sports, and starting from themselves, it will affect their children's preschool exercise habits, which will be more conducive to the development of children's FMS.

Acknowledgements

I thank all parents who participated in this work, especially Hsin-Yi Foundation for sending of questionnaires to parents and assisted with the investigations.

Informed consent statement

Informed consent was obtained from all subjects involved in the study.

Authors' contributions

Shu- Yu, Cheng and Tsung-Teng, Wang wrote the main manuscript text, Hsia-Ling Tai prepared Tables 1–6. All authors reviewed the manuscript.

Funding

This research received no external funding.

Institutional Review Board Statement: The study was conducted according to the provisions of the Research Ethic Committee of the University of Taipei expressed its approval (Decision No.: IRB-2022–093).

Data availability
Data are archived at the Graduate Institute of Physical Education, University of Taipei, Taiwan. If necessary, contact the author by e-mail tsungtengwang@yahoo.com.

Declarations

Ethics approval and consent to participate
The study was conducted according to the provisions of the Research Ethic Committee of the University of Taipei expressed its approval (Decision No.: IRB-2022–093). Informed consent was obtained from all subjects involved in the study. All research methods were carried out under the Declaration of Helsinki guidelines and regulations.

Consent for publication
Not Applicable.

Competing interests
The authors declare no competing interests.

Received: 14 October 2024 Accepted: 11 March 2025
Published online: 22 March 2025

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