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Original Investigation

Physical education in primary school and impact on primary teacher education students from two different university sites

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Purpose: The recent curricular reform of PE in primary schools has revealed several problematic issues, including the different training among the generalist teacher, a graduated in primary teacher education sciences, who taught in I, II and III classes, and the specialist in exercise and sport science, who taught in IV and V classes. A comprehensive study is required to investigate the impact of this legislative innovation on primary teacher education students, who are future generalist teachers, at two separate sites, in order to include the perspective of trainees as internal stakeholders. The aim was to investigate the perceptions of primary teacher education students on the compulsory teaching of PE, as well as the adequacy of their training to teach PE, and to verify which variables could influence their perceptions on PE teaching.
Methods: The sample consisted of 281 primary teacher education students from two south Italy Universities, who completed an ad-hoc questionnaire, focused on their experiences as a trainee, the adequacy of their training to teach PE and the importance of the specialist teacher in PE. Data were analyzed using Chi Square (X^2). $P < .05$ was considered statistically significant.
Results: Students considered important the introduction of the specialist teacher in primary school to teach PE (76.4 %), because of the perceived inadequacy of own training (49.3%). Observing PE lessons increased perceptions of preparation to design lessons using heuristic and prescriptive methods (P =.03). Students who considered important the PE specialist in primary school, believed that it should be present in the curricular teaching of PE (P =.00). The perceived adequacy of own training to teach PE increased the perceived competence to assess children's physical competences (P =.00) and the usefulness of this practice (P =.00). Prescriptive teaching was considered the most effective method (P =.00).
Conclusions: Future generalist teachers showed interest for the discipline but demonstrated training gaps, such as children's movement assessment and general training on PE, that need to be filled using a comprehensive and experiential approach. Academic institutions should use this information to improve student's training for PE teaching, since the role of specialist teacher is currently provided only for V and IV classes.

Keywords: sports reform; generalist teacher; health promotion; core curricula; university training.

Introduction

The Budget Law[1] art.1 cc.329 - 338 headed "Curricular teaching of physical education (PE) in primary school" states that: "*In order to achieve the objectives of the National Recovery and Resilience Plan (PNRR) and to promote in young people, starting from primary school, the assumption of behaviors and lifestyles functional to harmonious growth, health, psycho-physical well-being and the full development of the person... curricular teaching of PE in primary school in classes IV and V by teachers provided with appropriate qualification and the related class - Exercise and Sport Sciences in primary school - is introduced*." Before this reform, PE had no compulsory hourly quantification and was performed by the generalist teacher, who lacked a specific qualification[2], while, currently, PE is becoming curricular and compulsory. The importance of PE is crucial for growth[3] and for the mental and physical well-being of children.[4] Children spend little time in movement both qualitatively and quantitatively. The spontaneous opportunities children get to stay active are decreasing, due to the environment inhibiting movement. Inactivity increases the risk of developing many diseases such as obesity, cardiovascular disease, and type 2 diabetes, not to mention the effects of the COVID-19 pandemic[5-7], still being studied.

Several are the benefits of physical activity, starting from harmonious growth of the body, development of life and soft skills to cognitive and school performance.[8-9] These objectives are not achieved automatically, but using the most appropriate teaching method, depending on the goal to be pursued, the context, the individual characteristics of each student, and the time and equipment available. In literature, teaching methods in physical activities and sports range from the prescriptive teaching method, based on repetition-imitation of the movement gesture, to the heuristic learning, based on discovery[10-11] or mixed[12] towards which the specialist teacher in physical activities and sports should have received extensive university training.[13]

The recent curricular reform of PE in primary schools has revealed several problematic issues, including the different training among the generalist teacher, a graduated in primary teacher education sciences, who taught in I, II and III classes, and specialist, a graduated in exercise and sport sciences, who taught in IV and V classes. Several international studies[14-17] have addressed the problem of different university training between generalist and specialist teachers to teach PE in primary school. Specifically, the generalist teacher had holistic view of their training, adopting a flexible teaching methodology, because of

the plurality of disciplines they taught, neglecting the practical aspects.[18]

The specialist teacher employed a specific teaching methodology that ranged from prescriptive teaching, involving imitation and repetition of movement gestures, to heuristic learning, which is discovery-based. Respect to the generalist teacher, the specialist perceived a high level of competence and self-efficacy in teaching PE; they were more able to manage the class in dynamic activities and to use didactic strategies. PE teachers play a key role in encouraging children to be physically active. Research showed specialist were more able to improve children's physical fitness, respect to the generalist one. The teaching method used can be influenced by teacher's personal beliefs and habits. Therefore, it is important to know the perceptions and opinions, as well as prior experiences in the field of health and wellness or related to teaching PE, in teachers or student trainees. They may influence how PE is transmitted and taught to children.

Complementing previous studies on primary school generalist teacher education[18-19], an in-depth study on the impact of the legislative innovation by primary teacher education science students from two separate sites is needed, to understand their perceptions/opinions about this topic, which would be useful to complete the part of the study on the internal stakeholders of trainees' category. The aim was to investigate the perceptions and opinions of primary teacher education students, future generalist teachers, in relation to the compulsory teaching of PE, as well as the adequacy of their own training for teaching PE. Then, it would be interesting to verify the association between their responses to better understand which variables can influence their perceptions on PE teaching.

Method

Design and study participants

The study design was exploratory, as the topic of the impact of compulsory hours of PE in primary school teaching by a specialized teacher on primary education students had to be understood in depth. A convenience sample, consisting of 281 primary teacher education students attending class in Methods and Teaching of Physical Activities, including 170 from Campania Region (24 ± 5.4 years old) and 111 from other south Italy Regions (M ± SD = 27 ± 7.6 years old), was recruited. The reason for using this kind of sampling is due to its easy implementation, efficiency and cost-effectiveness, although the risk of low generalizability. Informed consent was obtained from the participants, and the data were processed anonymously. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Data Collection

An ad hoc questionnaire was prepared with Google Forms and sent to students via e-mail. The questionnaire included 26 items including 23 closed-ended questions on physical activity practice, the adequacy of own training, as well as perceptions and opinions on PE in primary school and the introduction of the specialist teacher, and 3 open-ended questions to elicit suggestions for improving the generalist training of primary school teachers. The construct validity and content validity were assessed.[20] The questionnaire was revised by two study groups: a group of survey experts adapted the structure of the questionnaire as they saw fit, while a group of sports science and primary teacher education sciences professors assessed whether the questions correctly covered the topic. Items with a content validity index (*CVI*) greater than .78 were included in the final questionnaire. All participants were informed, before completing the questionnaire, about voluntary participation, purpose of the research, data protection, to conclude with informed consent.

Statistical Analysis

Descriptive statistics were used to summarize data in frequencies (N) and percentage (%). Since the data obtained were qualitative, Chi Square (χ^2), was performed to identify associations between variables. The utility is to provide information on variables that can influence students' perceptions on PE teaching. The null hypothesis (H_0) stated that the two variables were independent, while the alternative hypothesis (H_1) stated that the two variables were associated. In this case dependence means that knowing the value of one variable helps to predict the value of another variable. Finally, Cramer's V was calculated to measure the degree of association between the variables. It ranges from 0 to 1 (values near 0 indicate a small effect, values near .3 indicate a medium effect, and values above .5 indicate a large effect). $P < .05$ was considered statistically significant. Data analyses were performed using the Statistical Package for Social Science software (IBM SPSS Statistics for Windows, version 26.0. Armonk, NY).

Results

Descriptive statistics

A total of 281 students answered the questionnaire. Most of all (45.4%) are partially active and have no experience in observing PE classes (54.6%). A detailed description of participants' is shown in Table 1.

Table 1. Participants' characteristics and PE teaching experience in primary school

Question		N	%
Gender	F	261	93.2
	M	18	6.4
	No answer	1	0.4

Are you physically active?	No	73	26.1
	Partially	127	45.4
	Yes, I practice 150 min per week of MVPA	61	21.8
	Yes, I practice more than 150 min per week of MVPA	19	6.8
In your direct internship experience have you observed PE classes?	No	153	54.6
	Yes	127	45.4
In your internship experience, how is PE perceived by the students?	With enthusiasm	127	45.4
	With indifference	5	1.8
	With participation	47	16.8
	I did not detect this data	101	36.1
In your direct internship experience, have you observed classes performed by by sports tutors?	No	218	77.9
	Yes	62	22.1
Have you observed difference in students' perceptions on PE when classes are performed by sports tutors?	No	18	6.4
	I did not observe it	211	75.4
	Yes, they were amotivated	2	0.7
	Yes, they were more motivated	49	17.5

Students are not fully convinced about the usefulness of the figure of the PE expert (45.4%). Nevertheless, 76.4% believe that the figure of the specialised teacher should be present in the curricular teaching of PE. 79.6% was convinced that children's spent movement was insufficient. A detailed description is shown in Table 2.

Tab 2. Perceptions of primary teacher education students on specialist teacher in PE.

Question		N	%
For the purpose of conducting PE classes. do you find it helpful the presence of an expert in sport science?	Somewhat	127	45.4
	Much	134	47.9
	Not at all	2	0.7
	A little	17	6.1
The presence of the PE graduate in primary school	Should be provided for curricular PE teaching	214	76.4
	Should be provided for extracurricular PE teaching	32	11.4
	Should be limited to tutoring in school projects	30	10.7

Do you think PE at school contributes to improving skills:	Physical-sports	4	1.4
	Physical-sports and social	41	14.6
	Physical-sports, cognitive-affective and social	234	83.6
	Social	1	0.4
Do you think PE in primary school can contribute to the spread of a culture of inclusion?	Somewhat	83	29.6
	Much	193	68.9
	Not at all	1	0.4
	A little	3	1.1
Are you familiar with WHO guidelines related to physical activity for children?	No	158	56.4
	Enough/sufficient	53	18.9
	Very/more than sufficient	2	0.7
Do you think the amount of time children spend on movement in school is	Little/insufficient	223	79.6
	Too much	2	0.7

49.3% considered own training inadequate to teach PE in primary school; in fact, 59.6% said that more exams in movement field could be useful to improve own training. 60% was not able to assess children's movement skills. The most teaching method observed was the prescriptive one, based on imitation and repetition of movement (76.8%). A detailed description is shown in Table 3.

Table 3. Perceptions of primary teacher education students on the adequacy of their education to teach PE and on the usefulness of different teaching methods.

Question		N	%
Do you consider your education adequate to teach PE in primary school?	Somewhat	104	37.1
	Much	12	4.3
	Not at all	26	9.3
	A little	138	49.3
Do you consider more exams in movement field useful for your education?	Somewhat	167	59.6
	Much	46	16.4
	Not at all	11	3.9
	A little	56	20.0

What teaching method do you think you will use (or have seen used) primarily to teach PE in primary school?	Heuristic learning	65	23.2
	Prescriptive teaching	215	76.8
Which method do you think is most effective in achieving the skill development goals and specific learning objectives of PE?	Heuristic learning	128	45.7
	Prescriptive teaching	152	54.3
You feel most ready to design PE activities based on which method?	Both	143	51.1
	Heuristic learning	9	3.2
	Prescriptive teaching	80	28.6
	I don't feel ready to perform PE classes	48	17.1
Which method do you think will most promote the development of life and soft skills?	Both	175	62.5
	Prescriptive teaching	33	11.8
	Heuristic learning	72	25.7
Do you think movement assessment tests in primary school are useful?	No	35	12.5
	Yes	245	87.5
Do you think you are able to assess children's movement skills in primary school?	No	168	60.0
	Yes	112	40.0

Chi-Square Associations

Several significant relationships emerged. Specifically:

1) Most of those who have observed PE lessons feel more ready to design lessons through either the heuristic or prescriptive method, with a greater tendency toward the latter. Those who have not observed PE lessons, on the other hand, in addition to agreeing with the other group, there is also a good % of students who do not feel ready to design PE lessons (P =.03; V = .2).
2) The majority of those who feel that it is very/quite important to have an PE graduate presence in primary school during PE hours feel that he/she should be present for curricular PE teaching, unlike those who feel it is less important, who feel that his/her presence should be limited to school projects (P = .00; V = .5).
3) Most of those who consider their training adequate to teach PE in primary school believe they can assess children's motor skills, in contrast to those who consider it little/not at all adequate (P = .00; V = .4).
4) The majority of those who consider their training adequate to teach PE in primary school, believe that motor skills assessment tests in primary school are useful, in contrast to those who consider themselves little/not at all adequate where there is a good % of students who do not believe it is useful (P = .00; V = .2).
5) The majority of those who will use the prescriptive teaching method to teach PE in primary school in the future believe that this method is the most effective in achieving the competency development goals and specific learning objectives of PE, in contrast to those who will use the heuristic method, who believe it to be the most effective (P = .00; V = .4).

Discussion

The results of the present study showed that most primary education students did not feel adequately trained to teach PE in primary school, favouring the introduction of the PE specialist. It is necessary to work on their training gaps, using a global and experiential approach, as they will be the likely future generalist teachers who will teach PE in classes I, II and III of primary school.

Influence of being physically active on teaching

Several variables, that seem to influence students' perceptions,

have been identified. Most of the respondents are partially active but did not reach an average of 150 minutes per week of moderate to vigorous physical activity (MVPA) as suggested by World Health Organization (WHO) [21] WHO recommends at least 150 to 300 minutes of moderate aerobic activity per week. The rest were either sedentary (26.1%) or physically active. PE teachers played a key role in promoting healthy and active lifestyles in children:[22] children had high levels of movement during PE classes when teachers were physically active.[23] Primary school teachers, working on training, can be promoters of public health because they can influence children's behaviour.[22] About 56.4% were unaware of the WHO guidelines and this was very negative, given global problems caused by physical inactivity and sedentariness; however, 89.6% were aware that children's movement was insufficient. According to WHO children should perform an average of 60 minutes of MVPA per day. Accordingly, time spent in school in movement is crucial to increase physical activity levels in children[24] and prevent diseases caused by physical inactivity, including obesity, cardiovascular disease, type 2 diabetes[25] situations worsened following the COVID-19 pandemic.[7,26] The global action plan[27] aims to reduce physical inactivity by 15% by 2030. Since children spend much of their time in school, it is important to take action to prevent and improve the problem of overweight and obesity through specific interventions[28].

Direct internship experience on PE and perceived importance of PE specialist teacher

In their own direct internship experience, most did not observe PE lessons, as stated by (54.6%). This figure was thought-provoking as it showed that in many schools PE is not actually conducted, having never been observed by students. In contrast, 45.4% have observed PE lessons. During these experiences, 45% perceived great enthusiasm by the children, a very common finding. About 77.9% did not observe lessons taught by experts in physical activities and sports, such as the sports tutor, who worked in schools to spread the healthy practice of movement; this implied that PE lessons were designed and taught at the discretion of the generalist teacher. Consequently, it was not possible to ascertain differences in perceptions toward children's behaviours, according to the type of teacher who taught PE lessons, and thus to make a comparison between the generalist teacher and the sports tutor, a probably future PE specialist teacher.

About 47.9% believed that the PE specialist was very important and PE teaching should be included in curricular teaching (76.4%). On the other hand, 45.4% were not fully convinced about it, while 11.4% believed that PE teaching should be provided in extracurricular teaching, and for 10.7% only for school projects. There was no complete awareness of the importance of the PE graduate in primary school. PE was perceived as a discipline that can improve physical-sports, cognitive-affective and social skills (68.9%) and to spread a culture of inclusion (68.9%). About 29.6% were not fully convinced of the power of PE to promote inclusion, which in practice seemed to be a difficult goal to achieve. The key is in the expertise of the PE graduate, who, being specialized in physical activity and sports, should be able to find adaptations through altering the environment, rules of play, strategies, and supports to promote the full inclusion. [29, 30]

Perceived inadequacy of students in PE teaching

About 49.3% considered their training to teach PE in primary school to be inadequate; therefore, students were aware that this discipline should be taught by the specialist teacher, who should have the appropriate knowledge and skills to ensure maximum psycho-physical, social, and affective development in children. 59.6% considered it quite useful to improve their training, to take more exams concerning movement and sports. This result was coherent with other studies found in literature. For example, the study of Morgan & Bourke[31] found a moderate perceived level of self-confidence in own skills to teach PE by non-specialist teachers. Since teachers influence the way PE is perceived, it is suggested to support the continuous development of generalist teachers.[32] The level of PE teaching must start from university training.[33] Currently, PE programmes provided by primary school teachers were of poor quality.[34] As for teaching methods, the most used (currently or in the future) was the prescriptive one (76.8%) as well as the most effective to achieve skill development goals and learning objectives (54.3%), while both prescriptive and heuristic seemed to be useful to promote life/soft skills (62.5%). Prescriptive teaching is a teacher-centred approach aimed to stabilize and improve motor program by reducing the execution variability through the repetition of exercises[10]. On the other hand, heuristic learning is a student-centred approach aimed to stimulate the spontaneous solutions to motor problems through the executive variability using the alteration of environment, rules and technique borrowed from psychology[10]. Heuristic learning was the most appropriate method to promote motor efficiency and life/soft skills in primary school children[35] although the prescriptive one made improvements. About 51.1% felt ready to design PE lessons with both methods, with a predominance toward prescriptive (28.6%). Finally, 87.5% felt that the assessment of motor skills was important but were not able to assess them (60%), unlike the kinesiologist.[13]

Associations from Chi Square analysis

Several significant associations emerged:

- It seemed that direct internship experience influenced the method students will use in designing PE lessons. Most of those who observed PE lessons felt more prepared to design PE lessons through both teaching methods, with a tendency toward the prescriptive one. In contrast, among those who did not observe PE classes, there was a good percentage of students who did not feel ready to design PE lessons.
- Perceptions of the usefulness of the sports science graduate in primary school influenced how he should operate. Most of those who considered very/quite important the presence of this figure in primary school, believed that he should be present for curricular PE teaching, in contrast to those who considered him less important, who believed that his presence should be limited to school projects.
- Perceptions of the adequacy of own training to teach PE influenced the ability to assess physical skills in primary school children and the usefulness of this practice. Most of those who perceived enough adequate their training, believed they were able to assess children's physical skills and the usefulness of this practice, in contrast to those who perceived inadequate their training.
- The method predominantly used during the internship experiences influenced the perceived effectiveness of one method over the other to achieve the skill development goals and learning objectives in PE.
- Most of those who will use the prescriptive teaching method in PE in primary school, believed that this method was the most effective to achieve the skill development goals and specific learning objectives in PE, in contrast to those who will use the

heuristic method.

These associations suggested to promote direct internship experiences as effective in preparing future generalist teachers on teaching methods. The teaching method most used during the placement influences the preparation of students for that specific method rather than the other.[18] Personal convictions about the usefulness of the PE graduate in primary education for teaching PE, probably derived from experience, influence the acceptance or non-acceptance of this figure in the school workforce. Therefore, universities should pay more attention to students' placement experiences, which should be positive and full of useful information and practical examples for conducting PE lessons. Many did not have the opportunity to follow the internship, resulting in less preparation in PE.

Limitations and strengths

The limitations of the study are the convenience sampling resulting in poor generalizability of results and the use of a self-report measurement, vulnerable social desirability effects. To our knowledge, this study is one of the first that address the topic related to the impact of compulsory hours of PE in primary school teaching by a specialized teacher on primary education students.

Practical Applications

The study could provide to academic institutions some parameters that could influence the perceptions of primary teacher education students, as well as future generalist primary school teachers, toward PE teaching. The goal is to make their training more suitable for PE teaching, since the role of specialist teacher is currently provided only for V and IV primary school classes. This is an original line of research since there are not similar studies in the literature.

Conclusions

The results of the present study showed the perceived inadequacy of primary teacher education students, as well as future generalist teachers, to teach PE. Several variables influence students' perceptions of PE including primarily direct internship experience. It is necessary to implement reform in the broader interest of learners by quantitatively and qualitatively increasing PE and physics. It is hoped to extend the presence of the specialist to all primary school classes and to expand the training of generalist teachers in physical activity methods and teaching. The utility of the study is to provide suggestions for improving the generalist training of primary school teachers, including more practical experience and insights on physical activities for children. Future generalist teachers showed interest in the discipline but showed training gaps, such as children's movement assessment and general training on PE, that need to be filled with a comprehensive and experiential approach.

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Ethical Committee approval

Data reported in the study did not require approval from an accredited ethics committee, as they are not covered by data protection principles, i.e., they are non-identifiable, anonymous data collected through an anonymous questionnaire. In addition, based on Regulation (EU) 2016/679 of the European Parliament and of the Council on 27 April 2016 on the protection of individuals concerning the processing of personal data and on the free movement of such data (which entered into force on 25 May 2016 and has been compulsory since 25 May 2018), data protection principles do not need to be applied to anonymous information (i.e., information related to an identifiable natural person, nor to data of a subject that is not, or is no longer, identifiable). Consequently, the Regulation does not affect the processing of our information. Even for statistical or research purposes, its use does not require the approval of an accredited ethics committee.

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Author-s contribution in according to ICMJE

Francesca D'Elia, Associate Professor, made substantial contributions to the conception and design of the work; the acquisition, analysis, and interpretation of data for the work; drafting and revising the work critically and the final approval for the version to be published. She agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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