Co-funded by the
Erasmus+ Programme
of the European Union

Sport at school

Summary of final evaluation

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Partners

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FÉDÉRATION FRANÇAISE KARATÉ

DKV

Introduction

The European Union Guidelines on Physical Activity (2008) highlight that the decline in physical activity and the concomitant increase of the time spent in sedentary behaviours observed among children in Europe represent an enormous threat.

In fact the EU Action Plan on Childhood Obesity 2014-2020, reports that the high level of overweight and obesity in children and young people is an area of particular concern. According to estimates from the WHO's Childhood Obesity Surveillance Initiative (COSI), around 1 in 3 children in the EU aged 6-9 years old were overweight or obese in 2010. This is a worrying increase on 2008, when estimates were 1 in 4.

Likewise, the WHO in the document "Prioritizing areas for action in the field of population-based prevention of childhood obesity: a set of tools for Member States to determine and identify priority areas for action", reports that "over the past three decades the prevalence of overweight and obesity has increased substantially. Globally, an estimated 170 million children (aged < 18 years) are estimated to be overweight, and in some countries the number of overweight children has trebled since 1980. The high prevalence of overweight and obesity has serious health consequences. Raised body mass index (BMI) is a major risk factor for diseases such as cardiovascular disease, type 2 diabetes and many cancers (including, colorectal cancer, kidney cancer and oesophageal cancer). These diseases, often referred to as noncommunicable diseases (NCDs), not only cause premature mortality but also long-term morbidity. In addition, overweight and obesity in children are associated with significant reductions in quality of life and a greater risk of teasing, bullying and social isolation.

Due to the rapid increase in obesity prevalence and the serious health consequences, obesity is commonly considered one of the most serious health challenges of the early 21st century".

The second EU Work Plan for Sport (2014-2017) gave priority to Health-Enhancing Physical Activity promotion and identified additional actions for the Member States (MS) and the Commission to promote HEPA. It mandated the Expert Group on HE (XG HEPA) to produce recommendations to encourage physical education in schools, including motor skills in early childhood, and to create valuable interactions with the sport sector, local authorities and the private sector.

It has been estimated that about 80% of school-age children only practice physical activity and sport in school Consequently, the Expert Group recognizes school as the major institution that can allow all children to achieve,

both through formal curriculum (PE) and extra-curricular sport, the WHO (World Health Organization) Physical Activity recommendations (>60 min/day). As regards the PE curricular content the XG affirms that from birth and during early childhood, PE should include daily active play, enjoyable games (fun), dance, and sports aiming to develop core neuromotor skills, physical, psychological, and social attributes; it also must respect maturity phases and neuromotor/skills trainability. Furthermore, the XG recommends the establishment of cooperative framework between school and sport organisations in order to promote both curricular and extra-curricular activities.

The Sport at School project

To address these issues, national Karate Federation of Italy, France, Germany, Poland, Portugal and Spain, together with FIJLLKAM, created a network to implement the Sport at School project, based on the Italian experience of the MOVI-MENTE initiative.

The overall aim of Sport at School project is to promote motor activities in primary schools to tackle children sedentary lifestyle and hypokinesia through an innovative approach based on recent neurosciences researches. The motor activities protocol was designed to stimulate "executive functions" of children, that are the cognitive functions that serve to maintain an appropriate problem-solving set to attain a future goal and encompass cognitive domains that are highly relevant for daily life activities, appropriate behavior, and academic and social function.

By developing this methodology, it was expected an improvement in children motor abilities, learning abilities and social behavior.

The experimentation involved 4 primary schools for each Country and it was implemented in one class per school (pupils aged 7-8) with a control class during 2017-2018 school year. The motor activities were conducted by specifically trained technicians in an "enriched environment".

This document shows the results assessed by the University of Padua and the Universidad Complutense of Madrid.

Department of Biomedical Sciences,
University of Padua, Italy.

Motor test evaluation of the Sport at School Project

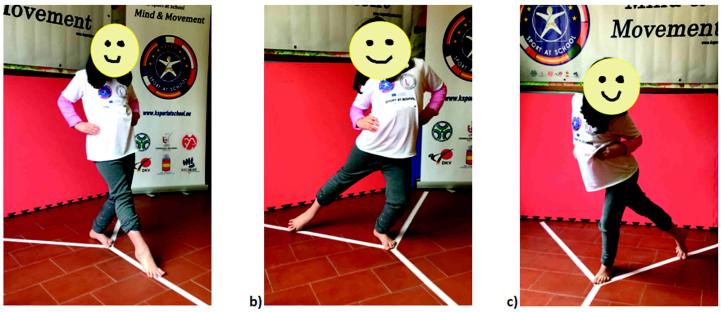
The Sport at School project was designed according to best-practice recommendations derived from research into teaching experiences that maximize opportunities for learning and success. It enhances cooperation between sport clubs and schools in order to increase the amount and quality of physical activity performed by children. A total of 688 pupils (mean age 8.1 ± 0.4 years) from 5 Countries participated in the study and were randomized into an experimental group (Karate group *n*=353) or a control group (*n*=335).

Evaluation of the program focusing on change in children motor abilities was conducted with five different motor tests. The tests have been administered by federal technicians at two-time points (at baseline – October 2017 - and after 6-months of project – May 2018).

The tests were selected in order to evaluate general coordination, karate-specific coordination, balance and flexibility. Below is a description of each test with reported results.

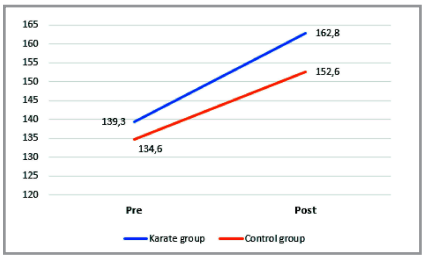
Y Balance test

In the Y-balance test the child stands on one leg in the center of a grid (Figure 1), with the most distal aspect of the great toe at the starting line. While maintaining a single-leg stance, the subject is asked to reach with the free limb in the anterior, posteromedial, and posterolateral directions in relation to the stance foot (*Figure 1, a, b, c*, respectively). The maximal reach distance is registered, corresponding to the point where the most distal part of the foot reached.

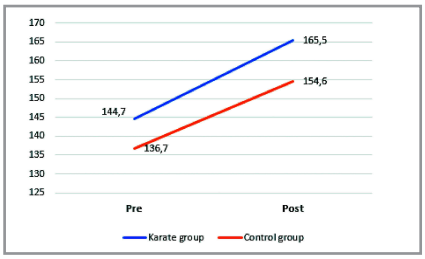


a) b) c)

Pre-post-intervention variations of Y balance test composite score for right leg (a) and left leg (b), for both the groups.



a)



b)

Castle test

The Castle test evaluates the rapidity and reaction of inferior limbs muscles; however, the result of this test is also influenced by the coordinative ability of the subject.

The Castle test consists of six, feet together jumps inside-out of a square (the castle) with sides of 80cm length and a rope positioned at 30cm high from the ground *(Figure 2a)*. Pre-post-intervention variations of Castle test for both the groups didn't reported significant differences, it is reported in *Figure 2b*.

Figure 2a

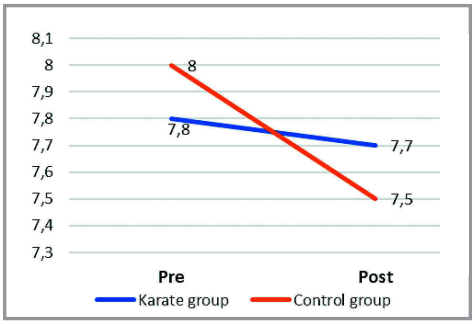
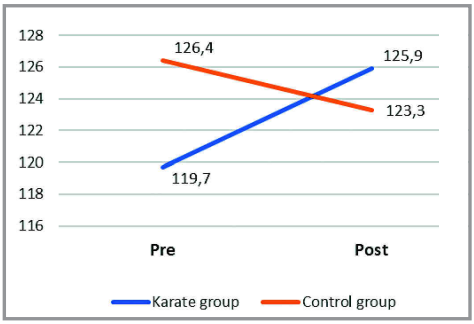


Figure 2b

Frontal split test

The Frontal Split test measures the flexibility of the hip joints. It is executed with the subject seated on the ground, their back vertical and against a wall, with legs stretched apart. This test measures the maximal frontal split in angle degrees *(Figure 3a)*, and it should be executed once.

The Karate group reported significant improvements in comparison to the control group *(Figure 3b)*.



a) b)

Figure 3. Frontal split test execution (sx) and results (dx)

Somersault test

The Somersault test evaluates the overall motor control ability and coordination of the subject that is asked to perform a somersault on a mat. The Somersault test was evaluated using three parameters: stiff legs contemporary feet arrival, and stand up arrival. The test was performed three times and the final total score is the average of the three trials. Strong effect size was reported on Somersault test (n^2 = .138) with a mean percentage increment of 60.3% in comparison to that of the control group of 28.4%. Results are represented in *Figure 4*.

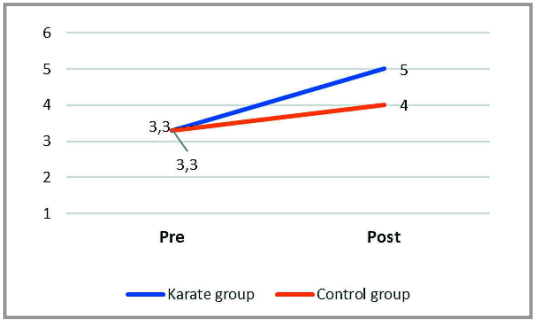


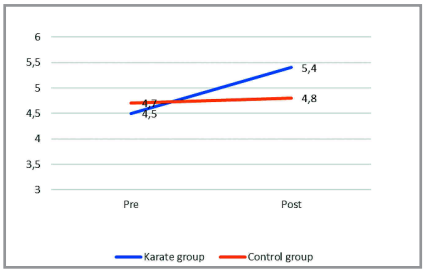
Figure 4. Somersault test results

Frontal Kick preparation test

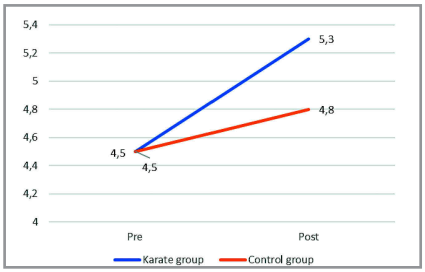
The Frontal Kick preparation test is useful in evaluating specific coordination ability. The participant is asked to stand with their feet together with arms alongside the body.

It consists of flexing each one of the legs until reaching a 90° angle at the hip joint and maintaining the position for at least 5 seconds *(Figure 4a)*.

a)



b)



c)

Figure 4. Frontal Kick preparation test execution (a) and results (b for the right and c for the left leg)

The Frontal Kick preparation test is evaluated on three parameters: ground foot stationary, the thigh is parallel to ground, and the trunk is vertical. The Karate group reported significant improvements in comparison to the control group improving of 26.9% the performance on the right leg and of 26.2% that on the left leg *(Figure 4b)*.

After the intervention period, participants in the Karate group reported significantly higher values in the post test evaluations in comparison to the Control group in all the motor tests, with exception of the Castle test where no differences were detected.

The findings support the fact that Sport at School project is effective in improving motor abilities of children aged 7-9 years. In particular, a strong effect was reported for somersault test, therefore the intervention seems particularly effective in improving specific coordination but also overall coordination of children.

Improving general coordination of 7-8 years old children is very important. Apart from the physical domain in which the reported results can have an impact, the importance of motor competence on the psychosocial lives of children has been recognized in the literature. Children with higher coordination abilities generally perceived themselves as more competent in several domains, with higher self-worth and lower levels of anxiety than children with coordination problems.

The Sport at School project showed promising results on motor coordination with far-reaching implications for social and emotional functioning of children. It can be predicted that this would have broad implications on the development of the coordinated child's self-perceptions extending beyond the athletic domain.

Behavioural and cognitive evaluation of the Sport at School Project
Complutense University of Madrid

1. Introduction

The Sport at School project (2015-18), co-funded by the Erasmus+ Programme of the European Union, was held as a tool to fight against the inactivity and sedentary lifestyle problems of European children. The lack of physical activity affects different domains of children's life, including cognitive factors such as attention, behavior, learning, mental health, academic performance and so on. Therefore, Complutense University of Madrid has been in charge of the Sport at School external evaluation by assessing the behavioural and cognitive results of the experimentation.

The main tool of the project is the Movi-mente Program which includes physical exercises based on karate skills. This program was successfully introduced in Italian schools and sport clubs. However, scientific research across different countries was yet to be conducted. Thus, the aim of this research was to evaluate the effects of the Movi-mente Program on European children cognition.

2. Methods

Children from 20 schools in Europe took part in the experimentation phase of the project during the 2017-18 academic years. The four schools from each country (France, Germany, Poland, Portugal and Spain) were selected to be representative of their countries' population according with geographic location (North/South, East/West and coast/inland), family socioeconomical status as well as city and town population. All the participants belong to second year of Primary School with an average age of 7.09 ± 0.34 years for girls and 7.20 ± 0.48 years for boys.

In each school, two homogeneous groups of second year Primary students were chosen and assigned to one of these conditions:

- **K group:** children belonging to the karate group who practiced the Sport at School protocol two hours per week in the curricular time.
- **C group:** children belonging to the control group who carried out their regular school subjects.

Technicians who implemented the Sport at School protocol were previously trained during two stages in Italy (theoretical and practical contents)

in the first half of 2017. In the same period, contacts with school administrations were carried out in order to achieve the permission to implement the project within the school curricular program.

Widely instruments used in educational research were selected for a reliable and valid evaluation taking into account the characteristics from this investigation: 5 different languages, the children age, the contact with families/schools and so on. Thus, the selected instruments were:

- The Strengths and Difficulties Questionnaire (SDQ) for 4-17 years-old children (parent version): 25 items of this test assess 5 scales: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems and prosocial behaviour. The *total difficulties score* is the sum of the first 4 scales, meaning that a higher score is associated with higher problems.
- School marks: results provided by their school teachers in each subject (Mathematics, Foreign Language, Mother Tongue Language, Science, Arts and Crafts, and so on) were analyzed and averaged separately for each student. School marks were coded from 0 to 10 in order to unify different country evaluation systems.

Other instruments were used to measure possible confounder variables that had been taken into account: gender, country, town, body mass index, aerobic fitness, physical activity, race/ethnical group, parents' education, health issues, learning disorders and attendance to the *Sport at school classes*. For all the data collection process, children anonymity was guaranteed according to Data Protection Laws and the Declaration of Helsinki ethical principles for medical research involving human subjects. The families informed consent was also obtained deciding whether they participate or not in the research.

3. Results

Statistical analysis of results included only those children who had the entire data from pre-test and post-test on an instrument. Thus, the final sample was composed from 526 children whose parents completed the SDQ and 668 children whose school grades were obtained from.

The first analysis confirmed that k and c groups showed similar results in pre-test (baseline) with no-significant differences between them. Therefore, post-test results (after the experimentation) were compared in order to know what group had a bigger improvement in these cognitive and behavioral variables.

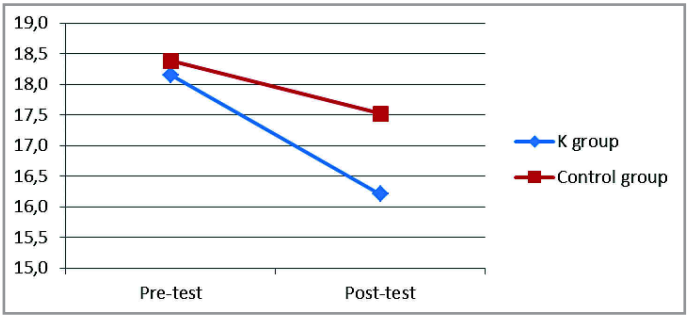


Figure 1: evolution comparison on the total difficulties score in karate and control groups.

In general, the group who practiced the Sport at School protocol showed better results than the control group after the program (post-test) in most of the SDQ scales and most of the school marks subjects. The SDQ analysis proved that k group obtained significant better results in total difficulties score ($t=-2.40$; $p<0.05$) and in hyperactivity scale ($t=-2.23$; $p<0.05$). The school marks showed a trend to be higher in the k group ($t=1.71$; $p=0.08$) and significantly better results in mother tongue language for the k group ($t=1.96$; $p<0.05$).

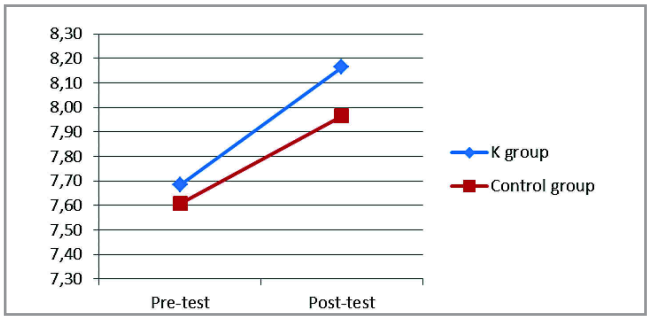


Figure 2: evolution comparison on school marks in karate and control groups.

4. Conclusions

To sum up it can be concluded that:

- The Sport at School protocol benefits parents´ perception of their children difficulties (emotional symptoms, conduct problems, hyperactivity/inattention and peer relationships problems).
- Children who participated in the experimental group from the Sport at School protocol had better school grades than the children control group after the school program. This difference is significantly better in the mother tongue language subject (French, German, Polish, Portuguese and Spanish).

Sport at School

Photogallery

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This project has been funded with support from the European Commission. This document reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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