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Original Paper

Biomedical Human Kinetics, 17, 57–67, 2025
DOI: 10.2478/bhk-2025-0006

The level of motor coordination is associated with sports club participation in late childhood

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Abstract

Study aim: This study examined the associations between gender, the nature of sports club participation, training volume, and motor coordination in late childhood.
Material and methods: 10- to 11-year-old children (n = 900) completed a questionnaire assessing anthropometrics, gender, the nature of sports club participation, and coach-led training volume. The Körperkoordinationstest für Kinder (KTK) test battery was used to evaluate motor coordination.
Results: In total motor quotient reflecting overall motor coordination, no gender differences were found. However, some differences in KTK sub-tests were found. Children participating in sports club activities performed better than their non-participating peers. The mastering of motor coordination was especially apparent in the competing children. Also, the volume of coach-led training was positively associated with motor coordination. Furthermore, participation in sports club activities and a higher level of motor coordination measured in the fourth grade seemed to promote continued sport participation two years later.
Conclusions: Participation in sports clubs, particularly in competitive settings, may play a crucial role in enhancing children's motor coordination and, consequently, their overall motor competence. This, in turn, may foster greater engagement in physical activity, offering additional opportunities for development of motor competence and health-related fitness. Therefore, sports clubs, in conjunction with non-organized physical activities and unstructured outdoor play, may serve as an essential environment for fostering children's long-term engagement in an active and healthy lifestyle.

Keywords: Children – Motor competence – KTK – Organized sport – Participation

Introduction

Mastering fundamental movement skills (FMS) has been proposed to contribute to children's physical, cognitive and social development, and to promote an active lifestyle later in life (Gallahue et al., 2012; Stodden et al., 2008). FMS, including object control/ball/manipulative skills, locomotor skills, and balance/stability skills, are building blocks of more advanced movements that are required to participate in sports, games, or other context-specific physical activity (Gallahue et al., 2012). The main construct underlying the development of FMS is motor coordination (Clark & Metcalfe, 2002) which after developing in early childhood, has been suggested to be a relatively stable age-related construct (Lopes et al., 2011; Vandorpe et al., 2012). To connect concept of FMS and its' underlying mechanisms, such as motor coordination, term motor competence is often used (Barnett et al., 2022).

The role of motor competence in children's physical activity has gained particular interest in recent years as a sedentary lifestyle and the decrease in physical activity have been identified as a global challenge (Aubert et al., 2022). Motor competence research has been largely affected by a conceptual model posed by Stodden and colleagues, which explains relationships between motor competence and physical activity as a dynamic and reciprocal age-related relationship with weight status, perceived motor competence, and health-related fitness as mediating variables (Stodden et al., 2008). Motor competence has been suggested to promote physical activity including both unstructured and structured activities and sports, which in turn contribute to various health-promoting aspects of child development, often referred to as the positive spiral of engagement (Stodden et al., 2008). This conceptual

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model of motor development has been recently updated based on novel research evidence, and the need for more empirical studies on the model has been emphasized (Barnett et al., 2022). In the present study, motor competence is reflected by motor coordination examined especially in the context of organized sports.

Organized sports is an important environment for children to learn and develop their motor skills. Additionally, it is one of the most popular leisure time activities and an essential context of physical activity in many countries. For example, in Finland, 58% of children and adolescents between ages 9 and 15 take part in sports club activities, participation being most common in 11-year-old children (Blomqvist et al., 2023). Organized sport has been shown to be positively associated with physical activity (Hebert et al., 2015; Kokko et al., 2019; Marques et al., 2016; Telford et al., 2016), and the increased probability of continued participation later into childhood (Henrique et al., 2016). Additionally, positive association between gross motor competence and organized physical activity has been indicated (Holfelder & Schott, 2014).

Motor coordination in children has been investigated from various perspectives, including its relationship to physical activity, gender differences, cognitive development, and sports participation. According to longitudinal data, motor coordination has been shown to be associated with physical activity in 6–10-year-old children (D'Hondt et al., 2013; Vandorpe et al., 2012), and to be an important predictor of sport participation in childhood (Fransen et al., 2014; Vandorpe et al., 2012). There is also some evidence that motor coordination is associated with sporting success in children and youth (Pion et al., 2015; Vandorpe et al., 2011). In regard to gender, some previous studies on motor coordination have indicated that boys tend to exhibit higher levels of motor coordination than girls (Lopes et al., 2012; Vandorpe et al., 2011), but there are also some conflicting findings (Laukkanen et al., 2014). Furthermore, previous research shows that in children, poor motor coordination may not only hinder the development of motor skills but also hamper academic achievement (Lopes et al., 2013) and cognitive functions (van der Fels et al., 2015). Regarding sports participation, previous studies have shown that children taking part in organized sports tend to have better motor coordination than non-participating peers (D'Hondt et al., 2013; Hohmann et al., 2021; Konttinen et al., 2019; Vallence et al., 2019; Vandorpe et al., 2012), and that active participation in sports-specific training may be associated with the development of motor coordination while engaged in training for the selected sport (Jaakkola et al., 2017; Rudd et al., 2017). In addition, there is some evidence, that children with high motor coordination participate in organized sport more often than children with low motor coordination (Fransen et al., 2014). Earlier findings also indicate that children who engage in organized sports for multiple hours per week exhibit better motor coordination compared to those who participate for only a few hours per week (Fransen et al., 2014; Opstoel et al., 2015; Vallence et al., 2019).

Although a growing body of research has examined the associations between sport participation and motor coordination levels, certain specific aspects, such as the relationships between motor coordination, the nature of sports club participation, and training volume have received less attention. The purpose of this study was to investigate the associations between gender, the nature of sports club participation (i.e. do the children participate in sports club activities, and if they do, is the participation competitive or non-competitive), training volume, and motor coordination among fourth-grade Finnish children. Additionally, we aimed to examine if gender, the nature of sports club participation, and the level of motor coordination measured in the fourth grade would be associated with sports club participation two years later.

Material and methods

Participants and data collection

Primary school children born in 2005 served as participants in this study. Participants were recruited from 62 comprehensive schools maintained by municipalities across six cities, representing three of the four major regions of Finland, ensuring broad geographical coverage. An invitation to participate in the study was distributed to children in all schools whose principals had given permission to conduct the research in their institution. During cross-sectional baseline data collection in 2016, the children were 10 to 11 years old and attended fourth grade (n = 900, 457 girls and 443 boys). During follow-up data collection in 2018, the children were 12 to 13 years old and attended sixth grade (n = 550, 272 girls and 278 boys). Cross-sectional baseline data were collected within four months from the beginning of 2016. The children who volunteered for the study, completed the questionnaire that included anthropometry, gender, the nature of sports club participation, and amount of coach-led training with their parents at home. After that, motor coordination tests were performed at school. Follow-up data included only the sports club participation status. The Ethics Committee of the University of Jyväskylä approved the study, and voluntary written consent was obtained from the participants' parents. All measurements were carried out following the Declaration of Helsinki and Finnish legislation.

Questionnaire

Anthropometrics, gender, the nature of sports club participation, and coach-led training volume were gathered through a questionnaire. Based on insights gained from the pilot study and feedback from the expert group on the

questionnaire, the research team conducted a thorough review of the instructions and questions to ensure clarity and eliminate ambiguities, thereby minimizing the risk of misinterpretation. Children were also advised to answer the questionnaire with the help of their parents or guardians, which is suggested to increase reliability. The questionnaire is a reliable method to assess whether children take part in organized sports (ICC = 0.95) (Marques et al., 2016).

In baseline measurements, the nature of sports club participation was obtained by asking the question: 'Are you currently participating in sports club activities?' The five options for answering were as follows: 1) 'No, I do not participate in sports club activities at the moment, and I never have participated' 2) 'No, I do not participate in sports club activities at the moment, but I participated before without competing', 3) 'No, I do not currently participate in sports club activities, but I participated before and competed', 4) 'Yes, I currently participate in sports club activities, but I do not compete', and 5) 'Yes, I currently participate in sports club activities, and I compete' (Konttinen et al., 2019). For the analysis, we merged all the children that answered to not currently attending sports club activities (options 1, 2, or 3) into one group, that is, No Sports Club (NSC) (n = 228). Children who participated in sports club activities and did not compete formed the group Sports Club No Competing (SCNC) (n = 326) and children who participated in sports club activities and competed formed the group Sports Club Competing (SCC) (n = 436). For the sports club participants, the amount of Coach-Led Training (CLT) in the sports club was obtained by asking the question: 'What sports do you currently play in sports clubs? Name all sports and how many hours per week you have coach-led training in each sport.' The participants were categorized as either the high training volume group or the low training volume group by using a median split (median = 5).

In follow-up measurements two years later, the sports club participation status was re-evaluated from 550 children by asking the question: 'Are you currently participating in sports club activities?' The three options for answering were as follows: 1) 'No, I do not participate in sports club activities at the moment, and I never have participated' 2) 'No, I do not participate in sports club activities at the moment, but I participated before', 3) 'Yes, I currently participate in sports club activities.' For the analysis, two groups were formed: children who did not participate in sports club activities (options 1 or 2) (n = 137) and children who participated in sports club activities (option 3) (n = 413).

Motor coordination tests

Children completed motor coordination tests during a school day. A team of trained supervisors gave oral instruction, modelled performance for every task, and scored each test. All the tests were conducted barefoot in an indoor sports hall and were conducted over a period of four months. Children's motor coordination was measured using the Körperkoordinationstest für Kinder (KTK) (Kiphard & Schilling, 1974). It has been used in numerous studies to assess motor coordination of 5 to 15-year-old children with typical and atypical motor development (Fransen et al., 2014; Kiphard & Schilling, 1974; Laukkanen et al., 2014; Vandorpe et al., 2011). The KTK is considered a highly reliable instrument, provides age- and gender-specific norms, and is also easy to administer (O'Brien-Smith et al., 2019). The KTK consists of four sub-tests. In *balancing backwards*, the participant walks backwards along three different balance beams. The difficulty of the task increases as the width of the balance beams decreases from 6 cm to 4.5 cm to 3 cm. In *hopping for height*, the participant hops with one leg over 5 cm foam blocks, starting the test without a foam block and ending with 12 blocks. *Jumping sideways* requires the participant to jump feet together over a wooden pole as many times as possible in 15 seconds. In *moving sideways*, the participant moves across the floor using two wooden platforms. The participant steps from the first platform to the second one moves the first platform by hands to their side, steps onto it, and then repeats this as many times as possible in 20 seconds. According to the original norms of the KTK procedure, all the raw performance scores were converted into standardized scores for age. *Hopping for height and jumping sideways* were also adjusted by sex. Further, standardized scores for each sub-test were summed and turned into a total motor quotient (Kiphard & Schilling, 1974). According to the original KTK manual, MQ is classified as follows: 'severe motor disorder' (values 56–70), 'moderate motor disorder' (values 71–85), 'normal' (86–115), 'good' (116–130), and 'high' (131–145) levels of gross motor coordination. For further analysis, the classes 'severe motor disorder' and 'moderate motor disorder' were merged into the 'low motor coordination' category, and 'good' and 'high' classes into the 'high motor coordination' category. Again, the 'normal' category was called 'average motor coordination'.

Statistical analysis

For baseline data, univariate GLM with Tukey's post-hoc test was used in analysing the associations between gender and the nature of sports club participation in the total motor quotient. An independent sample t-test was used to compare the total motor quotient between the genders. Because the raw values and motor quotients of the KTK subtests were not normally distributed, a nonparametric Mann-Whitney's U-test and a Kruskal-Wallis test were used for gender and nature of sports club participation comparisons in sub-tests, respectively. Dunn's test with Bonferroni adjustment for multiple comparisons was used as a post hoc test for the nature of sports club participation comparisons. A chi-square test of independence was performed to examine the association between the nature of

sports club participation and motor coordination level and between training volume and motor coordination level. For follow-up, binary logistic regression with enter procedure was conducted to investigate if the level of motor coordination, the nature of the sports club participation, and gender would be associated with the sports club participation status measured two years later. For the analysis, the total motor quotient was divided into two groups using a median split (median = 101), and the nature of sports club participation into two groups according to the questionnaire responses (sports club participants, sports club non-participants). Model fit was assessed using the Hosmer and Lemeshow test and model appropriateness with the Nagelkerke R^2. The magnitudes of associations were interpreted with Odds Ratios (OR). All the analyses were performed with SPSS Statistics 26.0.

Results

Descriptive statistics

Descriptive statistics for height and weight across gender are shown in Table 1. Boys were taller and heavier than girls. Of the sports club participants (n = 672), 87.5% provided us with information about the primary sport they played in the sports club. A total of 43.7% of the sports club participants were involved in individual sports, and 56.3% in team sports. The three most popular sports for the girls were gymnastics (17.4%), dance sports (16.4%), and football (9.4%), and for the boys, football (32.1%), ice hockey (18.2%), and floorball (13.0%). The distribution of the most popular sports in our study is in line with the recent report describing the 9–15-year-old Finnish sports club participants (Blomqvist et al., 2023).

Raw scores for each KTK sub-test are shown in Table 1. Between genders, a significant difference in raw scores was found only in balancing backwards, where girls outperformed boys ($p < 0.001$). In total motor quotient, there were no significant differences between girls (100.27 ± 15.84) and boys (101.48 ± 15.64). In motor quotients of the KTK sub-tests, however, significant differences between genders were found in balancing backwards, hopping for height, and jumping sideways (see Table 1). In balancing backwards, girls scored better than boys, whereas in hopping for height and in jumping sideways boys outperformed girls.

Table 1. Mean (*M*) and standard deviation (*SD*) of anthropometric data, raw scores of KTK sub-tests, and motor quotients of KTK sub-tests with the results of the Mann-Whitney *U*-test for gender

Variable	Girls		Boys		Total		*U*
	M	*SD*	*M*	*SD*	*M*	*SD*	
Height (cm)	144.3	7.1	145.6	7.0	145.0	7.1	113 520.0**
Weight (kg)	36.1	6.6	37.8	7.8	37.0	7.3	112 386.5**
BB[a]	53.6	12.2	46.7	13.5	50.2	13.3	70 843.5***
BB[b]	99.9	13.0	92.5	14.3	96.2	14.2	70 819.0***
HH[a]	56.7	13.2	55.6	14.5	56.2	13.9	97 805.0
HH[b]	94.6	15.6	96.7	14.9	95.6	15.3	110 269.0*
JS[a]	70.9	12.2	72.3	13.4	71.6	12.8	107 225.0
JS[b]	106.1	16.1	116.2	16.6	111.1	17.1	135 760.0***
MS[a]	47.3	8.5	46.8	7.9	47.1	8.2	99 295.0
MS[b]	100.8	19.6	99.8	18.5	100.3	19.1	99 297.0

Note. N = 900 (Girls n = 457, Boys n = 443).
BB = Balancing Backwards. HH = Hopping for Height. JS = Jumping Sideways. MS = Moving Sideways.
[a] Raw score, [b] Motor quotient.
*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

The nature of sports club participation

There was no gender and the nature of sports club participation interaction in the total motor quotient. However, significant differences were found between the three sports club participation groups as in total motor quotient, SCC (106.51 ± 15.11) performed better than both SCNC (M = 98.22 ± 13.65) and NSC (M = 92.97 ± 14.75), and SCNC scored higher than NSC (F(2, 897) = 70.887, $p < 0.001$). Again, when examining the KTK sub-tests there were significant differences in motor quotients between the groups (see Table 2). SCC outperformed NSC in all four sub-tests: balancing backwards (z = −128.807, $p < 0.001$), hopping for height (z = −185.771, $p < 0.001$), jumping sideways (z = −212.800, $p < 0.001$), moving sideways (z = −146.424,

$p < 0.001$). Furthermore, compared to SCNC, SCC scored higher in hopping for height ($z = -115.964$, $p < 0.001$), jumping sideways ($z = -165.873$, $p < 0.001$), and moving sideways ($z = -93.462$ $p < 0.001$). Finally, SCNC performed better than NSC in hopping for height ($z = -69.807$, $p = 0.011$) and balancing backwards ($z = -102.035$, $p < 0.001$).

Table 2. Mean (*M*) and standard deviation (*SD*) of anthropometric data and motor quotients of KTK sub-tests with the results of the Kruskal-Wallis-test for the nature of sports club participation (NSC = non-participating in sports club activities, SCNC = non-competing sports club participants, SCC = competing sports club participants)

Variable	NSC		SCNC		SCC		Total		*H*
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	
Height (cm)	144.4	7.2	145.1	6.7	145.2	7.2	145.0	7.1	1.545
Weight (kg)	37.0	7.5	36.8	6.9	37.0	7.4	37.0	7.3	0.001
BB	91.3	15.0	97.0	13.1	98.4	13.6	96.2	14.1	19.525***
HH	89.5	14.5	93.6	14.9	99.9	14.6	95.6	15.3	45.716***
JS	103.4	15.6	106.7	15.6	117.4	16.2	111.1	17.1	53.847***
MS	93.9	18.2	97.7	16.9	105.0	19.4	100.3	19.1	17.160***

Note. $N = 900$ (NSC $n = 228$, SCNC $n = 236$, SCC $n = 436$).
BB = Balancing Backwards. HH = Hopping for Height. JS = Jumping Sideways. MS = Moving Sideways.
***$p < 0.001$.

When assessing the distribution of total motor quotient in different categories of three sports club participation groups, the association between these variables was significant ($\chi^2(4, N = 899) = 112.672$, $p < 0.001$). Participants in SCC were more likely to belong in the high motor coordination category, whereas participants in NSC tended to belong in the low motor coordination category (see Figure 1).

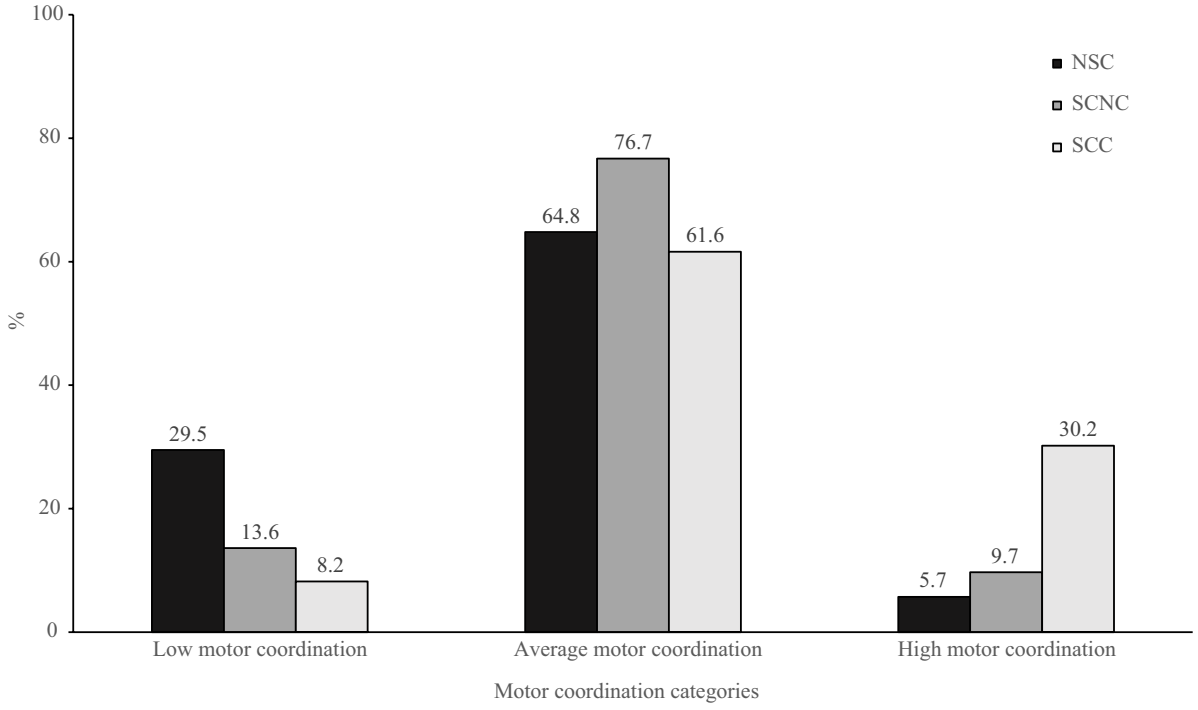

Figure 1. The distribution of the participants of three sports club participation groups into three motor coordination categories (NSC = non-participating in sports club activities, SCNC = non-competing sports club participants, SCC = competing sports club participants)

Coach-Led Training

When examining the amount of CLT in the sports club participants (5.09 ± 3.43 hr/week), it was found that SCC (n = 416) (6.56 ± 3.20 hr/week) spent significantly more (U = 6889.50, p < 0.001) time in CLT than SCNC (n = 213) (2.20 ± 1.43 hr/week). When assessing the distribution of total motor quotient in two groups of CLT volume according to a median split (median = 5), the association between these variables was significant ($\chi^2(2, N = 629) = 53.340$, $p < 0.001$). The participants in the high training volume group were more likely to belong in the high motor coordination category, whereas participants in the low training volume group tended to belong in the low motor coordination category (see Figure 2). Additionally, the association between CLT and the nature of sports club participation was significant ($\chi^2(1, N = 629) = 230.043$, $p < 0.001$) indicating that the participants in the SCC group were more likely to belong in the high training volume group and participants the SCNC group in the low training volume group.

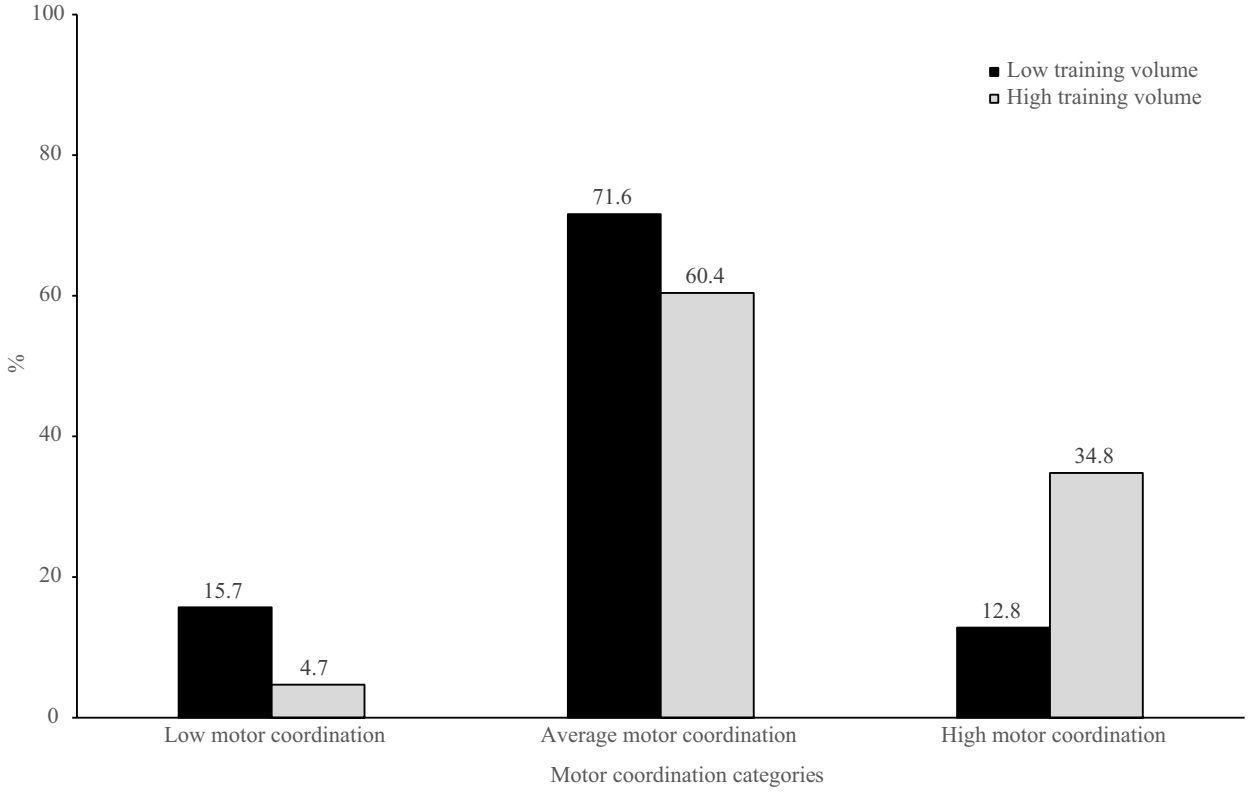

Figure 2. The distribution of the participants of two training volume groups into three motor coordination categories

Sports club participation status after two years

Out of all the children who took part in the baseline tests in 2016, 61% (n = 550) completed the follow-up questionnaire two years later. Of the children in the sixth grade, 83.9% had the same sports club participation status (68.4% sports club participants, 15.5% non-participants) as they had in the fourth grade. Sports club participation status has changed in 16.1% of the children of which 9.6% had dropped out and 6.5% had joined in sports club activities. In binary logistic regression, the model showed that sports club participation status and level of motor coordination measured in the fourth grade were associated with participation status assessed two years later. These variables accounted together 37.8% (Nagelkerke R^2 = 0.378) of the variance in sports club participation in the sixth grade. The effect of gender was not statistically significant and did not increase the probability of participating in the sports club. The correct classification of the sports club participation status in the sixth grade based on sports club participation status and level of motor coordination two years earlier was 83.8%. The results of the Hosmer and Lemeshow test (p = 0.674) indicated that the model fit the data well. For the children involved in sports club activities in the fourth grade, the odds ratio showed a 14.56 times greater chance of participating in sports club activities two years later, than children not participating in sports club activities two years earlier (see Table 3). Further, for the children scoring high on the motor coordination test in the fourth grade, the odds ratio indicated a 2.23 times greater chance to be a sports club participant than children scoring low.

Table 3. Summary of binary logistic regression

Variable	B	SE	Wald	df	p	OR
SCP status 10-yo	2.678	0.254	111.242	1	<0.001	14.560
Motor coordination	0.799	0.246	10.511	1	0.001	2.223
Gender	−0.088	0.244	0.130	1	0.718	0.916

Note. SCP status 10-yo = Sports club participation status at the age of 10

Discussion

The purpose of this study was to investigate the associations between gender, the nature of sports club participation, and training volume on motor coordination among fourth-grade Finnish children. Also, our aim was to examine if gender, sports club participation, and the level of motor coordination would be associated with the sports club participation status two years later.

In the present study, no gender differences were found in the level of children's overall motor coordination measured as total motor quotient. Our results seem to contradict some previous studies where boys have scored better than girls in overall motor coordination in children of the same age as in our study (Lopes et al., 2012; Vandorpe et al., 2011). In the KTK sub-tests, however, significant differences between genders were found. Girls performed better than boys in balancing backwards, whereas boys outperformed girls in hopping for height and jumping sideways. One explanation for the gender differences in balancing task can be children's developmental phase, as previous research findings indicate that girls may be slightly ahead of boys in balance control between 6 and 12 years of age (D'Hondt et al., 2011; Hohmann et al., 2021; Vandorpe et al., 2011). Furthermore, in line with our study, previous research has shown boys to perform better in tasks that require physical abilities such as strength, speed, and explosivity (D'Hondt et al., 2011; Hohmann et al., 2021; Prätörius & Milani, 2004; Vandorpe et al., 2011). This may indicate that boys of this age may have better physical abilities than girls (e.g., Vandorpe et al., 2011). Also, different sports preferences may reflect proficiency in different motor coordination characteristics in boys and girls (Hohmann et al., 2021; Rudd et al., 2017). In Finland, for example, the most popular sports for boys in sports clubs are soccer, ice hockey, and floorball, whereas girls prefer horse-riding, soccer, gymnastics, and dance sports (Blomqvist et al., 2023).

The nature of sports club participation appeared to be related to the level of motor coordination in fourth-grade children. When comparing the children who participated in sports club activities to non-participating ones, both competing and non-competing participants demonstrated higher overall motor coordination than children not participating in sports club activities. Furthermore, in the KTK sub-tests, the competing children outperformed the children not participating in sports club activities across all four tasks, while the non-competing children performed better in hopping for height and balancing backwards compared to their non-participating peers. Hence, our results support the findings of the previous longitudinal studies, which suggest that participation in organized sports is associated with higher motor coordination (D'Hondt et al., 2013; Fransen et al., 2014; Vallence et al., 2019; Vandorpe et al., 2012). In sports club participants, especially in children who were competing, the mastery of motor coordination seemed to be prominent. In addition to excelling in motor coordination measures, the competing children were more likely to belong in the high motor coordination category than non-participating ones, who, in turn, tended to belong in the low motor coordination category. In our study, superior motor competence, as reflected in motor coordination, seemed to be associated especially with competitive participation rather than recreational engagement in sports club activities. A plausible explanation for this could be that competing children may develop motor coordination to a greater extent due to increased training time and exposure to goal-oriented coaching.

On the one hand, the superior motor coordination observed in sports club participants may be attributed to the increased time spent in structured, coach-led training (Okely et al., 2001). On the other hand, it is also possible that children with higher motor coordination are more likely to participate in sports club activities compared to those with lower motor coordination (Cairney et al., 2005). Having better motor coordination may provide children with more possibilities to be physically active and take part in sports club activities and thus give them more opportunities to develop their motor competence (Stodden et al., 2008). By contrast, children with lower motor coordination may have had negative experiences of sports club activities or physical activities in general and therefore do not want to participate or find suitable possibilities to participate (Cairney et al., 2005; Fransen et al., 2014). Fewer opportunities for developing motor abilities may further prevent them from catching up with their peers with average or high motor competence. Therefore, it is essential to get rid of participation barriers for participation in sports club activities, such as lack of access to facilities and programs, and poor suitability (Bailey et al., 2013).

The training volume seemed to be associated with the level of motor coordination. The children in the high training volume group were more likely to fall into the high motor coordination category than children in the low

training volume group, who in turn, tended to belong in the low motor coordination group. Previous research findings have indicated that children who spend several hours a week in sports have greater levels of motor coordination than children spending a few hours a week in sports (Fransen et al., 2014; Opstoel et al., 2015; Vallence et al., 2019). However, in our study, it remains unclear if greater time spent in training and therefore greater exposure to target-oriented coaching may have led to the development of motor coordination, or if the children with high motor coordination levels had been involved more in sports club activities than their peers with lower coordination. Either way, it can be proposed that organized physical activities with instructions, such as coach-led training in sports clubs, are beneficial for the development of children's motor coordination, which in turn, may enable children to be physically active. This may facilitate the positive spiral of engagement as participation in physical activity offers greater opportunities for further development of motor competence and physical fitness (Stodden et al., 2008). Consequently, this can promote sustained involvement in sports and finally, support the adoption of a healthy and active lifestyle (Telford et al., 2016).

Sports club participation and the high level of motor coordination in the fourth grade were associated with sports club participation in the sixth grade. Our results are in line with previous findings (Basterfield et al., 2015; Henrique et al., 2016; Vandorpe et al., 2012) indicating that sports club participation in childhood leads to sports club participation in late childhood and adolescence. At the age of our participants, the dropout rate from sports is not yet at its highest. A recent survey of Finnish children aged 9–15 years reported sports participation peaking at age 11 indicating that 69% of the children are involved with sports club activities. However, soon after that, sports club participation starts to decrease, being 54% and 42% at the age of 13 and 15 years, respectively (Blomqvist et al., 2023). In addition to sports club participation, the level of motor coordination explained sports club participation, as higher motor coordination at the age of 10 years predicted participation two years later. The significance of participating in sports is being recognized both on international and national levels (Mountjoy et al., 2011; World Health Organization, 2018). In Finland, more attention has been recently directed to promoting children's positive development with sports and physical activity. As a part of the health and well-being policy, the Ministry of Education and Culture awards special development grants for sports clubs to bring more equal opportunities, especially for children and youth, to participate in recreational sports. Additionally, the role of non-organized physical activity and free outside play and sport is also emphasized both in promoting motor skills and as a basis of daily physical activity.

A major limitation of the present study is its study design. The cross-sectional design on motor coordination does not provide us with any causal evidence concerning the relationships between issues like the nature of sports club participation and levels of motor coordination. We included a longitudinal set-up only in investigating the association between gender, motor coordination, and previous sports participation status with sports participation two years later. Longitudinal study designs should be applied to gain a better insight into the effects of sports club participation on selected variables (Barnett et al., 2023). The identification of a causal relationship would be important to develop practical implementations. This could provide aids for decision making especially for coaches to design training sessions adequate to the target group. Furthermore, the children who participated in the study were volunteers recruited from schools where the principals had granted permission for the research. This sampling method may have introduced a selection bias, potentially influencing the study's results. Moreover, in this study, we examined the time spent in organized sports only, and not on physical activity as a whole. Therefore, the role of physical activity and sports in other organized and unstructured settings in assessing the level of motor coordination remains unknown.

Conclusions

Our results indicated that the children participating in sports club activities had higher motor coordination than their non-participating peers. Higher motor coordination seemed to be associated especially with competitive participation rather than more recreational engagement in sports clubs. It can be suggested that participation in sports clubs, particularly in competitive settings, may contribute to the development of children's motor coordination and, consequently, their motor competence. This, in turn, may foster greater engagement in physical activity, offering additional opportunities for development of motor competence and health-related fitness. Therefore, sports clubs may serve as an essential environment for supporting children's adoption of an active and healthy lifestyle.

Conflict of interest: Authors state no conflict of interest

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Received 13.05.2024
Accepted 17.01.2025

Acknowledgments

This work was supported by a grant (OKM/32/626/2016) from the Ministry of Education and Culture in Finland. We acknowledge Ph.D. student Ville Kallinen from the University of Jyväskylä for his assistance in data collection.