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The effectiveness of a community-based fundamental motor skill intervention in children aged 3-8 years: Results of the "Multimove for Kids" project

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Abstract

Objectives: The purpose of this study was to examine the effectiveness of a 30-week fundamental motor skill (FMS) program in typically developing young children and to investigate possible sex differences.

Design: A multicenter quasi experimental design was set up for this study which involved 992 children aged 3 to 8 years.

Methods: All participants received their typical Physical Education curriculum and habitual movement activities. The intervention group (*n*=523; 53.5% boys) received a weekly 60-min motor skill session provided by trained local instructors in existing child settings; the control group (*n*=469; 49.7% boys) received no additional practice. FMS were assessed using the Test of Gross Motor Development, 2nd Edition (TGMD-2) before and after the intervention. To assess the effect of the intervention and possible sex differences, hierarchical linear regressions analyses were conducted for locomotor and object control gain scores.

Results: The intervention group demonstrated a higher gain in both locomotor ($\beta=3.78$, $SE=1.08$, $p<0.001$) and object control ($\beta=4.46$, $SE=1.06$, $p<0.001$) skills than the control group. Girls demonstrated a lower gain in object control skills ($\beta=-3.50$, $SE=0.49$, $p<0.001$) and higher gain in locomotor skills ($\beta=1.01$, $SE=0.44$, $p=0.022$) than boys, regardless of group.

Conclusions: The present study demonstrated the effectiveness of a wide-scale community-based intervention in typically developing children. The sex differences reported may indicate the need to use different pedagogical and instructional strategies to enable boys and girls to develop and master a wide range of motor skills.

Introduction

The ability to perform a variety of basic motor skills is crucial for participation and engagement in physical activity. These skills, also known as fundamental motor skills (FMS), are considered to be the building blocks for more complex skills needed in sports, games and other activities across childhood and adulthood.[1] FMS are generally categorized into locomotor skills (e.g. running and hopping) and object control skills (e.g. kicking and throwing).[2] Mastery of FMS during early childhood is important as around the age of seven children begin to apply their FMS in sports and other physical activities that involve more specific and complex movement patterns.[3] Developing FMS competence early is also important as over the past decades, research has shown that FMS competence is related to different health benefits in terms of physical activity, physical fitness, perceived motor competence and weight status.[4] In addition, longitudinal studies have shown that proficiency levels of FMS in childhood is a significant predictor of physical activity in adolescence.[5,6] Thus, FMS are a critical set of skills to develop if children are to be physically active across their childhood and adolescent years. However, although maturation can influence the emergence of FMS, young children need to receive instruction and practice if they are to develop FMS competence.[3,4]

Early childhood motor skill interventions can provide opportunities for children to practice and master FMS through structured and unstructured activities. To this end different motor skill programs that promote FMS proficiency in children have been developed and implemented [see Logan, Robinson, Wilson et al.[7] for a review on this matter]. The majority of these interventions have targeted specific populations, especially children with motor difficulties [e.g. Bardid et al.[8]] and disadvantaged children [e.g. Goodway & Branta[9]]. However, some studies have demonstrated decreased levels of motor competence in general pediatric populations in Western countries[10-12], which might be related to a decline in children's physical activity levels.[13]

Given the value of FMS in children's overall development, intervention programs should target all children, not only children who are at risk. Although FMS interventions have been shown to be effective in improving children's motor competence, few programs have been implemented on a large scale using a collaborative approach with community-based organizations and local instructors.[14] In Belgium, the Flemish government has highlighted the importance of getting children active early through policy initiatives[15] and implemented the Multimove for Kids program in existing child settings across Flanders (see appendix). Such population-based initiatives reach large numbers of children and have strong ecological validity that randomized controlled trials with smaller samples generally lack.[16] However, such public policy initiatives in community settings are often not evaluated using robust measures and therefore there is little knowledge on the effectiveness, and translational value of these FMS programs. Overall, there is a gap in the literature on the effectiveness of community-based motor skill interventions for typically developing children.

To fill this gap, the present study examined the effectiveness of the Multimove for Kids intervention on the FMS of children aged 3-8 years old in Flanders, Belgium. A second objective was to investigate possible sex differences in FMS and improvement across the intervention. Based on previous intervention literature[7], it was hypothesized that the intervention would significantly improve children's FMS.

Methods

Thirty-seven child settings with a total of 50 sites were purposively selected for the Multimove for Kids project based on the type of setting (sports club, local council, school and day care center) and geographical distribution (5 provinces). A total of 1123 children, aged 3 to 8 years, initially took part in the Multimove intervention. Of this group, the children with an attendance rate of ≥70% (i.e. 21 lessons) were assessed on FMS before and after the intervention (*n*=523; mean age = 5.6 ± 1.4 years; from 39 out of 50 sites). This intervention group consisted of 280 boys and 243 girls. A control group of 491 children were recruited from five schools in different provinces through convenience sampling. Of this group, 469 children (mean age = 5.9 ± 1.6 years; 233 boys and 236 girls) were assessed twice on FMS proficiency. This study was approved by a University Hospital Ethical Committee and written informed consent was provided from the parents or legal guardians for all participants.

Children in the intervention group received a 30-week theoretically underpinned FMS program consisting of one session (approximately 60-min) per week, offered in existing community settings and provided by a trained local instructor (e.g. sport and recreation leaders, school teachers or caregivers). All instructors received a one-day training workshop and support during the program (see appendix). The Multimove program offered a wide range of playful activities using 12 basic motor skill themes: running, climbing, swinging, gliding, rotating, jumping, catching and throwing, pushing and pulling, lifting and carrying, hitting, kicking, dribbling. During each session children experienced 2-3 FMS themes, each of which were practiced for 15-30 min.

Children's FMS were measured using The Test of Gross Motor Development, 2nd edition (TGMD-2) [17], before and after the 30-week intervention. The test was administered in an indoor facility and took approximately 20 minutes per child to complete. The TGMD-2 is a criterion-referenced test examining the quality of performance in 6 locomotor skills (run, gallop, hop, leap, horizontal jump and slide) and 6 object control skills (strike a stationary ball, stationary dribble, catch, kick, overhand throw and underhand roll). Each child was evaluated twice on each skill using 3-to-5 components which were marked as either present (=1) or absent (=0). Raw scores of locomotor skills and object control skills were summed to compute a raw subtest score. Subsequently, gain scores were calculated by subtracting the baseline score from the post-intervention score. The psychometric quality of the TGMD-2 is well-established with excellent test-retest reliability and inter-rater reliability (all r-values > 0.85) as well as a good internal consistency (Cronbach's α is 0.85 and 0.88 for locomotor and object control subtests respectively). Construct, content and concurrent validity have been established for children aged 3-10 years.[17] Data-collection was conducted by a group of trained examiners in accordance with the test manual.[17] All examiners had a background in Physical Education, received a detailed TGMD-2 manual and completed a half-day assessment training.

Descriptive statistics were computed for the TGMD-2 subtest scores using SPSS 21 for Windows (IBM Corp., Armonk, NY, USA). Using a nested design (i.e. children within sites), hierarchical linear regression analyses with fixed and random effects were conducted in HLM 7 Student for Windows (SSI Inc., Skokie, IL, USA) to examine: (1) the effect of the Multimove intervention on the gain in locomotor and object control scores, and (2) sex differences. Potential effects of confounding factors such as sex, age, baseline score, and age x sex interaction were controlled for at level 1 (child level), and mean age and mean baseline score were controlled for at level 2 (site level). Full maximum-likelihood estimation was used for the 2-level model and the significance level was set at $p \leq .05$. Where relevant, effect sizes (ES) were calculated as the ratio of the absolute value of the estimate to the standard deviation of the gain score distribution.[18]

Separate hierarchical linear models were run for the gain in locomotor score (model 1) and object control score (model 2). First, two-level null models (child – site) including only the outcome, were estimated for gain in locomotor score (null model 1) and gain in object control score (null model 2).

Next, level 1 variables (sex, age, baseline score and age x sex interaction) were added to the model for locomotor gain score (model 1a) and object control gain score (model 2a) to examine child characteristics. Sex was entered as a dichotomous variable (0 = boy; 1 = girl); age and baseline score were entered as continuous variables. Age x sex interaction was calculated as following*: [age - (mean age per site)] x sex*. Only significant effects were kept in further analysis.

Finally, to investigate the effect of the intervention and possible sex differences, level 2 variables (treatment, mean age and mean baseline score) and a cross-level interaction (sex x treatment) were inserted in the model for locomotor gain score (model 1b) and object control gain score (model 2b). Treatment was added as a dichotomous variable (0 = control; 1 = intervention); mean age and mean baseline score per site were included as continuous variables. Age was group mean centered at level 1 due to age range differences between sites. All other variables with no meaningful zero value were grand mean centered in all analyses.

Results

Table 1 shows the means and standard deviations for the baseline and post-intervention scores on the TGMD-2 outcomes. ANOVAs showed no significant differences in baseline scores between intervention and control group for locomotor skills (F=0.47; p=0.492) and object control skills (F=1.75; p=0.187). There were no significant differences in locomotor baseline scores between boys (M=32.02, SD=8.90) and girls (M=33.06, SD=8.50) (F=3.551; p=0.06). However, boys demonstrated higher baseline scores for object control skills than girls (M=27.83 vs. 23.44, SD=9.035 vs. 8.047) (F=64.89; p<0.001; d=0.51). The results of the hierarchical linear regression analyses are presented for each outcome: locomotor gain score (model 1) and object control gain score (model 2) (see Table 2 and Fig 1).

The null model for gain in locomotor skills (null model 1) demonstrated a significant variance at level 2 [$\chi^2(43)=262.5$; *p*<.001]. The ICC showed that 17% of the variance in locomotor gain was situated at site level and 83% at child level. Of the included level 1 variables (model 1a), sex, age and baseline score were significantly related to children's locomotor gain. Girls made significantly more gain in locomotor skills than boys [β = 0.85; SE=0.37; t(43)=2.28; *p*=0.028; ES=0.13]. As age increased, the locomotor gain score increased [β=1.34;

SE=0.27; t(43)=4.90; p<.001; ES=0.20]. As baseline score increased, the gain score decreased [β=-0.55; SE=0.03; t(43)=-18.76; p<.001; ES=0.08]. A random effect was found for age [χ^2(37)=53.70; p=0.037] which indicates that the relationship between age and locomotor gain differs between sites. Results from the model that included treatment, mean age and mean baseline score per site (model 1b) indicated that – after controlling for different characteristics – children in the Multimove intervention sites had higher locomotor gain than children in control sites [β=3.74; SE=1.08; t(40)=3.48; p=0.001; ES=0.57]. No significant cross-level interaction between sex and treatment was found; sex differences were similar in both intervention and control sites.

The null model for gain in object control skills (null model 2) showed a significant variance at level 2 [χ^2(43)=295.26; p<.001]. The ICC revealed that 22% of the variance in object control gain was situated at the site level and 78% at the child level. With regard to the included level 1 characteristics in the random coefficient model (model 2a), sex, age and baseline score were significantly related to children's object control gain. Girls made significantly less gain in object control skills than boys [β=-2.75; SE=0.38; t(43)=-7.18; p=0.028; ES=0.43]. As age increased, the object control gain increased [β=1.62; SE=0.24; t(43)=6.74; p<0.001; ES=0.25]. As baseline score increased, the gain score decreased [β=-0.46; SE=0.03; t(43)=-14.24; p<0.001; ES=0.07]. A random effect was found for baseline score [χ^2(35)=56.51; p=0.012] which indicates a relationship between baseline and gain score differed between sites. The model that included treatment, mean age and mean baseline score per site (model 2b) revealed that – after controlling for different characteristics – children in the intervention sites had higher object control gain scores than children in control sites [β=4.46; SE=1.06; t(40)=4.21; p<0.001; ES=0.70]. There was no significant cross-level interaction between sex and treatment.

Discussion

The purpose of this study was to examine the effectiveness of a government-supported, community-based motor skill intervention on the FMS competence of 3- to 8-year-old children.

The results showed that the Multimove intervention brought positive changes in children's FMS. Children who participated in the Multimove intervention made more progress in both locomotor and object control skills compared to children in the control group. The effect size values indicated a medium intervention effect (i.e. 0.57 and 0.69 for locomotor and object control skills respectively). These findings are consistent with previous research on motor skill interventions, which showed medium to large effect sizes for locomotor skills and medium effect sizes for object control skills.[7,19] The present study provides evidence that a community-based FMS program containing developmentally appropriate activities can be effective for typically developing children also highlights that such programs led by trained local instructors can be as effective as programs led by motor development experts.

Results also revealed that children with lower baseline scores demonstrated higher gains in locomotor and object control skills than children with higher baseline scores. Such a finding may be related to the notion that children with lower levels of FMS have a greater potential to improve their motor proficiency.[7] However, regardless of the baseline score, children who received the Multimove FMS intervention benefited from the program in comparison to the control group. This finding demonstrates the importance of the motor skill intervention in all children's development, regardless of their initial status.

A secondary objective of this study was to investigate possible sex differences across the intervention. Similar to previous studies, no sex differences were found for locomotor skills before the intervention, but boys exhibited higher baseline scores for object control skills than girls regardless of group.[8],[20],[21] In addition, a significant difference in object control gain scores favoring boys was found. It seemed that the Multimove intervention did not allow girls to catch up with their male counterparts in object control skills, which is in agreement with some prior intervention research.[19] For example, the study of McKenzie, Alcaraz, Sallis, and Faucette[22] demonstrated that boys made more gain in object control skills than girls. Perhaps, the observed sex differences in object control skills may be attributed to how the teacher interacts with boys and girls differently (e.g. teacher feedback) or differences in practice across the intervention. In this respect, a review by Curtis[23] highlights that boys tend to receive more corrective feedback than girls which is especially important to promote the development of object control skills. Interestingly, this study showed that girls made more gain in locomotor skills than boys although the effect size is small. It should be noted, however, that other studies did not demonstrate these sex differences in skill gain.[19] For instance, van Beurden et al.[14] found similar improvements in FMS for boys and girls across the intervention. Nonetheless, literature does show differences in FMS performance between boys and girls, specifically for object control skills.[14,21] These sex differences related to the type of motor skills may be linked to gender roles in sports and games where boys participate more in object control related activities (e.g. ball games) while girls engage more in activities that rely on locomotor skills (e.g. dance) during free play.[24,25] Children's preference for certain types of activities due to gender norms may have enabled boys and girls to practice and develop certain skills more easily. In addition, a study of Garcia[25] showed gender-specific patterns in children's interactions when learning FMS, with boys interacting in a competitive and individualized manner and girls in a cooperative and caring manner. In view of the observed sex differences in the present study, future research should aim to examine the instructional and social aspects of motor skill programs and develop pedagogical approaches that would reduce differences in FMS performance between boys and girls.

A major strength of this study is the translational value of the study as it involved wide-scale implementation of a FMS intervention resulting from public policy implemented by local instructors within existing community settings. It is particularly noteworthy that this curriculum could be implemented successfully in a wide variety of community settings (e.g. sport clubs, schools, child cares) across a large geographic area using existing resources. A limitation of the study was the lack of a true experimental design with the Multimove intervention being delivered to children by sport organizations and local councils whereas control children were recruited from schools. Despite this limitation it was believed that control children were a representative group as the schools were selected across Flanders and baseline scores between the intervention and control group were similar. An additional limitation of the study was the lack of fidelity measures on the Multimove curriculum implementation. It was not possible to examine how the Multimove curriculum was implemented by the different instructors. However, instructors were trained in the Multimove program and received the Multimove teacher manual with a wide range of activities for each skill, but they were free to select the content for each session. In spite of these limitations it appears the Multimove curriculum is very robust as it had a positive impact on the FMS development of children across Flanders which establishes the ecological validity of this program.

Conclusion

The present findings showed that a 30-week FMS intervention program was effective in improving the FMS of typically developing young children. The collaborative approach with existing community-based organizations and instructors highlights the ecological value of the Multimove program and supports its further use in community settings. Sex differences showed that boys made more progress in object control skills and girls made more gain in locomotor skills. Further research is needed to determine long-term effects of community-based interventions and to explore appropriate teaching strategies that would address differences in FMS between boys and girls.

Practical implications

- The 30-week community-based Multimove intervention positively influenced the FMS of typically developing children. This shows that early childhood FMS programs can benefit all children, not only those with motor delay.
- Girls made less progress in object control skills and more progress in locomotor skills than boys, regardless of group. This suggests that a gender conscious teaching approach is needed to support optimal FMS development in both boys and girls.
- Policy makers need to utilize existing resources and invest in teacher preparation and training in FMS programs such as Multimove for Kids in order to support effective implementation of such programs in various community settings.

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Appendix

The Multimove for Kids project is a policy-based initiative funded by the Flemish Government. The main objective of this project was to promote fundamental motor skill (FMS) development of young children aged three to eight. Experts of several institutions and organizations took part in the development and implementation of the project: Ghent University, Vrije Universiteit Brussel, KU Leuven, Flemish Sports Federation, Flemish

Institute of Sports Management and Recreational Policy, and the Flemish Government's Department of Youth, Culture, Sports and Media.

A FMS intervention was set up to achieve the abovementioned objective. The project team developed a teaching manual that adopted twelve FMS themes: running and walking, climbing, swinging, gliding, rotating, jumping, throwing and catching, pushing and pulling, lifting and carrying, hitting, kicking, and dribbling. The development and selection of the program content (i.e. developmentally appropriate activities for each skill theme) was based on motor development literature [see Gallahue, Ozmun & Goodway[a] for an overview on developmental stages in FMS]. The age-related motor developmental stages in FMS were provided in the teaching manual for instructors to select appropriate activities for their group. Using Newell's constraints model[b], each FMS theme included a list of practice variations based on environmental, task and individual constraints. For instance, hitting can be performed in different ways (e.g. underhand, overhand), alone or in group, with different tools (e.g. hand, racket, stick) and objects (e.g. balloon, beach ball, tennis ball), stationary or moving, in various setups (e.g. even-inclined, high-low), and with different targets (e.g. small-large, close-distant). Moreover, each FMS theme contained 15-39 activity sheets, which included the description of the activity, required material, points of interest, variations in task and environment, and examples of differentiation for each activity based on the aforementioned factors. The emphasis of the program was on providing sufficient and various movement opportunities within each skill theme to promote children's FMS. Each session focused on 2-3 FMS themes for which appropriate activities were selected. The lesson content and structure depended on several aspects: children's developmental stage (based on age and performance level), organizational

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[a] D.L. Gallahue, J.C. Ozmun, and J.D. Goodway. Understanding Motor Development: Infants, children, adolescents, adults, 7th ed, 2012, McGraw-Hill; New York, NY.

[b] K.M. Newell, Constraints on the development of coordination. *Mot Dev Child Asp Coord Control*, **34**, 1986, 341–360.

elements (i.e., play themes, material, space and group size) and movement concepts (i.e., body awareness, space awareness, speed and rhythm). As such, the teaching manual provided information on the general development of children aged 3-8 years and guidelines with regard to organizational, didactical and pedagogical aspects when implementing and instructing the program.

The Multimove for Kids intervention was designed to be offered on a large scale in a sustainable manner through instructor-led programs in community settings. For this purpose, a public invitation was sent to Flemish organizations involved in sports or physical activity such as sports clubs and local councils. Thirty-seven organizations with a total of 50 sites were purposively selected for the Multimove for Kids project based on the type of setting (sports club, local council, school and day care center) and the geographical distribution (5 provinces). Prior to the start of the program, instructors from these settings received a one-day training workshop that addressed the teaching manual consisting of activities and didactical guidelines for appropriate delivery of the Multimove program. During the workshop, instructors received a morning lecture on FMS development during early childhood and information on teaching strategies and pedagogical principles. This lecture also contained group assignments that linked theory to practice, e.g. identifying developmental stages of motor skills for children of a certain age, selecting appropriate activities based on the age and developmental stages of children. In the afternoon, microteaching was implemented where groups of three instructors prepared and gave a 30 min session to young children while other instructors observed the session. These practice sessions were followed by group discussion and feedback.

During the program, instructors received a bimonthly newsletter with didactical tips and good practices. Instructors reported the skill themes for each session every six weeks which were checked by a supervisor. In addition, instructor observations were conducted followed by feedback from a member of the project team. For more information on the Multimove program, visit the website (www.multimove.be) or contact the corresponding author (farid.bardid@ugent.be).

Table 1

Means (M) and standard deviations (SD) of performance on the TGMD-2 and the results of the ANOVA for baseline scores.

	Control						Intervention						Total			
	Boys		Girls		Total		Boys		Girls		Total		Boys		Girls	
Variable	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Locomotor score																
Baseline	31.8	9.4	32.8	8.5	32.3	8.9	32.2	8.5	33.3	8.6	32.7	8.5	32.0	8.9	33.1	8.5
Post-intervention	32.6	8.4	34.3	7.0	33.5	7.8	36.2	7.7	37.2	7.0	36.6	7.4	34.6	8.2	35.7	7.2
Gain	0.8	6.2	1.5	6.0	1.1	6.1	4.0	6.6	3.9	6.6	3.9	6.6	2.5	6.6	2.7	6.4
Object control score																
Baseline	27.6	9.3	23.1	7.6	25.3	8.8	28.0	8.8	23.8	8.5	26.1	8.9	27.8	9.0	23.4	8.0
Post-intervention	29.4	8.9	24.1	7.9	26.7	8.8	32.3	8.8	28.2	8.7	30.4	9.0	31.0	9.0	26.2	8.6
Gain	1.8	5.8	1.0	5.7	1.4	5.8	4.2	6.2	4.4	6.7	4.3	6.4	3.1	6.1	2.7	6.5

Table 2: Intervention effect of the Multimove program on the development of locomotor and object control skills.

Locomotor gain score (Model 1)												
	Null model 1				**Model 1a**				**Model 1b**			
Fixed effect	*B*	*SE*	*t*		*B*	*SE*	*t*		*β*	*SE*	*t*	
Intercept	3.87	0.49	7.95	*	3.61	0.52	6.91	***	0.32	0.98	0.33	*n.s.*
Treatment									3.74	1.08	3.48	***
Mean Age ‡									2.07	0.58	3.57	***
Mean Baseline score ‡									-0.13	0.12	-1.03	*n.s.*
Sex					0.85	0.37	2.28	*	1.01	0.44	2.29	*
Sex x Treatment									-0.39	0.62	-0.62	*n.s.*
Age †					1.34	0.27	4.90	***	1.17	0.23	5.05	***
Baseline score ‡					-0.55	0.03	-18.76	***	-0.53	0.02	-21.35	***
Age x Sex					-0.43	0.28	-1.57	*n.s.*				
Random effects	σ^2	*SD*	χ^2		σ^2	*SD*	χ^2		σ^2	*SD*	χ^2	
Intercept	7.37	2.71	262.46	***	8.90	2.98	238.99	***	4.28	2.07	200.26	***
level-1 residual	35.91	5.99			4.67	21.78			22.43	4.74		
Sex					1.01	1.00	32.45	*n.s.*				
Age					0.66	0.81	53.70	*	0.49	0.70	74.12	**
Baseline score					0.01	0.08	36.61	*n.s.*				
Age x Sex					0.24	0.49	47.73	*n.s.*				

Table 2 *(continued)*

	Object control gain score (Model 2)											
	Null model 2				Model 2a				Model 2b			
Fixed effect	*B*	*SE*	*t*		*β*	*SE*	*t*		*β*	*SE*	*t*	
Intercept	3.79	0.52	7.32	***	5.34	0.59	9.02	***	1.35	0.97	1.40	*n.s.*
Treatment									4.46	1.06	4.21	***
Mean Age ‡									3.77	0.64	5.84	***
Mean Baseline score ‡									-0.37	0.13	-2.82	**
Sex					-2.75	0.38	-7.18	***	-3.50	0.49	-7.11	***
Sex x Treatment									0.99	0.66	1.52	*n.s.*
Age †					1.62	0.24	6.74	***	1.68	0.18	9.09	***
Baseline score ‡					-0.46	0.03	-14.24	***	-0.47	0.03	-14.83	***
Age x Sex					0.03	0.28	0.12	*n.s.*				
Random effects	σ^2	*SD*	χ^2		σ^2	*SD*	χ^2		σ^2	*SD*	χ^2	
Intercept	8.95	2.99	295.26	***	11.68	3.42	202.11	***	4.11	2.03	123.29	***
level-1 residual	32.21	5.68			24.13	4.91			24.59	4.96		
Sex					0.55	0.74	37.57	*n.s.*				
Age					0.20	0.45	41.46	*n.s.*				
Baseline score					0.01	0.09	56.51	***	0.00	0.06	53.65	*n.s.*
Age x Sex					0.12	0.35	36.19	*n.s.*				

Note: † group mean centered; ‡ grand mean centered

*Note: *** p < .001; ** p < .01; * p < .05; n.s. = not significant*

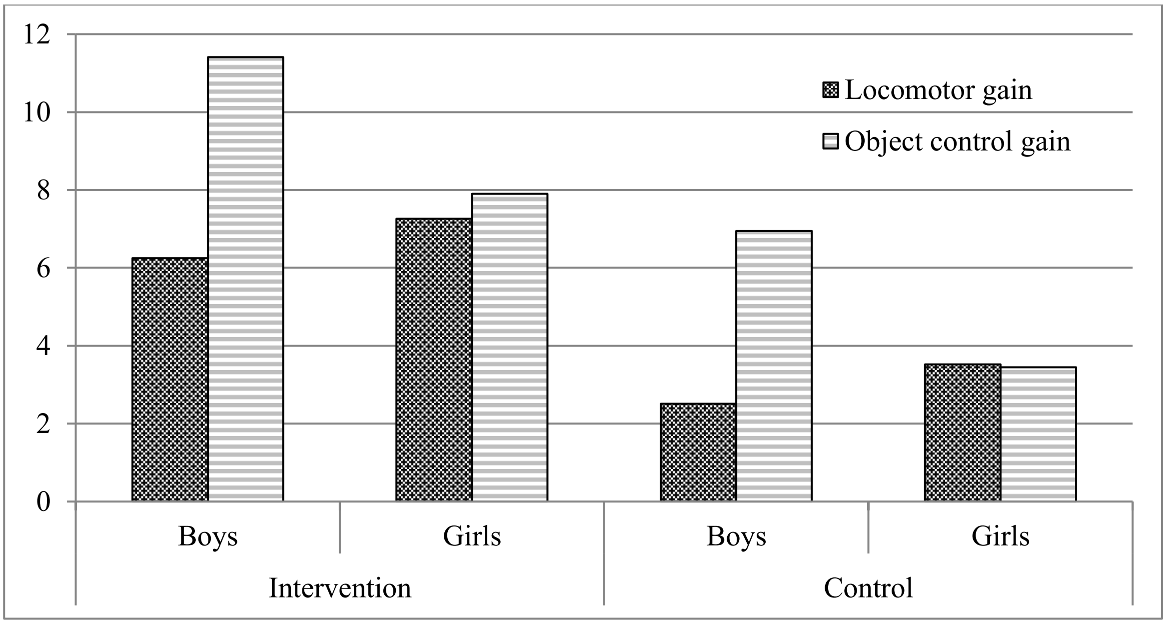

Fig 1: Model-based gain scores in locomotor and object control skills by sex and treatment.

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