The Impact of Participating in Cultural and Sports Events on Preschoolers' Emotional Competence

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Abstract. In recent years, participation in non-disciplinary extracurricular cultural and sports activities has become more and more common among preschool children, while children's emotional competence is the core of preschool children's social interaction and mental health, and whether participation in cultural and sports activities affects children's emotional competence has increasingly attracted the attention of parents and educators. In this study, we employed questionnaires to assess children's emotional competence using the Children's Emotional Regulation Scale (CERS) (Preschool Edition), as well as correlation analysis, regression modeling, and group comparison tests to investigate whether participation in sports and cultural activities impacts children's emotional competence. It was found that there was a positive correlation between participation in sports and cultural activities and emotional competence, but the effect on emotional competence could not explain this. In addition, when comparing the participation group with the non-participation group, it was found that there was no significant difference between the two groups. This suggests that participation in cultural and sports activities has only a weak effect on emotional competence, which may be influenced by factors such as family resources and family socioeconomic status. The study provides a scientific reference for educational practices in the context of urban middle-class families.

Keywords: Cultural and physical activities, Children's emotional competence, Preschoolers, Mental health.

1. Introduction

Children's emotional competence is the comprehensive ability to recognize, adapt, regulate, and express emotions formed by preschool children in the process of cognitive development and socialization, the core of which covers the three dimensions of emotional expression, regulation, and knowledge. It is based on the physiological foundation of the peak of brain neuroplasticity and the framework of the basic emotional experience through the system of daily interactions, which lays the foundation of social interactions, academics, and long-term mental health. Children's emotional competence is a core stage of early childhood development, directly affecting their social interactions, academic adaptations, and mental health [1]. Studies have shown that children with more substantial emotional competence usually show higher self-confidence and better social interactions. In contrast, children with weaker emotional competence are more likely to have negative emotional and behavioral problems, which lead to children's later school maladjustment, such as a lack of peer relationships and low academic achievement [2]. Therefore, by promoting self-confidence and exploratory behaviors, emotional competence not only supports children's current social functioning but also creates a stable adaptive framework for their lifetime growth. Emotional intelligence has a significant influence on children's early school adjustment and future development in addition to their present social interactions and peer relationships. As a result, it is critical to consider children's emotional competency in the classroom and use scientific ways to help them recognize and manage their emotions. Physical and cultural activities (including music, painting, dancing, sporting events, etc.) have recently attracted plenty of attention due to the progress of school reform because they are significant outside interventions that can pique children's interests. They may cultivate children's socio-emotional abilities through a process of subtle impact by creating engaging, participatory, memorable physical and cultural activities that help them recognize, express, and control their

emotions. Physical and artistic activities can help preschoolers joyfully develop basic emotional skills through the closed loop of "participation-expression-reflection." They can also give preschoolers a safe environment in which to explore their emotions and lay a vital psychological foundation for future learning and social adaptation [3]. The present study covers the whole stage of 3-6 years old, which is a critical window for the development of children's emotional ability, with the rapid growth of the prefrontal cortex and limbic system of the brain, and the cultural and sports activities may have a more significant impact on emotional ability than other ages through the direct effect of neural plasticity through multi-sensory stimulation (e.g., music rhythm, body movement).

It has been shown that musical play has a significant effect on the development of emotional socialization in young children, which was found to significantly improve children's implicit behaviors (e.g., anxiety, negative emotions) and activity/impulsivity, sensory sensitivity, imitation/play, and pro-social peer relationships. This, in turn, suggests that participation in musical games can alleviate children's anxiety and negative emotions, enhance children's imitation ability, and promote the development of their social competence [4]; drawing can be used as a tool for emotional regulation and expression of emotions to improve children's emotional state, and studies have shown that through drawing, children can be temporarily diverted from negative emotions, and this "distraction Research shows that through drawing, children can be temporarily diverted from negative emotions, and this "distraction" means of expressing emotions is more effective. Long-term participation in drawing-based activities enhances positive emotions and relieves stress. This highlights the important role of art in children's emotional lives [5]; creative dance, as a non-verbal expression, can help young children to express and regulate their emotions effectively, and at the same time, creative dance is also a teaching tool to promote the socio-emotional development of young children, which emphasizes the individual expression and creativity, which is very suitable for young children's characteristics of non-verbal communication, and can help young children in the early stages of the appropriate ways to express and regulate emotions [6]; sports games can effectively improve the emotional management ability of emotionally disturbed children, help young children vent their negative emotions, reduce conflicts and aggressive behaviors, and promote friendly interactions with peers, thus enhancing children's emotional connection. In addition, in this process, the accompaniment of parents, the encouragement of teachers, and the promotion of home and family cooperation on the effect of intervention are indispensable [6].

The study identified the relationship between children's participation in organized extracurricular activities (EAs) and their math, reading, and social skills, taking into account that family socioeconomic status (SES), children's gender, and prior math or reading skills play important moderating roles in the degree of EA participation and children's development. In particular, family SES not only positively predicted the intensity and breadth of children's participation in extracurricular activities, but participation also significantly contributed to the development of math and reading skills for children with low SES but not for children with high SES, suggesting that there is a compensatory effect of extracurricular activities on family disadvantage; whereas, children's prior math and reading skills positively predicted the breadth of participation in subsequent extracurricular activities, suggesting that parents may adjust extracurricular scheduling based on the academic performance of their children. Academic performance to adjust extracurricular scheduling; however, gender differences were only reflected in activity type preferences (e.g., boys were more inclined to sports) rather than overall participation levels [7]. In addition, extracurricular activities did not significantly affect children's social skills, possibly because the goals of the activities focused more on skill development. Extracurricular activities help children develop skills beyond schooling and are an important part of early learning. Parents want their children to acquire skills necessary for future employment, and early learning of a second language is essential for academic and career development. At the same time, parents encourage their children to participate in extracurricular activities to increase their competitiveness in elementary school, but the actual choices are often influenced by educational anxiety and social pressure to compete, such as a preference for language skills training. Despite the positive effects of extracurricular activities on emotional development,

overly structured arrangements may diminish children's enjoyment of self-directed exploration [8,9]. Because emotional competence is critical to children's well-being, mental health, and academic success, the importance of and methods associated with assessing preschoolers' emotional competence have been explored. Among them, the Children's Emotion Adjustment Scale-Preschool Version (CEAS-P), which focuses on the three competency dimensions of temperament control, social assertiveness, and anxiety control, is able to measure preschool children's emotional competence validly and is suitable for researchers and practitioners to apply in the field of children's mental health and development [10].

Although studies have confirmed the influence of physical and cultural activities, such as musical games, creative dance, painting, and sports games, on the development of children's emotional competence to a certain extent, research on the influence of physical and cultural activities on preschool children's emotional competence is still insufficient. First, most of the current research focuses on the effects of a single type of physical activity on children's emotional development but lacks research on the differentiation of the effects of different types of physical activities on preschool children's emotional development. Second, most of the previous studies have focused on children who participate in physical and cultural activities, and there is a lack of comparative research on the two groups of children who do and do not participate in physical and cultural activities. The present study will delve deeper into the effects of participation in physical and cultural activities on preschoolers' emotional competence to fill this research gap and provide targeted references for relevant educational research and practice. This study will also reasonably compare the differences in the effects of participation and non-participation in cultural and sports activities on preschool children's emotional competence to provide more scientific and practical suggestions for cultivating preschool children's emotional competence.

2. Methods

2.1. Participants

First, parents who participated in the study were selected and given the questionnaire on participation in cultural and sports activities (extracurricular interest classes) and the Children's Emotion Regulation Scale. In filling out the questionnaire, parents may have social desirability bias (overestimation or underestimation of children's emotional competence), and in order to minimize this kind of bias, the following methods were used in this study: (1) The introduction of the questionnaire clearly stated that the questionnaire was anonymous, that all the choices were free of correctness or incorrectness, and that they were filled out truthfully and honestly in accordance with the child's own situation. (2) The reliability of the Children's Emotional Adjustment Scale (CEAS) preschool version in China, which is filled out by parents on their behalf, was tested to have good reliability [1]. The study was conducted by stratified sampling, and children aged 3-7 years old in two classes of Jucheng Kindergarten in Zhongshan City, Guangdong Province, China, were stratified according to the class level. The sample of this study was concentrated in a kindergarten in Zhongshan City, with a predominantly urban middle-class family background that did not cover rural or low-income groups, and this kindergarten was used as a representative of preschool children in the middle-class area of the town, so the conclusions are more applicable to preschool children from middle-class family backgrounds in urbanized areas. The study sought permission from the kindergarten and parents to randomly select children in the kindergarten's primary, secondary and tertiary classes, and a total sample of 188 completed questionnaires from the children's parents was retrieved. The returned sample contained 96 boys, 51.1%, and 92 girls, 48.9%. There were 99 children (52.7%) in the small class, 39 children (20.7%) in the medium class and 50 children (26.6%) in the large class.

2.2. Procedure

In this paper, we contacted the directors of the kindergartens concerned, asked them to review the topics of the questionnaires in the study, and obtained the consent of their kindergarten children to

participate in the study, and ensured that the language of the questionnaires was in line with parental perceptions. Subsequently, the author will design the questionnaire through the "questionnaire star" platform to generate QR code, and by the kindergarten teachers directed to push to the classroom parent groups, to avoid non-target groups to fill out the questionnaire to fill out the questionnaire to randomly distributed to the kindergarten parents of the small, medium and large class in the way of the network, the parents to participate in the questionnaire survey in the form of voluntary and anonymous . In the process of distributing the questionnaires, after the number of girls exceeded half, the number of questionnaires distributed to parents of girls was gradually controlled. In the end, a total of 237 samples were collected, 119 from boys and 118 from girls. In the questionnaire the author added a trial-and-error question to screen the reliability of the questionnaire data, and in the process of data processing, the samples that failed to choose this question correctly (49) were excluded. The questionnaire consisted of three parts, the first part was basic questions on demographic characteristics, the second part consisted of three questions on participation in sports and cultural activities to understand the children's participation in sports and cultural extracurricular activities, and the third part was formed by 28 questions on the Children's Emotional Regulation Inventory [10], to understand the children's performance of their emotions in their past lives.

2.3. Measures

2.3.1. Demographic information

In the first part of the questionnaire, basic demographic information about the children was collected, which was filled in by the children's parents, including the child's gender, the child's age, and the child's grade level. This included 99 children in the primary class (52.7%), 39 children in the intermediate class (20.7%), and 50 children in the older class (26.6%); 96 (51.1%) of the children were male, and 92 (48.9%) were female; and the mean of the children's ages was 4.32 years (SD=1.111).

2.3.2. Participation in cultural and sports activities

A self-developed questionnaire on participation in cultural and sports activities was used to investigate the status of participation in cultural and sports activities among preschool children aged 3-6 years old, which was completed by the parents of the study participants. The questionnaire consisted of three questions, namely: the rich type of participation in cultural and sports activities (e.g., sports, painting, dancing, music, calligraphy, etc.) (0=not participated,1=single (1 item), 2=less (2 items), 3=moderate (3-4 items), 4=abundant (5 or more items)), frequency of participation in sports and cultural activities (0=no participation, 1=once a week, 2=twice a week, 3=three to four times a week, 4=five or more times a week), and length of time of participation in sports and cultural activities (0=non-participation 1=shorter (less than 1 hour), 2=moderate (1-2 hours), 3=longer). hours or less), 3=long (2-3 hours or less), and 4=extremely long (3 hours or more)).188 Of the 188 samples, in terms of the type of richness of participation in physical and cultural activities: 47 children (25.00%) did not participate in any physical and cultural activities; 34 children (18.09%) participated in 1 physical and cultural activity; 40 children (21.28%) participated in 2 physical and cultural activities; and 37 children (19.68%) participated in 3-4 activities; and 30 children (15.96%) participated in 5 or more activities. In terms of the frequency of weekly participation in sports and cultural activities: 45 children (23.94%) did not participate; 42 children (22.34%) participated once a week; 46 children (24.47%) participated twice a week; 36 children (19.15%) participated three to four times a week; and 19 children (10.11%) participated five times a week or more. In terms of the length of participation in cultural and sports activities: 43 children (22.87%) did not participate; 32 children (17.02%) participated in less than one hour a week; 66 children (35.11%) participated in less than 1-2 hours a week; 27 children (14.36%) participated in less than 2-3 hours a week; and 20 children (10.64%) participated in three or more hours a week. The Cronbach's alpha for this self-administered measurement tool was 0.923.

2.3.3. Emotion Regulation Scale

In this paper, we used the preschool version of the Children's Emotional Adjustment Scale-Preschool [10] developed by Örnólfur Thorlacius and Einar Gudmundsson, based on the Children's Emotional Adjustment Scale-Preschool Version, CEAS-P) to assess emotion regulation in children aged 3 to 6 years. The scale has high internal consistency reliability (Cronbach's α=0.93 for the total scale and 0.77-0.92 for the dimensions) and retest reliability (0.59-0.81, P<0.001) in a group of 3- to 6-year-old Chinese preschoolers, and the validated factor analysis supports its three-factor structure (temperament control, social self-confidence, and anxiety control), good model fit ($\chi^2/df=3.54$, CFI=0.90, RMSEA=0.06), and significant correlation with teacher-rated social competence and behavioral indicators, confirming its reliable validity. The scale has been translated and retranslated by a team of experts, and the content has been localized (e.g., optimizing the expression of "worry control") to ensure that the semantics are in line with the cultural characteristics of Chinese collectivism. Therefore, the scale can be used as a valid tool for measuring the emotional adjustment of preschoolers in Chinese cities and towns, and its optimization of cultural adaptability and positive item design make it both scientific and operable in practical application [1]. The scale consists of 28 items divided into three dimensions: temperament control, social assertiveness and anxiety control. The first dimension of Temperament Control contains 10 items (e.g., "Being patient with others") with a score of 0-40; the second dimension of Social Confidence contains 10 items (e.g., "Confidently seeking help from unfamiliar people") with a score of 0-40; The third dimension, Anxiety Control, consists of 8 items (e.g., "Repeatedly discusses distressing things") and is scored on a scale of 0 to 32. The CEAS-P is scored on a 5-point Likert-type scale (0=never, 1=rarely, 2=sometimes, 3=frequently, 4=always). A sum-of-scores scoring was used, with total scores ranging from 0 to 112, with higher scores indicating better emotional competence in children [10]. Cronbach's α was 0.947 for the first dimension Temperament Control, 0.969 for the second dimension Social Confidence, and 0.921 for the third dimension Anxiety Control, with all Cronbach 's α values were higher than 0.7, indicating excellent internal consistency of the scale.

2.4. Analytic Plan

This study uses quantitative research analysis to explore the impact of participation in sports and cultural activities on the emotional ability of preschool children, the parents of the research subjects were issued questionnaires and recycled, a total of 188 valid samples were recovered, and the specific data analysis was carried out by using SPSS29.0.2. When analyzing the recovered questionnaire data, the data were firstly subjected to a preliminary cleansing and quality checking, and then screened and processed according to the following criteria. Invalid questionnaires: incorrectly selected answers to trial-and-error questions (e.g., please select the fifth option in this question), and answers that took less than 30 seconds to answer. The following analytical strategies were used to characterize the distribution of categorical variables such as gender and grade level by frequency analysis for children's basic information, and mean (M) and standard deviation (SD) were used for children's age to report the concentration and dispersion trends of age. The distribution of activity richness, frequency and duration was presented in the section on participation in cultural and sports activities through frequency analysis in descriptive statistics. Secondly, the reliability test was conducted on the situation of participation in cultural and sports activities scale and the emotion regulation ability scale (CEAS-P) involved in the questionnaire, and the results were that the Cronbach's α of the two scales were >0.7, and the KMO value of the self-administered scale of the situation of participation was 0.737, with a $p < 0.001$, which verified the applicability of the variables. Then Pearson correlation coefficient was used to test the correlation between participation in cultural and sports activities (richness, frequency of weekly participation, total hours of weekly participation) and the sub-dimensions of emotional competence (temper control, social confidence, anxiety control), and the level of significance was set at $p < 0.05$, to verify whether there is a significant correlation between the two variables, and the higher the value of the correlation coefficient, the stronger the correlation between the variables is.

Next, a regression model was constructed using the total score of emotional competence as the dependent variable and the total score of participation in cultural and sports activities as the independent variable, reported as standardized coefficients (B) and standardized coefficients (Beta), and the overall explanatory power of the model was assessed by variance inflation factor (VIF < 10) and tolerance (> 0.1) to exclude the problem of multiple covariance using F-tests and coefficients of determination (R^2). Continued at the association of the demographic variables with emotional competence was tested by independent samples t-test for gender on the dependent variable emotional competence, and the association of demographic variables with emotional competence was tested by one-way ANOVA for age and grade level, respectively, and was not included in the model of the control variables if $p > 0.05$. Finally, differences in total emotional competence scores and subdimensions (temper control, social confidence, and anxiety control) between children in the participating and non-participating groups were compared by subgroups, independent samples t-tests were utilized, and the extent of the differences was quantified by Cohen's d. Ninety-five percent confidence intervals (CIs) were reported, with no significance being determined if the CIs contained zero.

3. Results

3.1. Correlation analysis of the impact of participation in cultural and sports activities on the emotional competence of preschool children

As shown in Table 1, the richness of participation in cultural and sports activities, the frequency of weekly participation in cultural and sports activities, and the total duration of weekly participation in cultural and sports activities were analyzed in Pearson's correlation analysis with Temperament Control, Social Confidence, and Anxiety Control. From the results of the Pearson's correlation analysis, it can be seen that the richness of participation in cultural and sports activities is positively correlated to Temperament Control, Social Confidence, and Anxiety Control; the frequency of weekly participation in cultural and sports activities is positively correlated to Temperament control, social confidence, and anxiety control; and the total number of hours of participation in cultural and sports activities per week is positively related to temper control, social confidence, and anxiety control. The results of the correlation analysis only proved that the correlation between the two variables did not represent a causal relationship, and the results are shown in Table 1.

Table 1. Correlation analysis

	Extent of participation in sports and cultural activities	Frequency of weekly participation in sports and cultural activities	Total hours of participation in sports and cultural activities per week	Temperament control	Social Confidence	Anxiety control
Temperament control	.279**	.216**	.208**	1		
Social Confidence	.311**	.177*	.149*	.537**	1	
Anxiety control	.290**	.192**	.183*	.607**	.652**	1

**. The correlation is significant at the 0.01 level (two-tailed).

*. At the 0.05 level (two-tailed), the correlation is significant.

3.2. Multiple linear regression analysis of the effect of participation in cultural and sports activities on preschoolers' emotional competence

On the basis of the correlation analysis, this paper further examined the total score of participation in cultural and sports activities as the independent variable, and the total score of the Children's

Emotion Regulation Scale as the dependent variable, and conducted linear regression analysis. The results of the analysis are shown in Table 2.

Table 2. Coefficients of linear regression analysis [a]

mould		Unstandardized coefficient		Standardized coefficient	t	significance	covariance statistics	
		B	standard error	Beta			tolerances	VIF
independent variable	(Constant)	58.968	2.476		23.813	0.000		
	Total points for participation in sports and cultural activities	1.546	0.385	0.282	4.010	0.000	1.000	1.000
R^2					0.080			
P					<0.001			
F					16.08			
a. Dependent Variable: IV. Total Emotional Competence Score								

The results of the regression analyses showed that the total score of participation in physical and cultural activities had a significant positive predictive effect on the total emotional competence score of preschoolers (as shown in Table 2), specifically, for every 1-point increase in the total score of participation in physical and cultural activities, there was a corresponding increase in the total score of the children's emotional competence scale by 1.546 points (B = 1.546, SE = 0.385, $p < 0.001$), and the standardized regression coefficients (Beta = 0.282) indicated a moderate impact effect. The model was overall significant (F = 16.08, $p < 0.001$), with the independent variable explaining 8.0% of the variance in the dependent variable (R^2= 0.080), suggesting that its independent predictive validity was limited and that the actual effect may have been diluted by other unobserved variables (e.g., family upbringing style, genetic factors). Both the tolerance (Tolerance = 1.000) and variance inflation factor (VIF = 1.000) indicate that the model does not suffer from multicollinearity. The constant term was 58.968 (SE = 2.476, $p < 0.001$), reflecting the baseline level of emotional competence when the total activity score for the literacy category was zero. However, the study's failure to control for potential confounding variables (e.g., family socioeconomic status, parental involvement, and family parenting style) may have overestimated the independent influence effect of cultural and physical activities. Follow-up studies should further disentangle the true impact of cultural and physical activities through stratified regressions or the introduction of instrumental variables. Despite the statistically significant predictive effect of physical and cultural activities on emotional competence, its explanatory power (R^2=8%) was much lower than the threshold usually focused on in individual differences studies (R^2>15%). There may exist, for example, family interaction quality or genetic factors that may explain a greater proportion of the variance in emotional competence [11]. Therefore, educational practice should avoid emphasizing the intervention value of physical and cultural activities in isolation, but rather incorporate them into multidimensional systems (e.g., home-school collaboration, social-emotional learning programs) to enhance overall effectiveness.

In the process, this paper attempted to include basic information about the children (age, gender, and grade) as control variables, and an independent samples t-test of gender with the dependent variable, total emotional competence scale score, found p=0.835, with a result of $p > 0.05$, which indicates that there is no significant difference. A one-way ANOVA test of age and grade respectively with the total emotional energy scale score resulted in p greater than 0.05, which resulted in no significant difference, so no control variables were added.

3.3. Comparison of group differences

The variance chi-squared test (F=1.956, p=0.164) in independent samples t-tests for total emotional competence score and whether or not they participate in cultural and physical activities

(0=not participate,1=participate) supported the hypothesis of variance chi-squared. The results of the t-tests showed a non-significant difference between the two groups (two-sided p=0.219), with a difference in the mean value of -4.38 (95% CI: -11.38 to 2.63). The effect size was small (Cohen's d=-0.216), and the confidence interval contained 0, indicating no practical significance.

In an independent samples t-test of anxiety control scores and whether or not they participated in cultural and sports activities (0=not participating,1=participating), a test of chi-squareness (F=0.788, p=0.376) was found to support the hypothesis of chi-squareness. T-tests revealed a non-significant difference between the two groups (two-sided p=0.138), with a difference in the mean value of -1.53 (95% CI: -3.56 to 0.50). The effect size was small (Cohen's d=-0.261), and the confidence interval contained 0, indicating no practical significance.

In an independent samples t-test of the distribution of social confidence scores and participation in cultural and sports activities (0=not participating,1=participating), this paper found that the test of chi-square between them (F=4.476, p=0.036) indicated that they were not chi-square, and that reference should be made to the results of the "no assumption of variance". T-tests showed that the difference between the two groups was insignificant (two-sided p=0.152), and the mean difference was -2.16 (95% CI: -5.12 to 0.81). (two-sided p=0.152) with a mean difference of -2.16 (95% CI: -5.12 to 0.81). The effect size was small (Cohen's d=-0.232), with a confidence interval of 0, suggesting that participation in sports and cultural activities is insufficient to have a meaningful impact in practice.

In the test of the sub-dimension temperament control total score and whether or not to participate in cultural and sports activities (0=not participate,1=participate), this paper found that the variance chi-square test (F=1.271, p=0.261) variance chi-square hypothesis was valid. However, the t-test showed a non-significant difference between the two groups (two-sided p=0.644) with a mean difference of -0.69 (95% CI: -3.64 to 2.26). The effect size was extremely weak (Cohen's d=-0.081), and the confidence interval contained 0, indicating no real difference.

All test variables (total emotional competence score, total temperament control score, total social confidence score, and total anxiety control score) did not show significant differences ($p>0.05$) between the two groups in terms of whether or not they were involved in physical and cultural activities. The effect sizes were all small, and the confidence intervals contained 0, indicating that the differences were neither statistically significant nor of practical application. It indicates homogeneity in the distribution of the above psychological traits between the two groups. Although the correlation analysis showed a positive association between participation.

4. Discussion

4.1. Analysis of causes

The study's results showed that participation in cultural and sports-type activities was a significant positive predictor of preschoolers' emotional competence, which is in line with the hypothesis. However, the model's explanatory power was low ($R^2=0.080$), indicating that only 8% of the differences in emotional competence could be explained by participation in cultural and sports-type activities. This paper analyzes several main reasons for this.

(1) Participation in cultural and sports activities is highly correlated with family affordability, which is one of the key reasons for children's ability to participate in extracurricular activities, and resource-poor families may choose low-quality activities or even be unable to participate, resulting in a limited study effect. For example, it has been found that high SES families are more likely to provide diverse extracurricular activities for their children, and such families are usually equipped with richer educational resources, which may indirectly promote children's emotion regulation skills through family interactions [7]. In addition, family parenting styles and emotional environments influence preschool children's emotional competence and interfere with the path of action in cultural and physical activities. Specifically, authoritative parenting styles (e.g., responsive high vs. moderately demanding) may enhance the effects of emotional strategies (e.g., cooperation and stress

coping, etc.) learned during the activity by promoting children's autonomy and emotional expression, whereas authoritarian or neglectful parenting styles may inhibit this process [14]. Without a favorable emotional climate in the home or positive parental guidance, children's emotional impact on cultural and physical activities may not be effectively extended. (2) One study found that despite the increasing popularity of physical and cultural extracurricular activities in China, they were significantly weaker than high-quality teacher-child interactions in promoting the development of children's emotional competence. Reasons for this may include that children spend most of their time in kindergarten, with minimal time for physical and recreational extracurricular activities, only after school and on weekends as well as the fact that physical and cultural extracurricular activities tend to focus on the development of specific skills and talents (e.g., arts, sports, cultural subjects, etc.) and are not optimized for children's cognitive and emotional development. In contrast, environmental education in kindergartens focuses more on holistic development and the development of children's emotional competencies (e.g., social, cognitive, emotional, etc.) [12].

(3) In addition, adult-reported questionnaires that rely on parents or teachers to complete may result in distorted data due to subjective cognitive bias (e.g., In the final recommendations, some parents mentioned that parents cannot always be around their children to accompany them, that is, some problematic children fit the extremes of the parents may not always be selected, etc.), and fail to incorporate behavioral observations (e.g., emotional interactions during free play) or physiological indicators (e.g., heart rate variability) for Multidimensional Measures. It has been shown that assessments of emotional competence need to integrate subjective reports, behavioral coding, and neurophysiological data to improve validity [13] and that single-dimensional measures may miss key behavioral manifestations or implicit emotional responses.

4.2. Optimization recommendations

In cultural and sports activities, more attention should be paid to the integration of emotion education, and through rich and varied content and forms of activities, children should be guided to express different emotions better and cultivate the ability to regulate their emotions. For example, we should add emotion-related story summaries, role-playing sessions in dances, and set up cooperative and competitive scenarios in sports games to guide children to learn how to manage their emotions in different situations. In measuring children's emotional competence, it is recommended that a multidimensional assessment framework be used, combining parent reports of children, teachers' observation records (recording children's emotional responses during group activities), and standardized emotional tasks (e.g., emotional face recognition tests or situational simulation tasks) to overcome the subjective bias of a single source of data (e.g., parents failing to be present at all times to observe the child, or the child's fearfulness and panic not being detected by parents). Psychological unnoticed by the parent).

4.3. Limitations and future directions

Although this study investigated preschool children's participation in cultural and sports activities, it used a cross-sectional survey to examine the relationship between cultural and sports activities and preschool children's emotional competence, which made it difficult to adequately and comprehensively reveal the long-term developmental relationship between cultural and sports activities and preschool children's emotional competence. In the future, a long-term longitudinal tracking study can be conducted to regularly collect data from the early stage of children's participation in cultural and sports activities to the stage of their subsequent development, including changes in their emotional ability, participation in activities and other related factors, in order to more accurately grasp the long-term and sustained impact of cultural and sports activities on their emotional ability and the potential causal mechanisms, as well as the changes in this impact at different ages and in different life settings, and to overcome the limitations of the cross-sectional study.

In addition, the sample of this study mainly collected data through parent questionnaires, which may be disturbed by factors such as parents' subjective perceptions, social expectation bias, parents'

knowledge of their children, family socioeconomic status, and parental expectations of children's education, affecting the objectivity and accuracy of the data, and in the study, the impact of related variables on the results was not controlled for, and these factors may simultaneously affect children's participation in extracurricular activities and the children's emotional competence development, resulting in biased results that do not accurately reflect the independent influence of cultural and sports activities on children's emotional competence. In the future, we can refine more variables and strictly control potential confounding variables, such as the quality of family interactions, the economic level of the family, and parental educational expectations, to analyze in-depth the effects of these factors on children's emotional competence in different dimensions in conjunction with sports and cultural activities.

At the same time, this study's sample was concentrated in one kindergarten, which is small and prone to selection bias. The sample only covered middle-class families in urban areas and did not include rural or low-income families, which limits the generalizability of the conclusions. In future research, the sample size can be increased to cover more schools, kindergartens, and groups of children from different geographic and cultural backgrounds to improve the representativeness and diversity of the sample and make the study's conclusions more generalizable and persuasive.

Finally, this study dichotomized "participation in sports and cultural activities" by comparing only two groups, those who participated in sports and cultural activities and those who did not, ignoring the differences in the degree of participation and the differences between interest-oriented and academically-enhanced activities. In the future, a multidimensional dynamic assessment of participation in cultural and sports activities could be conducted to measure the quality of the activities systematically participated in as well as the children's subjective experiences (e.g., interest, stress, parental expectations, etc.), and to systematically reveal the effects of different participation situations and motivations on children's emotional competence.

5. Conclusion

Through the study, this paper found that participation in physical and cultural activities positively impacts preschoolers' emotional competence, which helps preschoolers control emotions, social confidence, anxiety control and facilitates peer-to-peer interactions. In addition, the study also found that family support can contribute to the effectiveness of interventions in physical and cultural activities. Families with better financial means and more educational resources could provide children with various extracurricular activities, whereas families with fewer resources may choose lower-quality activities and may not even be able to participate in sports and physical activities. Thus, although participation in physical and cultural activities is associated with emotional competence, the causal relationship is questionable, and the results of no between-group differences suggest that the association may be driven by confounding variables such as family resources and socioeconomic status rather than by the direct cause of physical and cultural activities. At the same time, simply increasing participation in cultural and physical activities is ineffective in enhancing children's emotional competence. Systematic interventions are also needed to incorporate quality optimization of physical and cultural activities, family support, and home-school cooperation.

By combining empirical data from a sample of middle-class families in Chinese cities and towns, this study systematically compared the performance of emotional competence between groups who participated and did not participate in physical and cultural activities, revealing that the correlation may be driven by variables such as family resources and economic status and that physical and cultural activities did not directly affect children's emotional competence. The study results are instructive for preschool educators, physical and cultural activity counsellors, and children's parents to help them understand the limitations of physical and cultural activities more scientifically and to avoid the harmful effects of over-scheduling physical and cultural programs on children. Future research is recommended to focus on the long-term effects of preschool children's participation in physical and cultural activities and explore the differences in their impacts on families of different

cultural backgrounds and economic levels. A multidisciplinary research approach should be adopted to consider the interaction of family, learning, social, and other factors with physical and cultural activities to better understand the development of children's mood abilities.

Authors contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

[1] Wu M, Yang T, Zhu J, et al. Reliability and validity of the preschool version of the Children's Emotional Adjustment Scale in Chinese preschoolers [J]. Chinese Journal of Clinical Psychology, 2020, 28 (1): 46 - 52.

[2] Ren L, Kutaka T S, Chernyavskiy P, et al. The linear and nonlinear effects of organized extracurricular activities on Chinese preschoolers' development [J]. Contemporary Educational Psychology, 2020, 60: 101845.

[3] Wang F Y, Ni Y F, Ni Y, et al. Exploring the influence of music games on the social-emotional development of young children [J]. Chinese Journal of Women and Children Health, 2018, 9 (5): 34 - 36.

[4] Drake J E. How children can use drawing to regulate their emotions [J]. Theory Into Practice, 2023, 62 (2): 181 - 192.

[5] Cetin Z, Çevikbaş P E. Using creative dance for expressing emotions in preschool children[J]. Research in Dance Education, 2020, 21(3): 328 - 337.

[6] Li Y M. A case study on the promotion of emotional management ability in young children through sports games [J]. Early Childhood Education Research, 2020 (8): 83 - 86.

[7] Ren L, Zhang X. Antecedents and consequences of organized extracurricular activities among Chinese preschoolers in Hong Kong [J]. Learning and Instruction, 2020, 65: 101267.

[8] Lau E Y, Li H, Rao N. Parental involvement and children's readiness for school in China[J]. Educational Research, 2011, 53 (1): 95 - 113.

[9] Denham S A, Ferrier D E, Howarth G Z, et al. Key considerations in assessing young children's emotional competence [J]. Cambridge Journal of Education, 2016, 46 (3): 299 - 317.

[10] Thorlacius Ö, Gudmundsson E. The development of the Children's Emotional Adjustment Scale–Preschool Version [J]. Journal of Psychoeducational Assessment, 2017, 35 (8): 974 - 991.

[11] Pluess M, Belsky J. Vantage sensitivity: Individual differences in response to positive experiences [J]. Psychological Bulletin, 2012, 139 (4): 901 - 916.

[12] Ren L, Hu B Y, Wu H, et al. Differential associations between extracurricular participation and Chinese children's academic readiness: Preschool teacher–child interactions as a moderator[J]. Early Childhood Research Quarterly, 2022, 59: 134 - 147.

[13] Denham S A. Social-emotional competence as support for school readiness: What is it and how do we assess it? [J]. Early Education and Development, 2006, 17 (1): 57 - 89.

[14] Lau E Y, Li H, Rao N. Parental involvement and children's readiness for school in Chin a[J]. Educational Research, 2011, 53 (1): 95 - 113.