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Article

The effect of family physical education environment on gross motor skills in preschool children

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Abstract: The movement of our body is a part of our everyday life. The location and degree of movement give us the ability and capacity to perform simple to complex tasks. New or improved gross motor skills enable us to explore more of our environment. It ultimately allows more opportunities for learning and doing. This quantitative study investigates the effect of the home environment on the gross motor skills of children aged 5 to 6 years in Changzhi City, China. The sample included 124 parents and 66 children. The two main tools used were the 'Test of Gross Motor Development-2' (TGMD-2) and the 'Children's Family Physical Education Environment Questionnaire'. The data analysis through these tests found that a parent-child physical activity intervention program significantly improved children's gross motor skills. Post-intervention results indicated a strong relationship between parents' attitudes towards physical education and enhancing their children's motor skills. However, no significant relationship was found between the availability of sports materials at home before and after the intervention in the treatment group. These findings suggest that to improve children's gross motor skills effectively, parents should actively engage in physical activities with their children and maintain a positive attitude towards physical education. The study highlights the critical role of parental involvement and attitudes in fostering children's physical development within the home environment.

Keywords: gross motor skills; preschool children; fostering physical education; physical development; physical-activity intervention; home environment

1. Introduction

Gross motor skills control movement and coordination during activities like running, jumping or throwing and is a crucial determinant in most tasks in preschool, home and community [1]. These skills are critical to develop at the preschool age as they are one of the defining moments in establishing lifelong physical activity preferences and physid the surrounding physical, cultural, and social settings in which children grow up significantly affect it. It influences children's general development concerning language, scal activity patterns [2]. Concerning these physical activity patterns, the family setting anocial skills, motor skills, and cognition [3–5]. Along the phases of development ercise behavior and sports interest than any other stage of life [6].

So, bythroughout life, it is noted that early childhood ages are more or less highly susceptible to ex empowering your child from an earlier age by one's due attention towards physical education and awareness of the critical role gross motor skills have in devising the basic layout of future life, the parents emerge as the quintessential stakeholders in converging the child's attitude and action towards physical activity.

The home environment becomes the principal source of a child's configuring their physical surroundings and simultaneously being altered by them.

The lack of participation and encouragement from the main stakeholders, the parents, leads to unhealthy lifestyles and the physically inactive lives of their children. Such situations often lead to overweight children and obesity. These are significant threats that have emerged as critical public health concerns in the Chinese community, mainly affecting children in large numbers. Obesity and overweight children are social issues that pose a threat to future generations' health and should be addressed as well as any health issue. Preserving 'healthy child' interventions have risen amongst preschool children [3]. One of these directions focuses on improving gross motor skills, the prerequisite for fundamental child motor and general health and well-being in human life [5]. However, the factors that enable the home environment to develop these skills or the lack of such a setting in the Chinese context has not received much consideration.

The modernization process in China has also raised the pedestal of academics as of more value than actively engaging in physical activity. Currently, the nature of educational activities in China substantially focuses on values of intelligence rather than physical well-being. Even preschool kids in China are expected to adhere to efficacy in academics and cultivate their priorities like primary school students. They are sent off to chess lessons, painting sections and speech lessons by their parents [6,7]. Due to this academic emphasis, children get very little time for physical activities, correlated with the increased probability of childhood obesity. With academic activities assumed significant by parents and supplemented by children, it has ultimately reduced the time the child spends out playing or exercising [8]. The education sector takes advantage of this trend, where students must evolve and excel academically.

Moreover, the increasing population is becoming an urbanized working population which often results in parents having very little time for their children and hence having to employ the services of grandparents to take care of the children [9]. This has inadvertently led to increased time the children spend in front of the screen. This increased rate of screen time is feared to have adverse effects on the health of children who spend most of their time sitting down [10].

Over time, a growing body of research has raised awareness about the benefits of encouraging physically educated households for kids' gross motor development. However, most existing studies have targeted children below seven [11]. Specifically, existing literature needs an extensive study comparing temporal changes between the home environment and young children's gross motor skills in China [12].

Even though early childhood physical education is considered a vital component of children's development, more research should be done on parental beliefs and their influence on children's motor development [13]. Previous works have more or less focused on measuring motor developmental milestones such as rolling over, sitting up, and walking to be associated with children's physical health. The focus shifts to applying parenting styles and children's attitudes and beliefs to the physical education scale. It is essential to appreciate these influences because previous studies reveal that parents' perceptions of physical education can influence children's physical activity patterns and gross motor skills training [4].

The effect of exercise on health is undeniable, let alone perceive its impact on Gross Motor Skills. The regular practice of physical activity sustains a healthy life. It

maintains an individual's physical and mental health, contributes to weight control, and significantly improves the quality of life and well-being. It is also an effective way to treat or prevent chronic conditions [6]. So, in order to regulate one's life, a physically educated home environment or intervention of physical activities in our day-to-day life from early childhood will acquire long-term benefits both for the individual's health and well-being and contribute to society as a whole by nurturing healthy bodies and minds which will in result provide a healthy and well-regulated environment for the next generation. It ultimately serves the community. The paper follows a structured approach: Section 1 introduces the study by addressing research gaps, setting objectives, and posing questions. Section 2 reviews pertinent literature to provide background and context. Section 3 details the research methodology, outlining data collection and analysis methods. Section 4 presents study results and their implications, including practical insights. Section 5 concludes with a summary of findings, recommendations, and acknowledges study limitations. Lastly, Section 6 discusses limitations and proposes future research directions, ensuring a comprehensive framework from introduction to conclusion.

2. Literature review

In essence, a family is a micro social group that constitutes an essential aspect of social life and is formed as a result of a marriage, blood connection, or adoption and determines a familiar setting for practical living together that encompasses material, cultural, and spiritual experience [14,15]. The home environment constituted by family plays a crucial role in child development as many aspects of their lives are determined here, including language, social, physical, and emotional development, as well as their intellectual ability. A study in North America assessed the effect of family and environmental factors on young children of three to five years old [16,17]. They were observed in their home setting and were analyzed through a caregiver's survey with 395 participants. The results endorsed that parents' assessment of the environment incontestably influences their children's engagement in early childhood activities. Parents remain influential figures in their children's learning during their early years, especially in their physical activity (for instance, sports), which enhances their growth in motor ability [18]. The study also aimed to determine family factors that could explain the gross motor development of preschool children with support from sociological theories. This cross-sectional study selected 175 Preschoolers aged 3–6 years using a questionnaire and the Test of Gross Motor Development (TGMD) [18]. The study revealed that families that actively engage and support children in sports improve the gross motor development of preschool children.

In this respect, another quantitative study was conducted in Shanghai. The research tool, which consisted of questionnaires, was delivered to 207 parents, and the information regarding the family environment was collected and then analyzed through statistical tools [14]. The Movement Assessment Battery (MAB) for Children was employed to compare the differences in motor skills development among children from different family environments.

"Aim" and "grasp" were some of the evaluated parameters. It was discovered that environmental factors for an only child of the family showed a more significant impact on scores than others. Furthermore, children with physically active home

environments proved superior in grasping, and children directly attended by their fathers demonstrated better aiming and grasping efficiency. The further study established the correlation between family environmental factors and children's motor skill development in school [17]. Therefore, parents play a significant role in ensuring young children in early childhood get their best shot at developing physical education. It has been noted that parents' beliefs also crucially affect children's behaviour towards learning in general and physical education in particular surveyed twenty mothers, including those in the Melbourne Infant program [19]. The parents and caretakers were required to fill out questionnaires. The sample consisted of the parents of kids aged 4, 9, 19 months, and three years old. The researchers found that movement battery physical education (MBPE), including such components as knowledge about physical education (PE), attitude to PE, optimism, self-efficient coefficient in physical education (PE), and concerns about the infant's floor time, affected the infant's motor development. Furthermore, parental involvement processes in facilitating movement and maternal physical activity were other significant sources of variance in infants' motor development.

Informing parents about the effects of the home environment on the child's motor competence is crucial, and such counselling can commence from an infant [19]. Even at home, parents can set an example by using age-appropriate toys and equipment for engaging in physical activities. Parents can participate in indoor and outdoor activities with children. Not only is it practical for developing essential motor skills among the children, but such activities are also beneficial for parents to familiarize them with the kind of physical activity for young children that is healthy and advisable. In another quantitative experimental study, look at the effects of the physical and home environment on motor development of children [11]. They employed 321 families from Portugal with children 18–42 months old. The results revealed that the kind of play, like music, manipulating and locomotor things, influenced the growth of gross motor skills at home. In the same regard, another researcher assessed the effect of the home environment on the motor and cognitive development of infants in Brazil [20]. Within this study, the sample involved 32 infants, 3–18 months of age. They employed the Affordances in the Home Environment for Motor Development-Infant Scale (AHEMD-IS) to assess the home environment, focusing on five dimensions: Outside Space, Inside Space, Daily Activities, Fine-Motor Toys, and Gross-Motor Toys. In assessing the tool's validity in measuring the thermal environment of play, they found that the mean of daily activities and the mean of play materials have changed over time. The study also reported a moderately significant correlation between play material and GMP (global motor performance) and a significant correlation between daily living activities and GMP. Similarly, another study observed a similar correlation between play material and SES indices, such as parents' literacy and income, when employing the play material assessment. These progressively perceived patterns have significant implications for the need for a supportive home environment for the gross motor development of young children [21]. Gross motor development and the accessibility of materials in the home were also compared. The results revealed that available gross motor materials were highly correlated to the motor development of the children [22].

The researchers also found that parents shared a positive attitude about parent-child sports. The significance and necessity of these activities were acknowledged, but many parents experienced firsthand difficulties practicing them daily. The survey

findings indicate that most often, parents engage in physical activity with their child at least once a week, and the duration of the activity is between 30 min to one hour.

Additionally, the study supports the viewpoint that the supply of exciting playthings and the advancement of motor skills are interconnected [23]. The separate study, looked for the effects of play material on motor development for one-year-old and one-year-old infants [24]. The intervention lasted six weeks, and efficacy assessments were performed after the first and third weeks. Employing the Peabody developmental motor scale 2nd edition (PDMS-2) as the variable of interest, they noted that the modulation of exposure to age-pertinent toys notably boosted motor development in high-risk neonates in a six-week duration.

In another study, the development and implementation aspect of homemade sports toys in outdoor morning activities in kindergarten are reviewed through a qualitative research approach [25]. In order to get the most out of children, especially during games, the activities should be stimulating to enhance their desire to participate. The researcher stressed the possibility of homemade sports toys for children. The researcher noted that organized parent-child physical activity is a type of family sport that could act as a segment of mass sports and has been found to impact children's development and function significantly [26]. Childhood family factors like family structure and time spent in the family exercising are all significant to the primary motor skill development of the child [27–30].

Previous literature about the home environment of China and the gross motor development of Chinese children focused on infants or school-going children who are more than seven years of age, focusing on the school environment. However, more information is needed concerning the links between young children's gross motor skills and the home context in China.

3. Methodology

3.1. Research design

This is quasi-experimental research that studies the correlation between the nature of the home environment and gross motor abilities in children. The quasi-experimental design is ideal for determining the intervention's impact in real life. The research sample consisted of (N = 64) participants who were divided into an experimental group and a control group. The experimental group undertook a parent-child-organized intervention program of physical activities, while the control group was used to compare their results. The control group was left to exercise activities in their way without intervention or organized direction. Furthermore, the research design is divided into two phases, the pretest phase and the post-test phase, in order to analyze the results and observe the correlation between two variables, "home environment" and "GMS" (gross motor skills) of preschool children.

3.1.1. Pretest phase

Prior to the intervention process, all children involved in the study underwent a pretest, noting their gross motor activity, in order to have the TGMD-2 results of the children. The parents of the children filled in the 'Children's Family Physical Education Environment Questionnaire' to identify the type of home environment that

facilitates physical activity, enhances parent's attitudes towards physical education, and establishes the frequency of involvement in physical activity with children.

3.1.2. Intervention phase

The experimental group comprised parents and children in a structured eight-week physical activity program. One-hour weekly session was conducted at the preschool where gross motor skills program coordinators overlooked pre-planned physical activities for the children. Moreover, home-based physical activity programs invoked parents and their children to perform thirty minutes of exercises thrice weekly. These sessions were intended to revive and repeat the dance movements learned during the preschool sessions and establish physical activity as part of the family's regular schedule. On the other hand, children in the experimental group just continued with their regular motor tasks, which seemed more organized free-plays without any specific instructions from parents or rigid schedules of organized sessions.

3.1.3. Post-test phase

After the eight-week intervention period, all children underwent a TGMD-2 coordinated movement test to determine their gross motor development after the intervention. The scores obtained at the post-test were matched against those received via pretest to assess the impact of the intervention. This quasi-experimental study design enabled the author to carefully compare the results from the pretests and post-tests given to the experimental and control groups.

3.2. Survey instrument

Three key instruments were utilized in this study to gather comprehensive data on the home environment, parental involvement, and children's gross motor skills. Those research tools are 'The Children's Family Physical Education Environment Questionnaire', the 'Test of Gross Motor Development-2 (TGMD-2) and the 'parent-child physical activity intervention program'. Children's Family Physical Education Environment Questionnaire was developed to identify and evaluate several home environment factors. Pilot testing of this questionnaire with 60 parents was conducted to ensure internal validity and inter-item reliability of the resultant measure. Furthermore, the TGMD-2 is an appraisal instrument for identifying and measuring children's gross motor development. It focuses on two main areas: Locomotor Skills (the skills involved in movement and comprises of running, jumping and hopping while playing) and object Control Skills (the skills which involve using an object in a sporting activity like catching, throwing and kicking). This particular instrument was chosen for its ability to assess young children's gross motor development, mainly due to its reliability and validity.

The TGMD-2 was also employed to capture the baseline data of all children involved in the study before and after the intervention. It compared and determined the improvement or difference in the children's motor skills engendered by the physical activity intervention. The Parent-Child Physical Activity Intervention Program was devised to implement structurally appropriate rough motor activities with parents and children to enhance their gross motor skills and improve their skills through practice. These research and survey tools offered a practical and rounded method of evaluating the developmental needs of the children in the study.

3.3. Sampling and data collection

As for the participants for this quantitative study, there were 124 parents (including 60 parents for the pilot test) and 66 children aged 5–6 from Changzhi City, China. For the pilot test, 60 parents were included voluntarily. Its purpose was to assess the validity and reliability of the research instruments and tools. Several changes were made after the pilot test to ensure that the measures used to gather data were valid and reliable and that the proposed intervention program was feasible. In the main study, two parents refused to participate during the consent stage and two more during the pre-intervention assessment, making a total of six. This left us with 64 participants for the parent-child intervention program.

3.4. Ethical considerations

Given ethical concerns, it is duel concern to consider parents' consent and the rights of parents and children. This study strictly complied with the code of conduct and the ethical standards and guidelines recommended by the Institutional Review Board (IRB) and other professional ethical bodies. All participants who agreed to participate in the study were duel sought for consent prior to the intervention of any research program. The information regarding the purpose of the study, the process that would be followed, the risks involved, and the benefits of the study were all given to the participants before implementing any research. Their right to withdraw their children from the study at any stage without any repercussions was well-informed to ensure participants' approval.

The researcher further ensured that the participants' information was not disclosed to third parties without consent. Participants were assigned identification numbers to minimize bias and ensure that the results received were voluntarily delivered by the participants and not influenced by others. Data privacy was ensured by storing personal information with strict physical and electronic measures, and only the research team had access to the collected data. All the available study findings presented in other publications or presentations complied with the anonymity of participants. The following design considerations were incorporated to ensure minimal risks with the study's design. The type of physical activity that formed the intervention program included age-appropriate measures and safe exercises for young children. Qualified staff undertook various sessions to oversee the safety of the children. Children's welfare remained our primary concern. Furthermore, participants' concerns and reservations were promptly attended to and rectified immediately.

3.5. Data analysis techniques

The research methodology used in this study incorporated analysis techniques, including both descriptive and inferential analysis, to enable the study to effectively assess the influence of the home environment on children's gross motor skills. The demographic variables and their frequency were analyzed using descriptive statistics such as the frequency, mean and standard deviation. These variables included the age, gender, weight and height of the children and their parents. Furthermore, the education level that the parents had received, income, their view on children's physical education, the extent of physical activities that are inculcated in their day-to-day life, and the

nature of physical equipment that was available at home all made up to be the variables studied by this research.

Several statistical tools were used for analysis to determine the correlation and interaction between the data that has been collected. A T-test was applied to compare the pretest with the post-test performances of the four groups. It enabled a practical comparison between the outcome of the experimental group and that of the control group. Analysis of Covariance (ANCOVA) was used to adjust potential variables and more effectively investigate the interaction between experimental and control-group data. Likewise, Multivariate Analysis of Covariance (MANCOVA) proved helpful for investigating the principal effects and interactions of dependent variables and the effect of covariates included in the analysis.

Furthermore, Multiple regression analysis of variables was performed to determine factors influencing gross motor development (GMD) among children. Using this technique, it was easier to determine the overall contribution level of the independent variables towards the dependent variable. It arrived at the conclusion about which factors influence children's gross motor skills to a large extent, as shown in **Figure 1**.

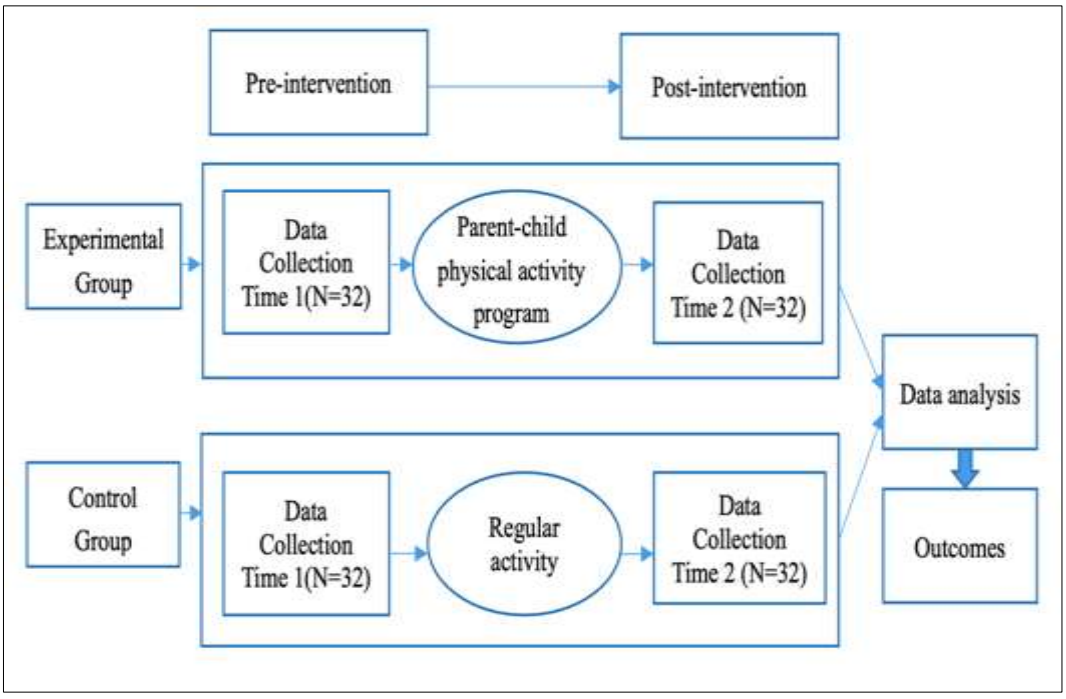

Figure 1. Methodology flow chart.

Note: Number of participants for experimental group = 32, Number of participants for control group = 32, total $N = 64$

The research sample consisted of (N =64) participants who were divided into an experimental group (n = 32) and a control group (n = 32). The experimental group undertook a parent-child-organized intervention program of physical activities, while the control group was used to compare their results.

The control group was left to exercise activities regularly without intervention or organized direction. Furthermore, the research design is divided into two phases: a pretest (pre-intervention) phase and a post-test (post-intervention) phase in order to

analyze the results and observe the correlation between two variables, "home environment/physically active home environment" and "GMS" (gross motor skills) of preschool children.

4. Results and discussion

Table 1 indicates that the baseline children's gross motor skills were noted before intervention. The treatment group (n = 32) and control group (n = 32) both elicited mean values of GMS as 71.92 ± 1.68 and 70.84 ± 1.375, respectively. Their respective standard deviation values indicate that in the control group, values in statistical data observe a slight variation from the mean. Meanwhile, a 9.54 standard deviation for the experimental group indicates that statistical data is relatively spread out from the mean. Furthermore, the relationship between the t-value (11.109) and the P-value (0.276) indicates that although the t-value is high, the P-value is greater than 0.05. This means the results are not statistically significant, and the null hypothesis cannot be rejected

Table 1. Baseline children's gross motor skills before intervention**.**

	Group	***N***	**Mean**	**Std. Deviation**	***T***	***P***
GMQ	treatment group	32	71.92 ± 1.68	9.54	11.109	0.276
	control group	32	70.84 ± 1.375	7.77		

MANOVA results in **Table 2** illustrate the changes in Gross Motor Quotient (GMQ) scores between the treatment and control groups' pre-and post-test assessments. Self-esteem was assessed by analyzing the Wilks' Lambda value of the control group, which was 0. 195 with an F-value of 0141. It shows no relationship between the two variables of control and treatment group and the F statistic result shows 9.392 and an Eta 0.055 As a result, the average of the GMQ total score showed no change before and after the intervention, with a value of 141. Result shows significantly higher proportion with MMSE 0–8 score group compared to MMSE 23–26 score group p-value < 0. 01, and an Eta square of 0. In light of these findings, the research discovered that the AMPS intervention influenced the children in the treatment group to develop better gross motor skills than children in the control group.

Table 2. Analysis of MANOVA towards GMQ of children before and after intervention in treatment group and control group.

Groups	**Variable**	**Pretest-Post-test**			
		Multivariate Analysis	*F*	*P*	Eta
Control Group	GMQ	Wilks' Lambda	0.195	0.662	0.141
Treatment Group	GMQ	Wilks' Lambda	9.392	0.01**	0.055

Furthermore, the MANOVA test highlights more variation in the scores resulting from the difference in the post-test and pretest Gross Motor Quotient (GMQ) scores among the treatment and control groups, as shown in **Table 3**.

For the control group, the analysis generated for the equality of covariance matrices gave a Wilks' Lambda of 0. significant, its F-value being 0. The students' GMQ scores remained relatively unchanged between pre-intervention assessment and

post-intervention testing. On the other hand, the treatment group presented a lower Wilks' Lambda value of 9. The children's General Motor Skills and Quality (GMSQ) scores were improved by the pretested mean score of 48 and a post-tested mean score of 055. The findings presented in this study indicated that the intervention resulted in an improvement and possessed significant statistical value about the gross motor performance of children in the treatment group. In contrast, children in the control group did not exhibit nearly as much improvement.

Table 3. *T*-test analysis of GMQ between two groups after intervention.

	Group	**M**	**Std. D**	***t*-value**	***P*-Values**
GMQ	TG preQ-post	−13.734	8.532	−12.88	0.000
	control group preQ-post treatment group	−0.438	1.20	−0.442	0.662

The results of the *T*-test test in **Table 3** are highlighted by the Gross Motor Quotient (GMQ) scores that distinguish between the treatment group and the control group after the treatment. We observed a more negative mean change (preQ-postQ) for the treatment group as = −13 against our expectations.

On the other hand, the control group as a total group presents only a mean difference of—0. It was 3, for example, with a standard deviation of 1. significant, an *f*-value of 20 and a t-value of −0. 50, indicating that there is enough evidence to support a mean body weight of 442 and a *p*-value of 0. 680, showing that there had not been a shift in the average scores regarding the GMQ test. From these findings, it can be deduced that the intervention helped enhance children's gross motor development within the treatment group, as there was no corresponding development in the control group.

Table 4. Factors influencing children's gross motor skills prior to parent-child physical activity intervention.

Control Group			**Experiment Group**		
Variables		GMQ	Variables		GMQ
preB (parents' attitude towards children's physical education)	Pearson Correlation	0.346	Post (parents' attitude towards children's physical education)	Pearson Correlation	0.255
	Sig. (2-tailed)	0.052		Sig. (2-tailed)	0.163
	N	32		N	32
preD (sports materials at home)	Pearson Correlation	0.306	PostD (sports materials at home)	Pearson Correlation	0.366
	Sig. (2-tailed)	0.089		Sig. (2-tailed)	0.124
	N	32		N	32

Table 4 shows the results of the Pearson correlation coefficients of factors affecting the Gross Motor Skills of Children Qualification (GMQ). The physical activity levels are observed before treatment and parent-child intervention program where there are control and experimental groups. With a non-PE attitude of the parents towards their children (prep), we get a value of Pearson's correlation coefficient of 0. This manifested an average of 0.346 with a significance level (Sig.) of 0.052 and a sample size of 32, highlighting a moderate and almost significant positive correlation.

The amount of sports material found at home (Pre-D) has constructed a Pearson correlation of 0.306 with a Sig. of 0.089, which may mean a mild but statistically insignificant positive correlation between the two values. Analyzing the results for the experimental group's post-intervention attitudes towards physical education (post), the researcher got the Pearson correlation coefficient as 0.255 with a Sig. of 0.163. The corresponding correlation coefficient 0.255 represents a near zero, a non-significant positive correlation. Sports materials at home (post) imply a significant relationship between GMQ with a coefficient of 0.366 and a Sig. of 0.124, signifying a moderate and positive correlation that is statistically insignificant. Based on these results, different types of parental attitudes and sports materials' availability affect Children's GM-S. At the same time, no significant correlation was identified between the two groups prior to the intervention.

Table 5. Influencing factors on children's gross motor skills after parent-child physical activity intervention.

Control Group			**Experiment Group**		
Variables		GMQ	Variables		GMQ
preB (parents' attitude towards children's physical education)	Pearson Correlation	0.233	post (parents' attitude towards children's physical education)	Pearson Correlation	0.593**
	Sig. (2-tailed)	0.158		Sig. (2-tailed)	0.000
	N	32		N	32
preD (sports materials at home)	Pearson Correlation	0.386	PostD (sports materials at home)	Pearson Correlation	0.341
	Sig. (2-tailed)	0.078		Sig. (2-tailed)	0.065
	N	32		N	32

Table 5 shows the Pearson correlation coefficients of factors affecting the GMS in children after the intervention of a physical activity program. The results are compared for both the control group and the experimental group. In the control group, parents' attitudes towards children's physical education (prep) are moderately related to the child's behaviour with a Pearson correlation coefficient of 0.233, an overall statistically significant score with Sig. of 0.158 and a sample size (N = 32) is depicting the low positive correlation coefficient, which is insignificant. Several variables have been investigated, such as Pre-sports motivation in the home environment (preMotHome) which also has a Pearson correlation of 0.386 with a Sig. of 0.078, which indicates that the relationship is positive and moderate or nearly significant. As in the case of the parents' pre-intervention attitudes in the experimental group, differences between their pre-intervention and post-intervention attitudes were calculated using the Pearson correlation coefficient; postB= 0.4% with a significant value of (Sig.) 0. 00, which indicates a very high significant correlation. The reliability coefficient of the fabricated scale was found to be 0.95. In contrast, the Pearson correlation between the availability of sports materials at home (post) and physical activity was 0.341 with a Sig. of 0.065, a positive though non-significant correlation coefficient. Implications from these findings indicate a positive shift in parental attitudes, predicting the significant independent variable after the intervention program in the experimental group.

Table 6. Post-intervention multiple regression analysis for treatment group.

		Model Summary			
Model	*R*	*R* Square	Adjusted *R* Square	Std. Error of the Estimate	
1	0.785a	0.616	0.604	4.48237	
		ANOVA[a]			
Model	Sum of Squares	df	Mean Square	*F*	Sig.
1 Regression	950.456	1	950.456	49.678	0.000b
Residual	596.237	31	19.231		
Total	1546.693	32			
		Coefficients[a]			
Model	Unstandardized Coefficients	Standardized Coefficients	*t*	Sig.	Collinearity Statistics
	B	Std. Error	Beta		
1 (Constant)	25.321	9.231		2.743	0.009
postC	14.783	2.154	0.785	6.857	0

In **Table 6**, the Multiple Regression Analysis gives some idea about the results in the treatment group after the intervention. Hypothesis: The model summary shows a coefficient of determination of 0.785, with the *R* Square of 0., *F* (2, 33) = 616 &; Adj *R*-squared = 0. *t* = 604, which implies that about 61 per cent of the prominent organizations have engaged in the development of sustainable strategy. This indicates that only 6% of the variability in the dependent variable can still be accounted for by the model. The standard error of the estimate is 4.48237. According to the ANOVA results, the regression model's association is deemed significant on the F-statistic of 49. Also, the overall model fit is statistically significant, *F* (678, $p < 0.001$), testifying that the model fits the outcome variable well. The coefficients table indicates that the post is the predictor variable with the least square estimates, also known as B, equal to 14.783, and a standardized coefficient (Beta) of 0 of the regression line was determined. 785, and a *t*-value of 6," homemade ingredients say that they use only high-quality products in preparing their foods. Their employees are highly qualified, with most of them being degree holders. At the same time, 785 supported Homemade Ingredients statement that they only use quality products to prepare their foods and all their employees are qualified, with 70% having a degree. 857 and a significance level of $p < 0.05$ The above a and b mean that the study has a total sample size of 857. The study is significant at a significance level of 0.05, meaning it has found a relationship between the two variables. 001. This means that postC is a significant predictor of the dependent variable in the Treatment group, which was reflected by a positive correlation.

5. Discussions

The purpose of the present study was threefold. Firstly, it intended to examine the effectiveness of the home environment of children with low gross motor skills based on the gross motor skills test (GMST); secondly, to compare the difference in home observation for measurement of the environment (HOME) scores between children with high and low gross motor skills; and thirdly, to determine the correlation

between the two scales. The participants were 124 parents and 66 children aged 5–6 from Changzhi City, China. This study offers many valuable suggestions for further understanding the correlations between home environments and children's motor skills with the help of the Children's Family Physical Education Environment Questionnaire, the Test of Gross Motor Development-2 (TGMD-2), and a parent-child physical activity intervention. In sum, child and parent programs for physical activity play have been shown to improve motor skills. The results showed no significant change caused by the accessibility of sports materials at home for the experimental group. The study reveals that more than merely providing the materials (without engagement) to promote physical education among children is required. Still, the overall findings showed that the parents in the treatment group had a more positive attitude towards children's physical education than the control group at the end of the intervention.

Parental perceptions influence sports engagements in the family. The study sharpens the understanding of the contextual relations regarding children's motor competence by stressing the critical role of the home environment. The home environment turns out to contain subjective elements such as parents' attitudes and parent-child interaction in physical activities.

In development during the early childhood stages, where a child is considered one to seven years of age, every child is believed to have emerging fundamental movement patterns that are 80%–90% similar to adults [19]. Gross motor development milestones are achieved during this age, and the home environment could shape these. Parents' positive attitude towards practicing parent-child sports directly affects the children's gross motor development [18,22]. Contrary to the correlational study used an experimental design to test the causality of the parental attitudes towards children's PE and their GMS. The intervention revealed that positive parental attitudes further the children's gross motor skills; hence, assessing parents' attitudes towards physical education is paramount and should be encouraged in helping children who need to shed some weight to improve their motor ability [17,31].

Theoretical & practical implications

The implications of this study put a high positive emphasis on parental support in improving children's gross motor skills during physical and structured activities. Large treatment programs in the introduced and follow-up lessons demonstrate the effectiveness of practices that involve parents in the activities of their children's physical education classes. The above findings imply that parents should encourage their children to engage in various physical activity exercises. Promoting awareness, alongside shows and other educational programs and workshops, can be a starting point for explaining to parents the importance of such engagement. We recommend ways to incorporate physical exercises into children's day. Arranged parent-child interaction (similar to this research's interactive programs) could be initiated in schools and community centers. These programs should be fun and exciting for parents and kids to make them engaging. Other escorts, such as guides and schedules for the day, can assist parents in continuing these activities at home.

Furthermore, there are crucial factors that parents should prioritize in a home environment to enhance children's gross motor skills. The guidelines on the use of appropriate sports materials and the creation of opportunities for fundamental movement skills at home can be suggested to parents. Low-technology teaching aids, well-organized games, and emerging household items can be advocated for use and training efficiently. Policymakers must consider the need and potential possibility for early childhood physical education and develop an agenda for home settings about motor skill development. It could include promoting other parental involvement activities, such as funding programs to provide resources to families. Future research can also investigate the durability of the changes in these individuals' physical-activity intervention programs and the specific approaches that should be utilized for different population subtypes. In this way, educators and policymakers can constantly modify and enhance these programs in the way they are designed to address. Therefore, they can prioritize the requirements of families and children in society.

6. Conclusion and recommendations

The finding of this study holds significance as it acknowledges the role that home environment and parental involvement play in the development of gross motor skills in young preschool children. The results presented provide overwhelming evidence that parent-child physical-activity intervention programs can boost gross motor skills in children. These changes are seen in the treatment group in comparison with the changes in the control group. It establishes the need for early and active parental involvement in getting their children to indulge in physical activities. This study also includes the factors about parental perception towards physical education, and the results noted that parental perception positively impacted the implementation of physical activity programs. This is why parents must not only offer the chance for physical activity but also encourage and create a favorable environment suitable for the child's physical activity.

As for the availability of sports materials at home (post-intervention), the results showed no significant relation between the provision of such materials and the gross motor skills in preschoolers. However, the provision of materials and an environment conducive to motivation and engagement in physical activities should be encouraged as it facilitates meaningful physical accomplishment, which is a quintessential factor, according to the study. Furthermore, these results have implications for educators, parents and policy makers given what the children are exposed to daily. Promoting parents' investment in children's activities, establishing home conditions appropriate for children's motor development, and reducing children's socioeconomic challenges are potent mechanisms that can be used to improve children's motor development. Further studies should systematically extend these findings and examine how we can facilitate and induce activity-oriented home environments since early childhood as a proactive initiative and help families become apt in physical education that contributes to preschool children's gross motor development.

Limitations and future studies

Some limitations of the study need to be noted, albeit this study offers notable information on the effects of home environment and parental involvement on children's gross motor skills. It is to be noted that the sample size is moderate, and the participants were selected only from Changzhi City, China. Thus, the generalizability of these findings may not apply to others. Future studies with larger and more diverse populations should be recommended to affirm these findings. The study measured sports availability at home and its use. Other than this, possible sources of influence like the physical condition of the playing environment, parents' activity levels, and children's motor ability at the onset of the study were not assessed. These variables could have helped offer the richness needed to explain other aspects affecting children's motor development.

It is recommended that future studies include research based on the observation of physical activity and motor function in children with attention-deficit/hyperactivity disorder (ADHD), which may minimize bias resulting from subjective ratings. Technology like digital wearable fitness trackers and motion sensors can help better assess children's physical activity and motor development. Examining potentially confounding variables that could affect children's GMS, other than the family factors, including parental physical activities (PA) levels, physical environment characteristics of the home setting where children play, as well as the child's initial basic motor abilities will create a better understanding of the factors that affect children's motor development. In addition, they might help with interventions focusing on these additional factors, which could increase the efficacy of the interventions.

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