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Patterns of Movement Performance Among Japanese Children and Effects of Parenting Practices

Latent class analysis

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Abstract

Objectives*:** The study aimed to examine the long-term effects of parenting practice during preschool years on children's movement performance in primary school. ***Methods: This study involved a three-year longitudinal study including 225 children aged 3–6 years old. Parents reported baseline parenting practice and evaluated children's movement performance three years later. Latent class analysis was used to explore latent classes of movement performance. A post hoc test was used to identify the characteristics of different patterns.

Finally, adjusted multinomial logistic regression models were used to test the influence of parenting practice on identified patterns of movement performance. ***Results:*** Children in this study were grouped into three movement performance pattens, labelled as 'least difficulties' (58.2%, n = 131), 'low back pain' (30.2%, n = 68), and 'most difficulties' (11.6%, n = 26). After controlling for age, gender, having siblings or not, family structure, BMI SDS, sleep condition and dietary habits, we found that if parents played games with children frequently, the children would have a 0.287 times lower probability of being in the 'low back pain' class, 95%CI [0.105, 0.783], and if parents take children to meet peers of a similar age frequently, the children would have a 0.339 times lower probability of being in 'most difficulties' class, 95%CI [0.139, 0.825]. ***Conclusions:*** Primary healthcare providers should pay careful attention to children with movement difficulties. The study provides longitudinal evidence to support the applicability of positive parenting practice in early childhood to prevent children's movement difficulties.

Keywords: Movement performance; Parenting practice; Latent class analysis; Child; Longitudinal study; Japan.

Advances in Knowledge

- The study originally used person-centred method to explore three patterns of children's movement performance in a Japanese community context.
- This study confirmed the long-term effects of parenting practice during preschool years on children's movement performance when they enter primary school. We indicated that playing games with children frequently contributed to preventing children from developing low back pain, while taking children to meet peers of a similar age helped in preventing children's movement difficulties during their school age.

Application to Patient Care

- Primary healthcare providers should pay special attention to children with movement difficulties. The study provides longitudinal evidence to support the applicability of positive parenting practice in early childhood to prevent children's movement difficulties.

Introduction

Movement performance is defined as the competence or skills related to motor coordination, muscle strength and balance, which are shown in self-care, sport, and other daily activities.[1]

School aged children need to possess motor skills, coordination, and body control in order to complete daily activities.[2] Movement difficulties in childhood may reduce a child's participation in daily activities and even impact their quality of life in adulthood.[3,4] The prevalence of movement difficulties has been rising worldwide recently.[5] In Oman (N = 97; M_{age} = 12.9, SD = 1.6), 55% of the total sample developed low grip strength and around 45% were scored low in flexibility and sit-up tests.[6] National reports in Japan also show a decline in school-aged children's movement performance, particularly among boys, which is at a historically low level.[7] However, there is no gold standard to measure children's movement performance in existing research.[8] Therefore, person-oriented cluster analysis might be a possible method to identify the characteristics of movement performance of children in a community.

Movement performance is determined by complex interactions between biological development and social environment.[9] Differences are always expected for the movement performance of children in terms of age, gender, body size and lifestyles.[10-13] Home rearing environment is one of the most important social environments, in which parenting practice affects children directly.[14] Parenting practice refers to the observable behaviours that parents use to socialise their children in daily activities.[15] A cross-sectional study demonstrated that maternal permissive parenting was gender-specifically associated with better PA performance in children experiencing authoritative parenting.[16] However, results were not consistent with the findings of Bradley et al. that indicated high parental monitoring was associated with poorer PA performance for boys experiencing later puberty but increased PA performance in boys experiencing early puberty using longitudinal data.[17] Furthermore, only sixteen of the 30 quantitative studies in an integrative review showed significant positive associations between supportive PA parenting and children's physical performance.[18] The majority of studies to date, have focused on the intensity and frequency of PA instead of using health conditions or function status as the outcomes. Limited studies have explored the relationships between parenting practice and movement performance.

To fill gaps in existing research, the present three-year longitudinal study examined the influence of specific parenting practices for preschool children on pattens of movement performance while school aged. To avoid bias of variable-centred methods, we aimed to investigate (1) the patterns of children's movement performance based on person-oriented

cluster analysis and (2) the effects of daily parenting practice on children during the preschool period. We hypothesised that (1) patterns of children's movement performance could be identified using different characteristics in a typical community and (2) more positive stimulations in parenting contribute to preventing children from developing movement difficulties.

Methods

Study design and participants

Our three-year longitudinal research study was part of a cohort study named 'Community Empowerment and Care for well-being and healthy longevity' (CEC), involving all residents in T village, a typical suburban community of Japan with a population of almost 5,000 from 1991. The inclusion criteria were as follows: (1) being aged 3–6 years old, (2) living in T village, and (3) having at least one parent living together. The exclusion criteria were as follows: (1) having a disability, serious disease, or developmental delay and (2) not living in T village for the next three years. In the baseline survey, 289 parents with children aged 3–6 years provided the information on demographics and parenting practice. After 3 years, children's movement performance was evaluated by parents. As 27 families dropped out of the project and 37 were excluded due to incomplete evaluation of movement performance, the final sample size was 225. All research procedures were reviewed and approved by the institutional review board and ethics committee of [blinded for review]. All participants provided written consent before participation.

Measures

Parenting practice

Parenting practice was measured using the Index of Child Care Environment (ICCE), which has been used in Japanese child cohort study for over 20. [19,20] ICCE is Japanese questionnaire edition of the globally-used scale called the Home Observation for Measurement of the Environment (HOME) and shows high reliability ($\alpha = 0.891$).[21]

The ICCE is a self-reported questionnaire for parents, consisting of 13 items regarding parenting practice, which are used independently in the present study. Questions for the 13 parenting practices are as follows: (1) How often do you play games with your child? (2) How often do you go shopping with your child? (3) How often do you read to your child? (4)

How often do you sing songs with your child? (5) How often do you go to the park with your child? (6) How often do you and your child meet with friends or relatives with children of a similar age? (7) How often do you talk with your spouse about child care? (8) How often does your spouse or other caregiver help you with the child? (9) How often do you and your spouse eat meals together with the child? (10) What do you do if your child spills milk on purpose? (11) How many times did you spank your child last week? (12) Do you have anyone else that helps you with daily home-rearing? (13) Do you have anyone to consult with about child care? Items 1–9 were measured using five-point Likert scale (1 = *rarely*, 2 = *1–3 times per month*, 3 = *1–2 times per week*, 4 = *3–4 times per week*, 5 = *almost every day*). As the responses were not normally distributed, binary-category classification was used in the analysis based on ICCE manual (Unfavourable group = *the bottom 25% of the total sample*, favourable group = *the rest*). Item 10 had five options (1= *hit the child*, 2 = *scold the child*, 3 = *discipline in another way*, 4 = *determine how to prevent it in the future*, 5 = *in other ways*). Item 11 had five different options (1 = *never*, 2 = *1-2 times*, 3 = *3-4 times*, 4 = *5-6 times*, 5 = *almost every day*). For items 10 and 11, responses were categorised into two groups (unfavourable = *spank children* and favourable = *no spank*). For items 12 and 13, responses were originally measured in a binary manner (i.e., *yes* or *no*), in which the answer '*yes*' was evaluated as favourable and '*no*' was evaluated as unfavourable.

Movement performance

Movement performance of children in the present study was investigated using a nine-item parent-reported movement performance questionnaire, which have been used by community government in large scale population-based surveys of the general population in Japan for over 20 years.[22] Parents were required to compare their children's coordination with other children of the same age based on their daily observations after the community government explained evaluation points in detail. The nine items included the following: (1) Does your child always appear energetic before and after school? (Keep active) (2) Are there any difficulties for your child to keep running? (Keep running) (3) Does your child have difficulties maintaining correct sitting posture? (Good sitting posture) (4) Does your child have any arm pain? (Arm strength) (5) Does your child have any lower low back pains? (Low back strength) (6) Does your child have any leg pain? (Leg strength) (7) Are there any difficulties for your child in moving agilely to avoid obstacles? (Agility) (8) Dose your child have any difficulties balancing? (Balance) (9) Does your child have any difficulties moving

their body flexibly? (Flexibility). Participants could respond to each item with '*no*' (without any difficulties) or '*yes*' (having some difficulties).

Covariates

Demographics, children's sleep condition, and their dietary habits were considered covariates in the analysis models. Demographics included children's age, gender, BMI (standardised BMI, BMI SDS, was used in the analysis), having siblings or not, and family structure (e.g., nuclear family type and extended family type). Children's sleep condition was reported by parents as '*sufficient*' or '*not sufficient*'. Dietary habits were also reported by parents as '*no fussy eating*' or '*having fussy eating behaviours*'.

Statistical analysis

First, we used descriptive statistics to confirm demographics, baseline condition of parenting practice and follow-up year's movement performance. Second, latent class analysis (LCA) was used to explore patterns of movement performance.[23] Third, A post hoc test for the chi-square test (Bonferroni) and ANOVA analysis (LSD and S-N-K) was used to clarify differences in demographics among the patterns of movement performance and identify the characteristics of the patterns. Finally, adjusted multinominal logistic regression analysis was applied to confirm the associations between parenting practice and movement performance patterns.

All statistical analyses were performed using SPSS (Version 26.0; SPSS Inc., Chicago, IL) and Mplus (Version 8.0; Muthén and Muthén, Los Angeles, CA, USA).

Results

Table 1 shows descriptive statistic results of demographic background. A total of 225 children (Age: M = 4.13, SD = 0.87; BMI SDS: M = 0.12, SD = 0.98) was even distributed in gender and family structure (boys: n = 119, 52.9%; girls: n = 106, 47.1%; Nuclear family: n = 107, 47.6%; Extended family: n = 118, 52.4%), while 83.6% children (n = 188) had siblings. 85.8% children (n = 193) had sufficient sleep while 68.9% children (n = 155) had fussy eating behaviours.

Table 2 shows baseline parenting practice conditions and follow-up year's movement

performance of children. In baseline year, the item with most negative evaluations was 'How many times did you spank your child last week?', in which 37.8% parents (n = 85) reported they had spanked their child in the last week. The item with least negative evaluations was 'Do you have anyone else help you in daily home-rearing?', in which only 2.2% parents (n = 5) reported they took care of children without any help from others. As for the movement performance of children three years' later, our study showed that more than half of the children were reported to have some difficulties on (1) maintaining right sitting posture (n = 139, 61.8%), (2) arm strength (n = 127, 56.4%), (3) agility (n = 114, 50.7%), and (4) flexibility (n = 163, 72.4%).

Table 3 shows the model fit information for five LCA models with two to six latent classes. Akaike information criterion (AIC), Bayesian information criterion (BIC) and sample-adjusted Bayesian information criterion (aBIC) in three-class model decreased sharply than two-class model and the decline scope was the biggest among all the models (ΔAIC = -71.126, ΔBIC = -36.965, ΔaBIC = -68.657). Entropy in three-class model was the highest in all the models (0.935). The smallest sample size of the latent class is just over 25 (n = 26). And the three-class model was significantly better than two-class model ($p<0.01$). Based on model selection recommendations for LCA model, we considered three-class model as the best identified class.

Table 4 presents the results of the chi-square test and one-way ANOVA analysis, showing demographics and movement performance characteristics of the three latent patterns. There was no significant difference between the demographics of the three movement performance patterns ($p>0.1$). All the nine items, except flexibility, showed significant differences among three movement performance patterns ($p<0.05$). The results of post hoc test indicated the number of responses of movement with difficulties in class 3 was significantly greater than that in class 1 among all the nine items, except flexibility ($p<0.05$). No significant difference between class 2 and class 1 was found in the following categories: keep active, keep running, arm strength, agility, and flexibility. No significant difference between class 2 and class 3 was shown in the following categories: good sitting posture, arm strength, leg strength, and balanced ($p>0.05$). The number of responses indicating having low back pain in class 2 was significantly greater than that in class 1, but less than that in class 3 ($p<0.05$). Class 1 was labelled as having the least difficulties (LD), class 2 was labelled as having low back pain

(LBP), and class 3 was labelled as having the most difficulties (MD). Figure 1 shows the item probability of movement performance without difficulties in LD, LBP, and MD classes. The LD class contained 58.2% (n = 131) of the sample and had high probabilities of movement performance without difficulties. The LBP class contained 11.6% (n = 26) of the sample, and all samples showed low back pain in the group. The MD class contained 30.2% (n =68) of the sample and had low probabilities of movement performance without difficulties.

Table 5 show the associations between parenting practice and children's movement performance. In the multinomial logistic regression models, each parenting practice was considered as independent variable respectively, while age, gender, having siblings or not, family structure, BMI SDS, sleep condition and dietary habits were included in the models as covariates. The LD class was used as the reference class to show the effect of positive parenting practice on preventing movement difficulties. Model 1 indicated that if parents played games with children frequently, the children would have a 0.287 times lower probability of being in the LBP class, 95%CI [0.105, 0.783]. Model 2 indicated that if parents take their children to meet peers of a similar age frequently, the children would have a 0.339 times lower probability of being in the MD class, 95%CI [0.139, 0.825].

Discussion

To the best of the authors' knowledge, this study is the first in Japan to examine the long-term effects of parenting practice in children's preschool period on their movement performance outcomes when they are school age. We originally explored three patterns of children's movement performance and identified their characteristics in a sample of children from a suburban area in central Japan. Based on our longitudinal results, we indicated that more positive stimulations in parenting practice, such as playing games with children frequently and frequently taking children to meet peers of a similar age, contribute to preventing children from developing movement difficulties three years later.

Several studies have used person-oriented method to explore pattens of movement performance, however, got inconsistent results. Jaakkola et al. investigated PA, sedentary time, perceived competence, motor competence, cardiorespiratory fitness, and muscular fitness in a Finnish elementary school student sample (N = 491; M_{age} = 11.27, SD = 0.32) and labelled three movement profiles as 'at-risk' (37.7%, n = 185), 'intermediate' (49.3%, n =

242), and 'desirable' (13.0%, *n* = 64).[24] Four movement profiles, which were 'poor movers' (27.9%, *n* = 129), 'average movers' (38.4%, *n* = 177), 'skilled movers' (18.9%, *n* = 87), and 'expert movers' (14.8%, n = 68), were identified when the performance of leap, throw-catch, jump, push-up, sit-up tests were focused on.[25] Our study explored three patterns of children's movement performance and originally identified the characteristics associated with different types of movement difficulties. The biggest cluster, LD (58.2%, *n* = 131), received significantly higher probability of 'no difficulties' than the MD cluster (30.2%, *n* = 68) for all nine items except flexibility. All samples in the LBP cluster (11.6%, n = 26) reported having pains in their low back, which was significantly different from the other two clusters. Previous studies highlighted the prevalence of low back pain in school-aged children was 24% in a British sample (N = 1376) while it was 22% in an American sample (N = 1241) and 51% in a Danish sample (N = 1395. This suggests low back pain is an important and relatively common problem in school children.[26] Our results are consistent with the existing research and additionally suggested low back pains should also be given attention in Japan.

Many previous studies have indicated parent-related factors, such as parents' attitude towards children's PA, parents' exercise habits, and parenting practice, are associated with children's daily physical activities, and therefore, influence children's motor competence and physical performance.[27] A systematic review indicated supporting children to do PA or enrol in PA classes, doing PA together significantly contributed to improving children's physical performance.[28] Davison originally created the Activity Support Scale (ACTS) to measure parental support for children's PA and confirmed that providing children with the chance or places to be active, and playing sports with children is beneficial for children to improve their physical activity levels.[29] In addition, previous studies also highlighted the important role of peer interactions on children's motor performance.[30] One systematic review reported positive influence of peers' support on PA and health outcomes.[31] Our results are consistent with previous studies and further clarified long-term effects of parenting practice during preschool years on children's movement performance when they entered primary school. We indicated that playing games with preschool children frequently contributes to preventing children from developing back pain three years later; while taking children to meet peers of a similar age is beneficial to the prevention of children's movement difficulties when reaching school age.

On the other hand, children's age, gender, BMI, sleep condition, and dietary habits were not

significantly associated with children's movement performance in the current study, which are not consistent with existing research. Boys performed better in 'walking', while girls performed better in 'ball control', and no gender difference were observed in 'running' and 'kicking' in a meta-analysis for Japanese preschool children.[32] Cardio-respiratory fitness (CRF) and flexibility decreased with increasing age in a sample of 4,903 European children aged 6–11 years.[33] Sleep duration did not have a consistent significant effect on physical fitness while fruit and vegetable intake positively related to physical performance with small effects.[34] Inconsistent results suggested influence factors and their effects of movement performance are complex and different across culture.

Several limitations should be considered when interpreting our results and designing future studies. First, children's movement performance was only measured by parent-reported questionnaires in the present study. Objective tests should be performed to verify the consistency of the results in the future. Second, although we have controlled several covariates, more related factors, such as SES and baseline movement performance, should also be included in the final analysis model. Finally, the sample size was small because of the loss of follow-up.

Conclusions

In conclusion, children in this study were grouped into three movement performance pattens labelled 'least difficulties (LD)', 'low back pain (LBP)', and 'most difficulties (MD)', based on a person-oriented perspective and cluster analysis. The LD group was characterised as having highest probability of having no difficulties for all items, while the MD group was characterised as having lowest probability of having no difficulties. The LBP group was characterised by having all samples in the group develop low back pain. More positive stimulations in parenting practice during preschool years, such as frequently playing games with children and taking children to meet peers of a similar age, contributed to preventing children's movement difficulties when they entered primary school. Children with movement difficulties should be carefully monitored by healthcare providers. Parents' support is beneficial for children to prevent developing movement difficulties. Nevertheless, there is still a great need for more diverse samples and sufficient sample sizes to confirm the results across cultures.

Conflict of Interest

The authors declare no conflicts of interest.

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Authors' Contribution

Conceptualization, Zhu Zhu and Cunyoen Kim; methodology, Zhu Zhu, Dandan Jiao, and Toshiyuki Kasai; software, Yantong Zhu and Xiang Li; validation, Zhu Zhu, Dandan Jiao, Ammara Ajmal, and Munenori Matsumoto; formal analysis, Zhu Zhu; investigation, Dandan Jiao, Xiang Li, Ammara Ajmal, Munenori Matsumoto, Yuko Sawada, Sumio Ito, and Rika Okumura; resources, Tokie Anme; data curation, Dandan, Jiao, Yuko Sawada, Taeko Watanabe, Etsuko Tomisaki, Emiko Tanaka, and Tokie Anme; writing original draft preparation, Zhu Zhu; writing—review and editing, Cunyoen Kim, Dandan Jiao, and Xiang Li; visualization, Tokie Anme; supervision, Tokie Anme; project administration, Tokie Anme; funding acquisition, Tokie Anme. All authors have read and agreed to the published version of the manuscript.

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Table 1: Demographic background in the baseline year

N = 225

Variables	Categories	N	%
Age of child (years)		4.13±0.87[a]	
Gender of child	Boy	119	52.9
	Girl	106	47.1
Siblings	Only child	37	16.4
	Having siblings	188	83.6
Family structure	Nuclear family	107	47.6
	Extended family	118	52.4
BMI SDS of child		0.12±0.98[a]	
Sleep condition of child	Sufficient	193	85.8
	Not sufficient	32	14.2
Fussy eating behaviour of child	No	70	31.1
	Yes	155	68.9

Note: [a] Mean and SD were shown for continuous variables.

Table 2: Parenting practice in baseline year and movement performance of children three years' later

		N = 225	
Items	Categories	n	%
Parenting practice			
Play games with child	Few	44	19.6
	Frequently	181	80.4
Shopping with child	Few	21	9.3
	Frequently	204	90.7
Read books to child	Few	56	24.9
	Frequently	169	75.1
Sing songs with child	Few	45	20.0
	Frequently	179	79.6
	NA	1	0.4
Take child to play outside	Few	27	12.0
	Frequently	197	87.6
	NA	1	0.4
Take child to meet peers of similar age	Few	46	20.5
	Frequently	178	79.1
	NA	1	0.4
Eat meals together with child	Few	48	21.4
	Frequently	176	78.2
	NA	1	0.4
Spank child for mistakes	Spank	14	6.3
	Not spank	210	93.3
	NA	1	0.4
Spank child last week	Spank	85	37.8
	Not spank	138	61.3
	NA	2	0.9
Take care of child with others	Few	18	8.0
	Frequently	204	90.7
	NA	3	1.3
Talk with spouse about child	Few	50	22.3
	Frequently	174	77.3
	NA	1	0.4
Have helpers	No	5	2.2
	Yes	218	96.9
	NA	2	0.9
Have someone to consult with	No	7	3.1
	Yes	216	96.0
	NA	2	0.9
Movement performance			

Keep active	With difficulties	69	30.7
	Without difficulties	156	69.3
Keep running	With difficulties	62	27.6
	Without difficulties	163	72.4
Good sitting posture	With difficulties	139	61.8
	Without difficulties	86	38.2
Arm strength	With difficulties	127	56.4
	Without difficulties	98	43.6
Low back strength	With difficulties	59	26.2
	Without difficulties	166	73.8
Leg strength	With difficulties	54	24.0
	Without difficulties	171	76.0
Agility	With difficulties	114	50.7
	Without difficulties	111	49.3
Balanced	With difficulties	94	41.8
	Without difficulties	131	58.2
Flexibility	With difficulties	163	72.4
	Without difficulties	62	27.6

447 *Note: NA = No answer*

Table 3: Model fit information for the LCA models

	Log-likelihood	df	G-squared	AIC	BIC	aBIC	Entropy	BLRT
Two-class model	–1112.676	492	381.606	2263.352	2328.258	2268.043	0.827	<0.01
Three-class model	–1067.113	481	278.509	2192.226	2291.293	2199.386	0.935	<0.01
Four-class model	–1036.648	471	217.222	2151.296	2284.524	2160.925	0.903	<0.01
Five-class model	–1018.885	462	194.023	2135.769	2303.158	2147.867	0.921	<0.01
Six-class model	–1009.066	452	174.386	2136.133	2337.683	2150.700	0.935	0.122

Note: df=degrees of freedom; AIC=Akaike information criteria; BIC=Bayesian information criteria; aBIC=adjusted Bayesian information criterion; BLRT= Bootstrapped Likelihood Ratio Test

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Table 4: Demographics and movement performance characteristics of three patterns

Variables	Categories	Movement performance Class1		Class 2		Class 3		F/c^2	*p*
		n	%	n	%	n	%		
Age		4.13±0.87						2.112	0.123
Gender	Boy	65	54.6	14	11.8	40	33.6	1.533	0.465
	Girl	66	62.3	12	11.3	28	26.4		
Siblings	Single child	23	62.2	4	10.8	10	27.0	0.289	0.865
	Having siblings	108	57.4	22	11.7	58	30.9		
Family structure	Nuclear family	61	57.0	11	10.3	35	32.7	0.757	0.685
	Extended family	70	59.3	15	12.7	33	28.0		
BMISDS		0.12±0.98						0.389	0.678
Sleep	Sufficient	19	59.4	3	9.4	10	31.3	0.175	0.916
	Not sufficient	112	58.0	23	11.9	58	30.1		
Fussy eating	No	93	60.0	17	11.0	45	29.0	0.653	0.721
	Yes	38	54.3	9	12.9	23	32.9		
Keep active	With difficulties	21_a	30.4	5_a	7.2	43_b	62.3	48.721	0.000
	Without difficulties	110	70.5	21	13.5	25	16.0		
Keep running	With difficulties	15_a	24.2	4_a	6.5	43_b	69.4	62.315	0.000
	Without difficulties	116	71.2	22	13.5	25	15.3		
Good sitting posture	With difficulties	66_a	47.5	20_b	14.4	53_b	38.1	17.254	0.000
	Without difficulties	65	75.6	6	7.0	15	17.4		
Arm strength	With difficulties	59_a	46.5	$16_{a, b}$	12.6	52_b	40.9	18.300	0.000
	Without difficulties	72	73.5	10	10.2	16	16.3		
Low back strength	With difficulties	12_a	20.3	20_b	33.9	27_c	45.8	60.649	0.000
	Without difficulties	119	71.7	6	3.6	41	24.7		

Leg strength	With difficulties	15_a	27.8	14_b	25.9	25_b	46.3	30.083	0.000
	Without difficulties	116	67.8	12	7.0	43	25.1		
Agility	With difficulties	47_a	41.2	$15_{a, b}$	13.2	52_b	45.6	30.090	0.000
	Without difficulties	84	75.7	11	9.9	16	14.4		
Balanced	With difficulties	42_a	44.7	16_b	17.0	36_b	38.3	12.743	0.002
	Without difficulties	89	67.9	10	7.6	32	24.4		
Flexibility	With difficulties	95_a	58.3	18_a	11.0	50_a	30.7	0.175	0.916
	Without difficulties	36	58.1	8	12.9	18	29.0		

Note: a, b refers different groups based on the results of Post hoc test using Bonferroni method.

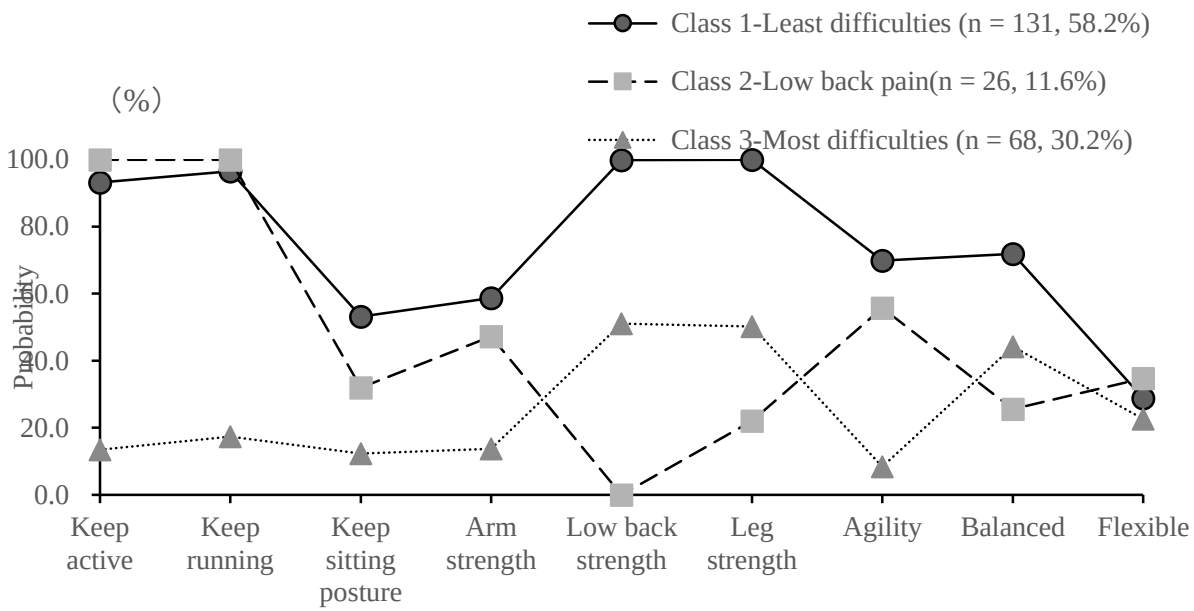
Table 5: Significant results of multinominal logistic regression model showing associations between parenting practice and movement performance

Variables	LBP class vs. LD class				MD class vs. LD class			
	OR	95%CI		*p*	OR	95%CI		*p*
	Model 1							
Play games with child	0.287	0.105	- 0.783	0.015	0.834	0.371	- 1.873	0.660
Age	0.860	0.499	- 1.480	0.585	1.389	0.965	- 1.998	0.077
Gender	1.101	0.453	- 2.674	0.833	1.491	0.804	- 2.764	0.205
Having siblings or not	0.543	0.141	- 2.092	0.375	0.847	0.362	- 1.984	0.702
Family structure	0.773	0.315	- 1.901	0.575	1.166	0.634	- 2.147	0.621
BMI SDS	0.997	0.616	- 1.612	0.989	0.957	0.695	- 1.316	0.785
Sleep condition	0.961	0.245	- 3.777	0.955	1.144	0.475	- 2.759	0.764
Fussy eating	0.914	0.349	- 2.393	0.855	0.843	0.436	- 1.631	0.613
	Model 2							
Take child to meet peers of a similar age	1.175	0.443	- 3.115	0.746	0.339	0.139	- 0.825	0.017
Age	0.936	0.552	- 1.586	0.806	1.401	0.973	- 2.019	0.070
Gender	1.006	0.419	- 2.413	0.990	1.399	0.745	- 2.627	0.296
Having siblings or not	0.634	0.169	- 2.378	0.499	0.837	0.357	- 1.964	0.682
Family structure	0.880	0.367	- 2.110	0.774	1.155	0.626	- 2.134	0.645
BMI SDS	1.085	0.681	- 1.728	0.732	0.941	0.685	- 1.294	0.710
Sleep condition	0.853	0.220	- 3.300	0.818	1.117	0.459	- 2.718	0.807
Fussy eating	0.921	0.356	- 2.385	0.865	0.878	0.450	- 1.712	0.703

Note: 1. Reference group: play games with child = few, encourage child to play with peers of a similar age = few, gender = boy, having siblings or not = only child, family structure = nuclear family, sleep = sufficient, fussy eating = no fussy eating behaviours, age, BMI SDS = continuous variables.

2. LD = least difficulties, LBP = low back pain, MD = most difficulties

458 **Figure 1:** Item probability of movement performance without difficulties in three classes.



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