

# Changing Beliefs about Health in Early Elementary School Years: Effect of a Motor Creativity Intervention

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CAMBIARE CREDENZE SULLA SALUTE NEI PRIMI ANNI  
DELLA SCUOLA ELEMENTARE: L'EFFETTO DI UN INTERVENTO  
DI CREATIVITÀ MOTORIA

## ABSTRACT

*School physical education offers an ideal venue to promote healthy habits. Motor creativity has been found to effectively increase children's learning and attitude formation. The aim of the present study was to test for the effectiveness of an intervention promoting motor creativity through healthy lifestyle stimuli in the promotion of elementary children's knowledge regarding health, as well as in the change of their attitudes about nutrition and exercise. One hundred twelve elementary school students participated in the study. Participants were assigned into the experimental (n = 58) and control (n = 54) groups. Students performed the TCAM and they were administered the Health Lifestyle Evaluation Instrument along with measures of attitudes towards healthy nutrition and exercise. Analyses of variance with repeated measures showed a significant increase of knowledge towards health in the intervention group. However no differences were found between the two groups regarding the attitudes towards healthy nutrition and exercise. The results provided useful information regarding the effect of motor creativity in the learning process in elementary schools.*

*Key words:* Attitude, Children, Elementary school, Healthy nutrition, Physical activity, Physical education.

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## 1. INTRODUCTION

International statistics demonstrated a decline in children's health-related behaviors (Trudeau & Sheppard, 2005). More specifically, an increase in physical inactivity (Cecchini *et al.*, 2010), overweight and obesity rates (Shields, 2006) and eating disorders (Smink, Van Hoeken, & Hoek, 2012) has been reported. Accordingly, the majority of children and adolescents do not meet the guidelines for physical activity participation (Biddle, Gorely, & Stensel, 2004). These negative trends are perceived as an emerging threat to public health and called for specific actions that make public health a priority (see for example Kohl *et al.*, 2012).

Kriemler *et al.* (2011) and De Bourdeaudhuij *et al.* (2011) suggested that school-based interventions are the most universally applicable and effective way to counteract physical inactivity and promote health-related behaviors. Indeed, numerous interventions have been designed and implemented in order to promote physical activity and healthy nutrition through school activities. The majority of these interventions was knowledge-based and involved the whole school. For instance, Manios and his associates implemented a knowledge-based intervention for six years and reported increase on the knowledge about health, physical activity and fitness, and physiological indices, such as BMI and blood indices (Manios & Kafatos, 1999; Manios *et al.*, 1999 and 2002; Manios *et al.*, 2006). Gorely, Nevill, Morris, Stensel, and Nevill (2009) using a similar knowledge-based intervention were able to increase elementary school children's moderate-to-vigorous physical activity and slow the rate of increase in percent body fat, BMI, and waist circumference. Furthermore, Llargues *et al.* (2011) reported that educating elementary school students on healthy eating and physical activity could improve BMI, healthy eating habits and physical activity patterns. Similarly findings were reported by Stock *et al.* (2007) who implemented a peer-led intervention in the school context.

In a systematic review of the available literature on physical activity Kriemler *et al.* (2011) suggested that the application of multi-component intervention strategies, such as those described above, was most consistently found to be effective in increasing in-school, out-of-school or overall PA, and fitness. These findings supported the potential of school-based PA interventions to promote physical activity levels. Similarly, De Bourdeaudhuij *et al.*

(2011) suggested that school-based interventions including physical activities during recess, before or after the school hours, and opportunities for physical activities in and around the school, increased physical education lesson participation. Also, they increased the availability and accessibility to healthy foods. Furthermore, these were effective strategies in promoting mostly knowledge about the importance of physical activity and healthy nutrition and to a lower extend actual behavior.

### *1.1. Physical education interventions: the role of motor creativity*

Nevertheless, the majority of the above mentioned interventions included a whole school approach whereas there is a paucity of research about the effectiveness of interventions within specific school disciplines. For instance, school physical education can provide an important venue to promote health-related behaviors such as physical activity participation and nutrition. In this school discipline, van Beurden *et al.* (2003) implemented the «Move it Groove it» intervention focusing on physical education lessons by supporting physical education teachers, but also creating supportive environments and healthy school policies. The intervention was effective in increasing students' moderate-to-vigorous physical activity and their fundamental movement skills. Furthermore, Kriemler *et al.* (2010) modified the existing physical education lessons in order to be more active and added two more lessons per week as part of the KISS intervention. Students in the intervention group reported higher levels of moderate-to-vigorous physical activity in school and more favorable bodily indices, such as aerobic fitness.

However, these interventions focused mainly in improving physical fitness, skill development and physical activity in school but not in promoting knowledge about health, and physical activity and healthy nutrition habits. In addition they were mainly interested in influencing physical activity. Still, Brown and Summerbell (2009) suggested that a combination of diet and physical activity is more effective in preventing diseases that rely on both behaviors, such as obesity. In addition, they concluded that intervening in younger children may be more successful.

From the above mentioned literature review it is apparent that effective interventions should be education-based and target younger children. In the context of physical education, the development of motor creativity has been proliferated as an important learning tool for preschool and early elementary school students. Motor creativity reflects children's effort to produce movements that provide solutions to motor problems (Zachopoulou, 2007). In this age group motor creativity is closely related to motor development

(Runco, 2007). Vygotsky (1981) was among the first to acknowledge that motor creativity and motor development influence each other and develop in parallel. As Klein (1990) pointed out giving meaning to an object or activity through experimentation, raising questions and searching for solutions results in deeper learning. Empirical research has long ago confirmed the direct association between motor creativity and creative thinking (e.g. McBride, 1991; Cleland & Gallahue, 1993). This association might explain the notion that motor creative activities can foster children's motivation to change attitudes or lifestyle (Cleland & Gallahue, 1993).

Acquiring knowledge about a healthy behavior, such as physical activity participation and healthy nutrition, and changing attitudes towards this behavior are important steps in changing the behavior itself. This has been empirically supported with respect to childhood obesity (see Goldfield *et al.*, 2012). Also, creative movement has been positively associated with creative thinking (Scibinetti, Tocci, & Pesce, 2011) and higher self-concept (Bournelli, Makri, & Mylonas, 2009). Importantly, in the early elementary years motor creativity can assist in increasing knowledge and changing attitudes as it addresses the fundamental educational principle that learning occurs when enriching children's awareness towards an issue (Byrne & Hills, 2007). Indeed, past evidence has shown that playful activities can promote learning (Kangas, 2010; Pramling, Samuelson, & Johansson, 2006) and develop positive attitudes towards exercise and healthy eating (Digelidis *et al.*, 2003)

## 1.2. *The present study*

The above mentioned literature indicates a growing interest using school-based interventions in promoting students' healthy nutrition and physical activity. The majority of the interventions implemented so far involved activities that complement the school curriculum. However, in most instances such activities are difficult to implement as they require educated and committed personnel, extra time and facilities. On the other hand, there is a paucity of research on interventions within the school hours and school disciplines. The present study was set out to investigate whether such an intervention could be effective in changing elementary school students' beliefs about health. More specifically, the purpose of the present study was to examine the effectiveness of a motor creativity intervention implemented during the physical education lesson on students' knowledge about healthy lifestyle, and attitudes towards nutrition and exercise. Based on prior literature on the effect of motor creativity in learning and attitude formation (Cleland & Gallahue, 1993; Zachopoulou, 2010) it was hypothesized that students in

the intervention group will report better knowledge towards health and more positive attitudes towards healthy nutrition and exercise after the implementation of the intervention as compared to students in the control group.

## 2. METHOD

### 2.1. *Sample*

Participants were 112 elementary school students ( $M = 6.19$ ,  $SD = .37$ ) attending typical public elementary schools in Thessaloniki, an urban city in Northern Greece. Four schools were selected to take part in the study using a stratified sampling approach. The regional educational authorities provided a list of all elementary schools from which two areas of the city were selected; then, two schools from each of these areas were chosen. The students that participated in the study were representative of the city's population and were attending mixed gender classes and a medium socioeconomic level.

### 2.2. *Measures*

#### 2.2.1. Motor creativity

Children's motor creativity was assessed via the Greek version (Zachopoulou, Makri, & Pollatou, 2009) of the Thinking Creatively in Action and Movement (TCAM; Torrance, 1981). Four activities were included in this test that assessed three dimensions of motor creativity. The first, third and fourth activities assessed fluency and originality while the second one imagination.

The stem question of the first activity was «How many ways?» and the child was asked to run or walk across the room in every possible way that he/she can think of. The stem question of the second activity was «Can you move like?» and six pretend situations were shown to the child. In four of these situations the child was asked to move like a certain animal or object (e.g., tree, rabbit, fish and snake) while in the remaining two the child was asked pursue other behaviors (e.g., drive a car and push an elephant off a desired object). The stem question of the third activity was «What other ways?» and the child was asked to show every way he/she can think of, so as to put a paper cup in a trashcan. The stem question of the fourth activity was

«What might it be?» and the experimenter were asking the child to play with and find variant ways of using a paper cup.

The motor creativity dimensions were rated according to the recommendations provided by Torrance (1981), as well as the prior use of the test in a Greek population (Zachopoulou *et al.*, 2009). The index of Fluency was provided by the total of the responses that were recorded on the score sheets in the first, third and fourth activities. Originality was computed by the comparison of the responses with the norms of the most frequent responses that Torrance (1981) provided. A five-point scale ranging from 1 (*no movement*) to 5 (*excellent imitation*) was used to calculate the Imagination scores.

### 2.2.2. Knowledge about healthy lifestyle

Student's knowledge about aspects of healthy lifestyle (including exercise and nutrition) was assessed by the Health Lifestyle Evaluation Instrument (HLEI) developed by Grammatikopoulos *et al.* (2008). HLEI is a 13-item scale that assesses children's acquired knowledge regarding healthy lifestyle (example item «Which one of the following foods helps me build stronger bones?»). Each item included two images with a correct and a false food/behavior and students had to indicate the image reflecting the right answer to the question. One point was assigned to every correct answer, while zero point was assigned for every false answer. There was also an «I don't know» response option which was also assigned with zero points. The score on knowledge about health was calculated by the total of correct answers. The psychometric properties of the scale for preschool children were provided by Grammatikopoulos *et al.* (2008).

### 2.2.3. Attitudes towards healthy lifestyle

The scale is consisted of two subscales assessing two aspects of a healthy lifestyle, nutrition and exercise. Each of the subscales is measured with four bipolar adjectives (i.e., good-bad, useful-useless, easy-difficult and beneficial-harmful). A happy emoticon was used to express the positive pole, while an unhappy emoticon was used for the expression of the negative one. Participants were asked to describe their opinion about each adjective by circling one of the emoticons. There was also a neutral emoticon to express the «Don't know» option. In the past, Privitera, Vogel and Antonelli (2013) have found this approach to be effective in matching dimensions of health to the emotional evaluations of health in pre-school children. A total score was calculated with a minimum score of 4 and a maximum of 8, representing a very negative attitude and a very positive attitude respectively.

### 2.3. *Experimental design*

The selected schools were randomly assigned into intervention and control groups. The school was used as the unit of assignment as the interaction among children in the same school (even if they attended different classes) could distort the data in case children belonging into different groups; 58 students comprised the intervention group (Mage = 6.32, SD = .47, 24 females) while the control group consisted of 54 students (Mage = 6.00, SD = .01, 29 females). The intervention group received a motor creativity intervention consisted of 12 physical lessons, each lasting 35 to 40 minutes. The intervention included stimuli related to eating and physical activity. For example, in order to improve knowledge of body children were asked to balance on two different body limbs each time. Similarly, in order to teach motor coordination children were asked, for instance, to move trying to balance a balloon with different parts of their body or resemble the imaginary movement of healthy and unhealthy foods. Knowledge about fruits and vegetables was taught through exercises including among others dramatizing a story with fruits and vegetables in the key roles. The intervention was implemented by the school physical education teachers assisted by trained personnel. Each lesson included six exercises lasting 7 to 8 minutes each. Four of the exercises were designed aiming to improve children's motor creativity through stimuli associated to nutrition and exercise (one warm up and one cool down exercise). The control group attended the typical education lesson which included the typical physical activities and plays included in physical education curriculum. Their duration was also 40 to 45 minutes.

### 2.4. *Procedure*

The study was approved by the Ministry of Education, Research and Religious Affairs. The researchers informed the principals and the teachers of the selected schools about the aim and the procedures of the study and they agreed to participate in the study. Students' parents were also informed by the principals about this innovative approach in physical education and they were asked to give their consent. All parents agreed and gave their permission. The principals of the control group schools were also informed the parents that their school was chosen to participate in a study about motor creativity and attitudes towards healthy lifestyle and all parents gave their permission.

TCAM was administered following the standardized test instructions (Torrance, 1981) by two trained research assistants. Each child was tested individually in a multi-purpose room of the elementary school. Neither of the

research assistants was aware of which group children were allocated to. According to Zachopoulou *et al.* (2009) the research assistants demonstrated each of the skills once and gave specific verbal instructions to the children, while he/she encouraged them to give their maximum effort. Concerning knowledge about health and attitudes towards healthy lifestyle students read the items and responded in the score sheet. The duration of the procedure was approximately 35 minutes for each child. The next phase included the implementation of the 12 lessons. The duration of the intervention was approximately 2½ months and took place in the fall semester. The second measurement of the tested variables took place right after the intervention. Schools assigned to the control condition followed the same procedure and the two measurements took place in the fall semester with a time gap of 2½ months. The administration of the tests was the same in all measurement points in both groups.

### 3. RESULTS

#### 3.1. Descriptive statistics

Table 1 presents the means and standard deviations of the variables. Table 2 shows the correlation coefficients among the variables.

Table 1. – Descriptive statistics of the study's variables.

	TOTAL SAMPLE		CONTROL GROUP		EXPERIMENTAL GROUP	
	M	SD	M	SD	M	SD
Fluency*	96.20	15.19	96.62	14.93	95.81	15.55
Originality*	99.08	17.71	101.53	18.64	96.79	16.62
Imagination*	90.63	15.72	89.75	15.67	91.44	15.87
Nutrition attitudes*	7.46	1.21	4.66	1.46	4.41	.91
Exercise attitudes*	7.52	.92	4.53	1.11	4.41	.72
Health knowledge*	11.59	1.98	11.51	1.96	11.67	2.02
Fluency**	115.30	17.25	137.00	14.66	121.79	16.92
Originality**	124.95	22.66	159.00	19.43	133.44	22.12
Imagination**	106.74	13.07	141.00	14.27	111.82	9.41
Nutrition attitudes**	7.64	.81	4.44	1.03	4.27	.55
Exercise attitudes**	7.67	.88	4.51	1.17	4.15	.45
Health knowledge	12.62	2.46	11.24	2.90	13.91	.73

Note: \* pre-intervention measurement, \*\* post-intervention measurement.



*Table 2. – Correlation analysis among the study's variables.*

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	2	3	4	5	6
1. Fluency	.91**	.55**	.02	.02	.26**
2. Originality		.46**	.01	.01	.20*
3. Imagination			.23*	.30**	.30**
4. Nutrition attitudes				.46**	.19*
5. Exercise attitudes					.37**
6. Health knowledge					

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Note: \*  $p < .05$ , \*\*  $p < .001$ .

### 3.2. *Effect of the intervention on motor creativity*

An analysis of variance with repeated measures on time was conducted to assess the effects of the intervention on the dimensions of motor creativity. Regarding Fluency, the results showed a significant group by time interaction,  $F(1,108) = 29.86$ ,  $p < .001$ ,  $\eta^2 = .21$ . Post hoc analyses showed that scores in the experimental group increased more from pre- to post-intervention measurement ( $M = 95.81$  and  $M = 121.89$  respectively) as compared to the control group's scores ( $M = 97.51$  and  $M = 108.07$  respectively). Similar results were revealed for Originality, where the analysis of variance with repeated measures on time showed a significant group by time interaction,  $F(1,108) = 41.62$ ,  $p < .001$ ,  $\eta^2 = .27$ . Post hoc analyses revealed a significantly higher increase in the scores of Originality at the intervention group ( $M = 96.79$  at pre-intervention and  $M = 133.44$  at post-intervention). Results of the control group demonstrated a smaller and non-significant increase ( $M = 102.48$  at pre-intervention and  $M = 115.48$  at post-intervention). Lastly, analysis of variance with repeated measures on time showed a significant group by time interaction for Imagination,  $F(1,108) = 14.66$ ,  $p < .001$ ,  $\eta^2 = .12$ . Like the other dimensions, post hoc analyses revealed a significant increase on the Imaginations scores at the intervention group from pre- ( $M = 91.44$ ) to post-intervention ( $M = 111.82$ ). A smaller and non statistically significant increase in the scores of Imagination from pre- ( $M = 90.61$ ) to post-intervention ( $M = 101.07$ ) was found in the control group.

### 3.3. *Effect of the intervention on the knowledge and attitudes towards healthy lifestyle*

An analysis of variance with repeated measures on time was conducted to assess the effects of the intervention on knowledge and attitudes towards healthier lifestyle. Regarding health knowledge, the results showed a significant group by time interaction,  $F(1,108) = 28.60, p < .001, \eta^2 = .20$ . Post hoc analyses indicated that scores in the control group increased from the pre- to post intervention measurement points ( $M = 11.67$  and  $M = 13.91$  respectively), whereas the scores in the control group remained stable ( $M = 11.48$  and  $M = 11.67$  respectively).

In regard to the attitudes towards healthy nutrition, results of the analyses showed no significant group by time interaction,  $F(1,108) = .26, p > .05, \eta^2 = .002$ . No significant main effect on group or on time was found. Similar results were emerged regarding attitudes towards exercise. The results of the repeated measures analysis of variance didn't indicate a significant group by time interaction,  $F(1,108) = 1.42, p > .05, \eta^2 = .01$ . In addition, no significant main effect on group or on time emerged.

## 4. DISCUSSION

The present study was designed to assess the effect of a motor creativity intervention in promoting knowledge concerning health and enhancing attitudes in regard to healthy nutrition and exercise in elementary school children. The intervention was found to be efficient in developing student's motor creativity while the results also showed that there was an increase in children's knowledge about health. Nevertheless, the intervention was found to have no significant impact on student's attitudes towards nutrition and exercise.

The findings of the study confirmed the effectiveness of the intervention in enhancing motor creativity in all of its dimensions – Fluency, Originality and Imagination – suggesting that motor creativity can evolve. In order for this to happen, physical education lessons should include exercises promoting imagination and student's communication. The results also highlighted the importance of including motor problem solving tasks in the learning process, giving the chance to students to work on such motor problems as well as encouraging them to identify new solutions. In addition, the relevant to healthy lifestyle stimuli that was used in this study was found to be adequate in developing motor creativity. These results suggest that the intervention applied in the present study can be used for the promotion of

motor creativity in educational settings. The finding that the intervention enhanced student's knowledge about health is in line with prior studies on creative and playful learning. Past evidence suggested that learning can be promoted by integrating playful activities in the learning process (Kangas, 2010). Furthermore, Pramling, Samuelson and Johansson (2006) underlined in their study that playful activities can promote several skills in children such as fantasy and empathy as well as the ability to communicate, think in a symbolic way and solve problems. Importantly, the present study indicated that such playful and creative activities can promote learning too. Our results are also consistent with those of previous research which has yielded that the promotion of a healthy lifestyle can be accomplished by interventions that target exercise and healthy nutrition (Leslie *et al.*, 1999; Parizkova & Hills, 2005; van Sluijs *et al.*, 2007; de Bourdeaudhuij *et al.*, 2011).

It should be emphasized that the outcome of the present study was the result of an intervention formed on the development of motor creativity. Our results are consistent with findings of previous research and theoretical tenets which support the association of motor activity with the improvement of creative thinking and learning (Vygotsky, 1981; Klein, 1990; McBride, 1991; Cleland & Gallahue, 1993; Zachopoulou, 2007), and suggest that motor creativity can promote learning in multiple areas of the curriculum. For example, activities of motor creativity that include stimuli related to environment might be able to enhance knowledge for this curriculum subject. Hence, it is suggested that it would be beneficial for the learning process if teachers include in their regimes playful activities that promote motor creativity (Pramling Samuelsson, & Johansson, 2006).

Regarding positive attitudes towards nutrition and exercise, the results showed that the intervention didn't have an impact on them. Digelidis *et al.* (2003) applied an intervention including playful physical activities, which was found to be effective in developing positive attitudes towards exercise and healthy eating. Furthermore, it has been suggested that a change of attitude, especially if it happens early in childhood, is crucial for the change of the behavior (Godfield *et al.*, 2012). Based on the above, it would be assumed that such an intervention, as the one applied in the present study, that incorporates playful and motor creative activities would improve children's attitudes regarding exercise and healthy nutrition. Nevertheless, the results failed to support this idea. This finding could be attributed to the short duration of the intervention. The intervention lasted 6 weeks only, two hours per week, and it seems that this period is not long enough in order for the student's attitudes to change. Hence, an intervention that would have lasted longer might have had an impact in the change of children's attitudes.

The failure of the intervention to change children's attitudes might also be the consequence of the flexibility of the school curriculum. This means that teachers might have already incorporated in their classes units and activities that target healthy nutrition and exercise, so children might have already established positive attitudes concerning exercise and healthy nutrition as a result of these projects. An additional explanation about the lack of change in student's attitudes might be the type of measurement that was used. The scale included a two response option that represented the two poles (good - bad) of the adjective at hand. This approach might have which might have not allowed variability in answers, since children could only choose the one pole they thought that could best describe their evaluation. As a result, the options that the measurement provided might haven't been able to identify low or moderate changes in children's attitudes since it could only estimate the development of a positive attitude for students who previously had a negative one. A greater variability in the responses might be more useful.

Our study has limitations. Firstly, the researchers didn't carry out a systematically observation of the learning process in the schools that were used as the control group. Even though a detailed conversation with the principal and the teachers took place before the intervention in order to affirm that they wouldn't include in their curriculum activities any projects regarding exercise and healthy nutrition, the research team didn't observe systematically the learning process. Furthermore, no records of school activities that might be related to healthy lifestyle were kept neither before the intervention nor the first measurement in the control schools.

Further research should aim to cope with these issues by keeping diaries of the activities included in the school's curriculum during the whole year, so as to detect any effect that these activities might have in the tested variables. Moreover, in order to ascertain that children would be capable of clearly differentiating the two poles of the adjectives, the scale that was used was a two option semantic differentiation scale. As a result the scale couldn't provide variability in student's answers. This could provide directions for further research that will use measures that give the opportunity of a wider variability of responses. Despite its limitations, the present study, along with few others, employs a motor creativity intervention whose ultimate goal is to enhance a child's knowledge of a specific school subject and to improve elementary school children's knowledge and attitudes towards physical activities and healthy nutrition. Findings of the present study highlight the importance of using playful and creative activities in order for the learning process to be improved. As such activities appear to be effective in teaching curricular areas other than motor skill development, it would be beneficial for teachers to include them in their teaching regimes.

## REFERENCES

- Biddle, S. J. H., Gorely, T., & Stensel, D. J. (2004). Health-enhancing physical activity and sedentary behaviour in children and adolescents. *Journal of Sport Sciences*, 22, 679-701.
- Bournelli, P., Makri, A., & Mylonas, K. (2009). Motor creativity and self-concept. *Creativity Research Journal*, 21(1), 104-110.
- Brown, T., & Summerbell, C. (2009). Systematic review of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity: An update to the obesity guidance produced by the National Institute for Health and Clinical Excellence. *Obesity Reviews*, 10(1), 110-141.
- Byrne, N. M., & Hills, A. P. (2007). The importance of physical activity in the growth and development of children. In A. P. Hills, N. A. King, & N. M. Byrne (Eds.), *Children, obesity and exercise: Prevention, treatment and management of childhood and adolescent obesity* (pp. 50-60). London: Routledge.
- Cecchini, M., Sassi, F., Lauer, J. A., Lee, Y. Y., Guajardo-Barron, V., & Chisholm, D. (2010). Tackling of unhealthy diets, physical inactivity, and obesity: Health effects and cost-effectiveness. *The Lancet*, 376(9754), 1775-1784.
- Cleland, F. E., & Gallahue, D. L. (1993). Young children's divergent movement ability. *Perceptual and Motor Skills*, 77, 535-544.
- De Bourdeaudhuij, I., Van Cauwenberghe, E., Spittaels, H., Oppert, J. M., Rostami, C., Brug, J., ... & Maes, L. (2011). School-based interventions promoting both physical activity and healthy eating in Europe: A systematic review within the HOPE project. *Obesity Reviews*, 12(3), 205-216.
- Digelidis, N., Papaioannou, A., Laparidis, K., & Christodoulidis, T. (2003). A one-year intervention in 7th grade physical education classes aiming to change motivational climate and attitudes towards exercise. *Psychology of Sport and Exercise*, 4(3), 195-210.
- Goldfield, G. S., Harvey, A., Grattan, K., & Adamo, K. B. (2012). Physical activity promotion in the preschool years: A critical period to intervene. *International Journal of Environmental Research and Public Health*, 9(4), 1326-1342.
- Gorely, T., Nevill, M. E., Morris, J. G., Stensel, D. J., & Nevill, A. (2009). Effect of a school-based intervention to promote healthy lifestyles in 7-11 year old children. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 1.
- Grammatikopoulos, V., Konstantinidou, E., Tsigilis, N., Zachopoulou, E., Tsangaridou, N., & Liukkonen, L. (2008). Evaluating preschool children knowledge about healthy lifestyle: Preliminary examination of the healthy lifestyle evaluation instrument. *Educational Research and Review*, 3(11), 351-352.
- Kangas, M. (2010). Creative and playful learning: Learning through game co-creation and games in a playful learning environment. *Thinking Skills and Creativity*, 5(1), 1-15.

- Klein, J. (1990). Young children and learning. In W. J. Stinson (Ed.), *Moving and learning for the young children* (pp. 23-30). Reston, VA: American Alliance for Health, Physical Education, Recreation and Dance.
- Kohl, H. W., Craig, C. L., Lambert, E. V., Inoue, S., Alkandari, J. R., Leetongin, G., ..., & Lancet Physical Activity Series Working Group. (2012). The pandemic of physical inactivity: Global action for public health. *The Lancet*, 380(9838), 294-305.
- Kriemler, S., Meyer, U., Martin, E., Van Sluijs, E. M. F., Andersen, L. B., & Martin, B. W. (2011). Effect of school-based interventions on physical activity and fitness in children and adolescents: A review of reviews and systematic update. *British Journal of Sports Medicine*, 45(11), 923-930.
- Kriemler, S., Zahner, L., Schindler, C., Meyer, U., Hartmann, T., Hebestreit, H., ..., & Puder, J. J. (2010). Effect of school based physical activity programme (KISS) on fitness and adiposity in primary schoolchildren: Cluster randomised controlled trial. *British Medical Journal*, 340, c785.
- Leslie, J., Yancy, A., McCarthy, W., Albert, S., Wert, C., Miles, O., & James, J. (1999). Development and implementation of a school-based nutrition and fitness promotion program for ethnically diverse middle-school girls. *Journal of American Dietetic Association*, 99, 967-970.
- Llargues, E., Franco, R., Recasens, A., Nadal, A., Vila, M., Pérez, M. J., ..., & Roure, E. (2011). Assessment of a school-based intervention in eating habits and physical activity in school children: The AVall study. *Journal of Epidemiology and Community Health*, jech-2009.
- Manios, Y., & Kafatos, A. (1999). Health and nutrition education in elementary schools: Changes in health knowledge, nutrient intakes and physical activity over a six year period. *Public Health Nutrition*, 2(3a), 445-448.
- Manios, Y., Kafatos, I., Kafatos, A., & Nutrition Clinic Research Team. (2006). Ten-year follow-up of the Cretan Health and Nutrition Education Program on children's physical activity levels. *Preventive Medicine*, 43(6), 442-446.
- Manios, Y., Moschandreas, J., Hatzis, C., & Kafatos, A. (1999). Evaluation of a health and nutrition education program in primary school children of Crete over a three-year period. *Preventive Medicine*, 28(2), 149-159.
- Manios, Y., Moschandreas, J., Hatzis, C., & Kafatos, A. (2002). Health and nutrition education in primary schools of Crete: Changes in chronic disease risk factors following a 6-year intervention programme. *British Journal of Nutrition*, 88(03), 315-324.
- McBride, R. E. (1991). Critical thinking: An overview with implications for physical education. *Journal of Teaching in Physical Education*, 11, 112-125.
- Parizkova, J., & Hills, A. P. (2005). *Childhood obesity: Prevention and management* (2nd ed.). Boca Raton, FL: CRC Press.
- Pramling Samuelsson, I., & Johansson, E. (2006). Play and learning: Inseparable dimensions in preschool practice. *Early Child Development and Care*, 176(1), 47-65.

- Privitera, G. J., Vogel, S. I., & Antonelli, D. E. (2013). Performance on a food health assessment using emoticons with pre-literacy-aged children. *American Journal of Educational Research*, 1(3), 110-114.
- Runco, M. A. (2007). *Creativity, theories and themes: Research, development, and practice*. Burlington, MA: Elsevier Academic Press.
- Scibinetti, P., Tocci, N., & Pesce, C. (2011). Motor creativity and creative thinking in children: The diverging role of inhibition. *Creativity Research Journal*, 23(3), 262-272.
- Shields, M. (2006). Overweight and obesity among children and youth. *Health Reports*, 17, 27-42.
- Smink, F. R., Van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Current Psychiatry Reports*, 14(4), 406-414.
- Stock, S., Miranda, C., Evans, S., Plessis, S., Ridley, J., Yeh, S., & Chanoine, J. P. (2007). Healthy Buddies: A novel, peer-led health promotion program for the prevention of obesity and eating disorders in children in elementary school. *Pediatrics*, 120(4), e1059-e1068.
- Torrance, E. P. (1981). Empirical validation of criterion-referenced indicators of creative ability through a longitudinal study. *Creative Child & Adult Quarterly*, 6, 136-140.
- Trudeau, F., & Shephard, R. J. (2005). Contribution of school programmes to physical activity levels and attitudes in children and adults. *Sports Medicine*, 35, 89-105.
- van Beurden, E., Barnett, L. M., Zask, A., Dietrich, U. C., Brooks, L. O., & Beard, J. (2003). Can we skill and activate children through primary school physical education lessons? «Move it Groove it»: A collaborative health promotion intervention. *Preventive Medicine*, 36(4), 493-501.
- van Sluijs, E. M. F., McMinn, A. M., & Griffin, S. J. (2007). Effectiveness of interventions to promote physical activity in children and adolescents: Systematic review of controlled trials. *British Medical Journal*, 335, 703-707.
- Vygotsky, L. S. (1981). The genesis of higher mental functions. In J. V. Wersch (Ed. and Transl.), *The concept of activity in soviet psychology* (pp. 61-80). Armonk: M.E. Sharpe.
- Zachopoulou, E. (2007). Early years physical education: Expression of children's creative thinking through physical education activities. *Bulletin of the International Council of Sport Science and Physical Education (ICSSPE)*, 51, 14-21.
- Zachopoulou, E. (2010). Description of the early steps project. In E. Zachopoulou, J. Liukkonen, I. Pickup, & N. Tsangaridou (Eds.), *Early steps physical education curriculum: Theory and practice for children under 8* (pp. 195-202). Champaign, IL: Human Kinetics.
- Zachopoulou, E., Makri, A., & Pollatou, E. (2009). Evaluation of children's creativity: Psychometric properties of Torrance's Thinking Creatively in Action and Movement test. *Early Child Development and Care*, 179(3), 317-328.

## RIASSUNTO

*L'educazione fisica scolastica rappresenta un momento ideale per promuovere abitudini salutari. La creatività motoria è riconosciuta efficace nel facilitare l'apprendimento dei bambini e sviluppare atteggiamenti salutari. Lo scopo del presente studio era quello di verificare l'efficacia di un intervento che promuove la creatività motoria attraverso indicazioni per uno stile di vita sano e per la crescita delle conoscenze dei bambini in materia di salute, nonché attraverso il cambiamento dei loro atteggiamenti in tema di nutrizione ed esercizio fisico. Centododici studenti della scuola elementare hanno partecipato allo studio e sono stati assegnati rispettivamente ai gruppi sperimentale (n = 58) e di controllo (n = 54). Gli studenti hanno eseguito il TCAM e sono stati amministrati loro anche lo strumento di valutazione dello stile di vita e della salute (Health Lifestyle Evaluation Instrument) ed alcune misure di atteggiamento circa l'alimentazione sana e l'esercizio fisico. L'analisi della varianza con misure ripetute ha mostrato un significativo incremento della conoscenza degli indicatori di salute nel gruppo di intervento. Tuttavia non sono state riscontrate differenze tra i due gruppi riguardo l'atteggiamento verso un'alimentazione sana e un esercizio fisico adeguato. I risultati hanno inoltre fornito informazioni utili sull'effetto degli interventi di creatività motoria nel processo di apprendimento nelle scuole elementari.*

*Parole chiave:* Atteggiamento, Attività fisica, Educazione fisica, Nutrizione salutare, Scuola elementare.

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