

Teaching methods of physical activity workshop in the university training of Italian generalist teachers

Francesca D'Elia

Department of Human, Philosophical and Education Sciences, University of Salerno, Fisciano, Italy

Purpose: Generalist teachers (GT) need specific and practical training to develop adequate professional skills that will enable them to teach Physical Education (PE) effectively. The Primary Education Sciences (PES) degree provides both theoretical and practical training opportunities, but students perceive gaps in training, particularly in the practical application of the Teaching Methods of Physical Activities (TMPA). The purpose of this study was to deepen the understanding of future teachers' perceptions regarding their personal and educational experiences in PE and also their motor skills, and to investigate if there is a correspondence between perceptions and awareness derived from specific motor testing.

Methods: A survey was conducted on 266 students of PES, using two ad hoc questionnaires, aimed at the objectives of the study, during three workshop sessions that also included motor testing to provide knowledge on performance related to some motor skills. Descriptive statistics, Chi-square and Spearman's correlation were used.

Results: The analysis of the questionnaires revealed that the school played a secondary role in personal and educational experiences in PE compared to informal contexts. The Chi-square analysis revealed six relationships ($P < .05$) between physical activity and BMI, perceptions of graduates in Exercise and Sport Sciences, teaching methods, training adequacy for PE, and accurate self-assessment of motor skills, supported by strong statistical correlations. Those who perceive themselves as adequate in physical assessment also have a perception highly/totally consistent with the reality of their skills. There is correspondence between perception and awareness of one's motor skills in an average of 92.37% of cases.

Conclusions: The relationships emerged regarding the students' personal and educational experiences confirm the importance of direct experience not only for perception but also for awareness of being adequately trained to teach PE. The TMPA workshop in the university training of GT offers the opportunity to approach physical activity as an experience that is not only executive and exercise-based, but above all elaborative and heuristic.

Keywords: perception, awareness, ecological approach, physical education

Introduction

The teaching of physical education in primary schools in Italy has a didactic organization that, since the 2022/2023 school year, includes both generalist and specialist teachers¹. In grades IV and V, physical education is compulsory for two hours per week and is taught by specialist teachers², master graduate in Exercise and Sports Sciences. In grades III, II, and I, the subject is taught by generalist teachers, who are qualified to teach all primary school subjects including physical education. However, unlike grades IV and V, there is no minimum requirement of two hours per week, and, although physical education is mandatory, it is often not taught³.

The initial training of generalist teachers in Italy has a particular structure and currently includes a specific five-year master's degree called Primary Education Sciences. This master's degree includes three types of training activities: courses, workshops, and internships at schools. It is the only degree that qualifies to teach in primary and pre-schools in Italy, and it was introduced in 1998. Currently, there are still non-graduate teachers in Italian primary schools because, until 2008, it was possible to teach with a high school diploma obtained by the 2001/2002 school year. However, the high school diploma did not include specific training in physical education, so there are still teachers who teach physical education in primary schools without having

received any specific training, which has a negative impact both on the children and the overall job satisfaction and health of the teachers⁴.

Initial and in-service training⁵ is crucial for the specific nature of teaching physical education, which is characterized by its practical and operational dimension^{6,7} and must contribute to the development of students' motor skills with appropriate methodological approaches⁸.

With the introduction of the degree courses in Primary Education Sciences, for the first time, courses and workshops on Teaching Methods of Physical and Sports Activities were included to enable future teachers to acquire the methodological and didactic skills for effective teaching of physical education. The peculiar organization of the study program, which integrates theory (lectures) and practice (direct internships in schools and indirect internships at the university), also includes the implementation of workshop activities for many subjects, including Physical and Sport Sciences.

The workshops in the initial training of teachers represent a space of analysis, design and simulation where students can apply the theories and methodologies learned in lectures. The workshops are a fundamental training activity to prepare students to become effective and competent teachers, allowing them to move from theory to practice in a gradual and supported manner. They can thus be considered as a link between theoretical lectures and

internship activities in schools.

Considering that, in the training of generalist teachers, dealing with specialized content positively develops the knowledge of content and the ability to teach physical education⁹, the workshop on Teaching Methods of Physical Activities must be designed and implemented to apply theories and methodologies of human movement^{10,11}; to experiment with methodological approaches to physical activities and teaching techniques^{12,13} in a simulated and controlled “gym” environment; to collaborate with fellow students in the development of educational designs for polyvalent and multilateral play experiences¹⁴ and in the experimentation of active teaching strategies; to analyze practical cases, discuss their experiences, and reflect on what works and what does not in teaching physical education, developing a reflective and critical professional^{15,16,17}; to acquire concrete skills that will be useful in future professional experiences, such as managing groups in dynamic physical activities and designing lessons and learning units based on movement games.

However, previous surveys¹⁸ have shown that there is a particular lack of specialized and practical training in physical education in Primary Education Sciences programs. Many students report inadequate preparation on the subject and based on their perceptions or field experiences, believe that one of the main causes of the perceived inadequate preparation is the lack of opportunities to apply theoretical concepts studied in lectures. Most students suggest¹⁹ the provision of practical training to support theoretical concepts, including thematic integrations. In fact, they propose in-depth studies related to the development of transversal pathways and practical knowledge of different physical and sports activities for children. Students of Primary Education Sciences, therefore, express the need for specific and, above all, practical training, believing that direct physical and movement experiences are transferable to teaching activities. There is a persistent perception that being physically active and having previous experiences in teaching Physical Education is a valuable source of experience for the specific teaching of the subject.

Based on these critical issues and the lack of literature on the subject, this study aimed to deepen the understanding of perceptions related to direct personal and educational experiences in physical education and subsequently to one's own motor skills. This was done through self-assessments of performance, investigating whether there was a correspondence between the perception of one's motor skills (balance, coordination, strength, and speed) and the awareness of these abilities following specific physical testing performed during the workshop on Teaching Methods of Physical Activities, which provided students with objective knowledge of their performance.

Method

Study Design

A survey was conducted using ad hoc questionnaires administered to students of Primary Education Sciences during three sessions of the workshop on Teaching Methods of Physical Activities. During these sessions, the participants were involved in designing and simulating physical education lessons and performing motor tests.

Participants

The study initially involved 270 students enrolled in an university in southern Italy. The inclusion criteria required participants to be enrolled in the course, while the exclusion criteria applied to those not in adequate health conditions to perform practical activities. Following the application of inclusion and exclusion criteria, out

of the initial 270 participants, data were successfully collected from 266 individuals. The sample was predominantly female ($F = 94.40\%$, $M = 5.60\%$) with an average age of approximately 22 years ($F 22.75 \pm 0.3$, $M 22.66 \pm 0.7$). The participants were third-year university students enrolled in a degree course of Primary Education Sciences. They had no prior university-level training in Teaching methods of physical activities.

Questionnaire

The tools used in this study were specifically designed to address the unique objectives of the research, focusing on investigating perceptions related to direct personal and educational experiences in physical education and subsequently to one's own motor skills of Primary Education Sciences students. Two ad hoc questionnaires were designed and administered to participants through the Google Forms platform:

1. The first questionnaire (Table 1) consists of 9 closed-ended questions aimed at investigating physical education experiences and perceptions of motor skills, asking participants to provide a self-assessment estimate of their physical performance based on their past personal and school experiences.
2. The second questionnaire (Table 2) aims to investigate opinions and perceptions regarding physical education in primary schools, the adequacy of their training in teaching methods of physical activities, as well as the correspondence between perceptions and awareness of their motor skills based on data obtained after performing the physical tests during the workshop sessions. This questionnaire consists of 27 closed-ended questions, divided into three parts: the first includes questions related to demographic data (gender, age, body mass index), personal experiences in physical education and perceptions derived from the internship experiences, the second includes questions on perceptions of the adequacy of their training to teach PE, and the third includes questions about the correspondence between perceptions and awareness of their motor skills.

All participants completed the two questionnaires. As part of this research, focused on examining students' perceptions related to direct personal and educational experiences in physical education and of their motor skills and the connection between perception and awareness, the second questionnaire (Table 2) included a query on BMI, participants were asked to self-report their Body Mass Index (BMI). Height and weight were not directly measured; instead, the BMI data were obtained solely through self-reported information provided by the participants. Although this information offered valuable context on participants, it was not critical for addressing the study's primary goals.

Procedure

The workshop activities consisted of 6 hours of training, delivered by the professor of the course “Teaching Methods of Physical Activities”, and conducted in the gym during two weeks. Considering the high number of participants, they were divided into 12 groups, each consisting of 20 (minimum) - 25 (maximum) students. Each group participated in 3 sessions, 2 hours each. During the 3 sessions, the students were involved in practical activities in pairs, small groups, and large groups, experimenting with active techniques such as circle time, brainstorming, and cooperative learning, applying the methodological principles of polyvalence and multilateralism in the design of movement games which were subsequently simulated by the students themselves.

During the first session, a questionnaire (Table 1) was administered to explore personal and educational experiences in physical education and perceptions of their motor skills, specifically

balance, coordination, strength, and locomotor speed. At the end of the 3 workshop sessions, and after performing the physical tests related to balance, coordination, strength, and locomotor speed, questions (Table 2) were asked about the correspondence between perceptions (reported at the beginning of the workshop in the first questionnaire) of their motor skills and the awareness (i.e. the knowledges) derived from the physical tests performed. The results of the physical performance tests were not linked to the formal evaluation of the laboratory.

Data Analysis

The responses were processed to ensure completeness and accuracy before proceeding with further analysis. The dataset was subjected to descriptive statistical analysis, including measures such as frequencies and percentages, to summarize and organize the data meaningfully. These steps provided a clear overview of the patterns and trends emerging from the responses, serving as the foundation for subsequent statistical testing.

Statistical Analysis

To explore the relationships and differences within the dataset the Chi-squared test was applied to assess the independence between categorical variables, identifying statistically significant associations. The significance threshold was set at $P < .05$. Furthermore, Spearman's rank correlation was used to evaluate the strength and direction of relationships between ordinal variables. These analyses allowed for a comprehensive understanding of the connections and patterns within the data, providing robust insights to address the research objectives.

The statistical analyses were performed using SPSS version 28.0 (IBM Corp., Armonk, NY, USA).

Results

From the responses to the first questionnaire (Table 1) on personal and educational experiences in physical education and perceptions of their motor skills, it emerged that 56.39% of the students had their physical education experiences mainly in non-formal contexts such as associations, sports clubs, and gyms, followed by formal contexts (such as school) with 29.32%, while experiences in informal contexts (family or leisure time) were less significant, with 13.15%.

On the educational level, physical activities seem to have played a significant formative role, especially in non-formal contexts (50.00%), followed by formal contexts such as school (30.45%), while the educational role of motor activities carried out in family or leisure settings is considered marginal (14.28%).

In the school context, physical activities are perceived as sporadic and inconsistent with PE objectives (27.44%), suggesting that students do not consider them to be in line with the expected goals. School physical activities seem to have a greater impact on socialization (31.57%), followed by physical efficiency and coordination (28.57%).

In terms of the self-assessment of their motor skills, the majority of participants consider their physical efficiency (48.12%), specific coordination (43.98%), locomotor speed (48.12%), and strength (44.73%) to be adequate. Only general coordination was rated as good by 47.74%.

Table 1. Questionnaire on Personal and Educational Experiences in Physical Education and Perceptions of Motor Skills

		Frequency	Percentage (%)
I have experienced my physical and/or sports activities mainly in contexts	Formal (school)	78	29.32
	Informal (family, leisure time)	35	13.15
	Non-formal (associations, sports clubs, gyms)	150	56.39
	I have not had significant experiences in any context	3	1.12
In my personal experience, physical and/or sports activities have played an educational and formative role in contexts	Formal (school)	81	30.45
	Informal (family, leisure time)	38	14.28
	Non-formal (associations, sports clubs, gyms)	133	50.00
	I have not had significant experiences in any context	14	5.26
The physical and/or sports activities carried out in the formal context of the school have been	Systematic and consistent with the goals of physical education	62	23.30
	Systematic, but inconsistent with the goals of physical education	64	24.06
	Sporadic and inconsistent with the goals of physical education	73	27.44
	Sporadic, but consistent with the goals of physical education	67	25.18

The physical and/or sports activities carried out in the school context have mainly focused on	Physical efficiency (strength, endurance, speed)	76	28.57
	Coordination	30	11.27
	Socialization	84	31.57
	Both coordination and physical efficiency	76	28.57
How do you evaluate your motor skills in terms of quantitative physical efficiency?	Insufficient	5	1.87
	Mediocre	46	17.29
	Sufficient	128	48.12
	Good	77	28.94
	Excellent	10	3.75
How do you evaluate your motor skills in qualitative terms (coordination)?	Insufficient	5	1.87
	Mediocre	32	12.03
	Sufficient	117	43.98
	Good	105	39.47
	Excellent	7	2.63
How do you evaluate your locomotor speed (movement speed through space)?	Insufficient	8	3.00
	Mediocre	34	12.78
	Sufficient	128	48.12
	Good	89	33.45
	Excellent	6	2.25
How do you evaluate your strength capacity?	Insufficient	8	3.00
	Mediocre	47	17.66
	Sufficient	119	44.73
	Good	82	30.82
	Excellent	10	3.75
How do you evaluate your overall coordination ability?	Insufficient	6	2.25
	Mediocre	21	7.89
	Sufficient	104	39.09
	Good	127	47.74
	Excellent	8	3.00

From the analysis of the responses to the second questionnaire (Table 2), which explored demographic data, opinions and perceptions on physical education in primary school, the adequacy of training in teaching methods of physical activities, and the correlation between perceptions and awareness of one's motor skills based on the data obtained from physical tests, it emerges that almost all student's perceptions of their motor skills were found to have sufficient, high, or total correspondence with the knowledge acquired following the physical tests performed during the workshop.

In the sample of 266 participants, the mean BMI was found to be $24.03 \text{ kg} \cdot \text{m}^{-2}$ with a standard deviation of $3.21 \text{ kg} \cdot \text{m}^{-2}$. This mean value falls within the "normal range" (18.5–24.9), confirming that the majority of participants (183 out of 266, equivalent to 68.79%) reported having a BMI within the normal range.

However, it is important to emphasize the variability within the sample, represented by the standard deviation of 3.21. This value

indicates that the BMI of the participants deviates, on average, by about 3.21 points from the mean value. The distribution reflects the diversity of the sample, which includes individuals who are overweight (56 participants, equivalent to 21.05%), obese (14 participants, 5.26%), and underweight (13 participants, 4.88%). Regarding the internship experiences, it emerged that the time dedicated to physical activity during the school day is perceived as little/insufficient (82.33%). Moreover, 62.03% of participants observed physical education (PE) lessons, using a predominantly prescriptive approach (57.51%). PE is perceived enthusiastically by 55.26% of the students. Additionally, 74.43% of participants did not observe any interventions by external experts during their internship experiences. Half of the participants (50.00%) identified the presence of a tutor/graduate in Exercise and sport sciences as quite useful, a figure who should be included in curricular PE teaching (68.42%). PE is perceived as a valuable tool for enhancing physical, cognitive-affective, and social skills

(86.09%) and for promoting a culture of inclusion (81.20%). Regarding the perceptions of the adequacy of their training to teach PE, 72.93% of participants are introduced to the physical activity guidelines for children. Training is perceived as fairly adequate for teaching PE by 52.25% of participants; students suggest that increasing ECTS credits in Teaching methods of physical and sport disciplines would be beneficial (63.53%). The heuristic teaching method is the preferred approach for teaching PE (53.75%), as it is perceived as effective in achieving PE goals (56.01%) and in promoting soft skills (63.90%). However, the prescriptive method was predominantly observed during

the school internship experience (84.58%). A total of 64.28% of participants feel prepared to design PE activities using both methods.

Finally, regarding the assessment of motor skills, 95.86% of participants consider it useful to evaluate motor skills through specific tests. However, slightly more than half of the participants (53.75%) feel competent in movement assessment. Almost all participants reported correspondence (enough, very much or total) between their perception and the test results regarding balance (in 95.47% of cases), coordination (91.72%), strength (88.34%) and locomotor speed (93.97%).

Table 2 – Questionnaire on perceptions related to physical education and awareness of one's motor abilities

		Frequency	Percentage(%)
1. Gender	F	251	94.36
	M	15	5.63
2. Are you physically active?	No (I am sedentary, I do not engage in physical and/or sports activities in my free time)	73	27.44
	Partially (I am active but do not reach 150 minutes per week)	94	35.33
	Yes (I engage in at least 150 minutes per week of moderate to vigorous physical and/or sports activities)	51	19.17
	Yes (I engage in much more than 150 minutes per week of moderate to vigorous physical and/or sports activities)	48	18.04
3. BMI	Normal weight	183	68.79
	Obese	14	5.26
	Underweight	13	4.88
	Overweight	56	21.05
4. During your direct internship experience, did you observe physical education lessons?	No	101	37.96
	Yes	165	62.03
5. If you observed physical education (PE) lessons, which method was mainly used?	Heuristic method	17	6.39
	Prescriptive method	153	57.51
	I did not observe PE lessons	96	36.09
6. During your internship experience, how is physical education perceived by the students?	Enthusiastically	147	55.26
	Indifferently	11	4.13
	With participation	57	21.42
	I did not observe this data in my observations	51	19.17
7. During your direct internship experience, did you observe interventions conducted by external experts for motor and sports activities?	No	198	74.43
	Yes	68	25.56
8. Did you observe differences in the students' perception of physical education when it was conducted by experts?	No, I did not notice any differences	20	7.51
	I did not observe lessons conducted by physical education experts	196	73.68
	Yes, they were less motivated/interested	1	.37
	Yes, they were more motivated/interested	49	18.42

9. In order to conduct physical education lessons, do you find useful the presence of a tutor/graduate in Exercise and sport sciences?	Quite	133	50.00
	Very	112	42.10
	Not at all	1	.37
	Not much	20	7.51
10. Graduates in Exercise and sport sciences in primary school	They should be there for teaching curricular physical education	182	68.42
	They should be there for teaching extracurricular physical education	48	18.04
	They should be there, but only to act as tutors in school projects	35	13.15
	They should not be there	1	.37
11. Do you think that the physical education lesson at school contributes to improving students' skills in:	Physical	2	.75
	Physical and social	31	11.65
	Physical, cognitive, social and affective	229	86.09
	Social	4	1.50
12. Do you think that physical education and/or sports activity projects in primary school can contribute to the spread of an inclusive culture?	Quite	47	17.66
	Very	216	81.20
	Not much	3	1.12
13. Do you know the national guidelines (Ministry of Health) and international guidelines (World Health Organization) regarding physical activity for children?	No	72	27.06
	Yes	194	72.93
14. Do you think the time that children dedicate to movement during the school day is	Enough	44	16.54
	A lot	3	1.12
	Not enough	219	82.33
15. Do you consider your training adequate for teaching physical education in primary school?	Enough	139	52.25
	A lot	17	6.39
	Not at all	6	2.25
	Not enough	104	39.09
16. Do you find it useful for your training to have a higher number of ECTS in the disciplines of Teaching Methods of Physical and Sport activities?	Enough	169	63.53
	A lot	55	20.67
	Not at all	3	1.12
	Not enough	39	14.66
17. Which teaching method do you think you will use to teach physical education in primary school?	Heuristic method (students self-manage)	143	53.75
	Prescriptive method (the teacher explains and demonstrates the activities to be carried out)	123	46.24
18. Which teaching method was mainly used for teaching physical education in your school experience?	Heuristic method (students self-manage)	41	15.41
	Prescriptive method (the teacher explains and demonstrates the activities to be carried out)	225	84.58
19. Which method do you think is the most effective for achieving the goals for skill development and the specific learning objectives of physical education?	Heuristic method (students self-manage)	149	56.01
	Prescriptive method (the teacher explains and demonstrates the activities to be carried out)	117	43.98

20. Which method do you feel more ready to design physical education activities based on?	Both	171	64.28
	Heuristic method (students self-manage)	17	6.39
	Prescriptive method (the teacher explains and demonstrates the activities to be carried out)	58	21.80
	I don't feel ready	20	7.51
21. Which method do you think can most promote the development of life and soft skills (cross-disciplinary skills)?	Both	170	63.90
	Heuristic method (students self-manage)	11	4.13
	Prescriptive method (the teacher explains and demonstrates the activities to be carried out)	85	31.95
22. Do you think that physical assessment tests in primary school are useful?	No	11	4.13
	Yes	255	95.86
23. Do you think you are able to assess the motor skills of children in primary school?	No	123	46.24
	Yes	143	53.75
24. After performing the flamingo balance test, considering your perception of your balance, how do you evaluate the qualitative and quantitative data obtained?	Quite matching my perceptions	121	45.48
	Very matching my perceptions	103	38.72
	Not at all matching my perceptions	0	0
	Not much matching my perceptions	12	4.51
	Totally matching my perceptions	30	11.27
25. After performing the slalom dribbling test with a ball, considering your perception of your coordination skills, how do you evaluate the qualitative and quantitative data?	Quite matching my perceptions	128	48.12
	Very matching my perceptions	90	33.83
	Not at all matching my perceptions	0	0
	Not much matching my perceptions	22	8.27
	Totally matching my perceptions	26	9.77
26. After performing the shuttle run and sprint tests, considering your perception of your locomotor speed ability, how do you evaluate the qualitative and quantitative data obtained?	Quite matching my perceptions	142	53.38
	Very matching my perceptions	83	31.20
	Not at all matching my perceptions	0	0
	Not much matching my perceptions	16	6.01
	Totally matching my perceptions	25	9.39
27. After performing the abdominal strength test, considering your perception of your strength ability, how do you evaluate the qualitative and quantitative data obtained?	Quite matching my perceptions	110	41.35
	Very matching my perceptions	86	32.33
	Not at all matching my perceptions	2	.75
	Not much matching my perceptions	29	10.90
	Totally matching my perceptions	39	14.66

Chi-Square Associations

From the application of the Chi-square test, six relationships emerged:

1. BMI and being physically active ($P = .013$): Most participants who are physically active tend to have a normal weight, whereas those who are sedentary/partially active, are more likely to be overweight/obese.
2. Perception of the usefulness of a graduate in Exercise and sport sciences and their role in the primary school schedule ($P = .009$): Most participants who consider the presence of a graduate in Exercise and sport sciences to be very useful for conducting PE lessons also believe these professionals should be involved in curricular teaching. On the other hand,

those who perceive their importance as minimal believe they should act solely as sports tutor in school projects.

3. Perception of the usefulness of a graduate in Exercise and sport sciences and the choice of teaching methods for achieving PE goals and objectives ($P = .031$): those who find the presence of a graduate in Exercise and sport sciences very useful for conducting PE lessons believe that the heuristic method is ideal for achieving goals and learning objectives in PE. The majority of participants who consider their presence only "fairly" useful tend to prefer the prescriptive method.
4. Perception of the adequacy of their training to teach PE and the usefulness of PE in promoting inclusion ($P = .009$): Most

participants who rate their training as fairly adequate for teaching physical education also believe that this subject is very effective in promoting inclusion.

5. Perceptions of their motor skills and their ability to assess others' skills ($P = .031$): The majority of those who feel capable of assessing children's motor skills also have a high or total alignment between their perception and the actual knowledges of their own skills. This contrast with those who consider themselves unable to assess motor skills ($P = .009$).
6. Relationship between perception of balance and other motor skills: Participants whose perception of their balance aligns well with reality also demonstrate a corresponding perception for other motor skills, such as coordination, strength, and agility ($P = .000$).

Table 3. Spearman Correlations between the perception of the level of physical efficiency, strength, specific coordination, and general coordination

		How do you assess your physical skills from a quantitative perspective (physical efficiency)?	How do you assess your physical skills from a qualitative perspective (coordination)?	How do you assess your locomotor speed ability (speed of movement in space)?	How do you assess your strength ability?	How do you assess your overall coordination ability?
Spearman's rho	How do you assess your physical skills from a quantitative perspective (physical efficiency)?	1.000				
	How do you assess your physical skills from a qualitative perspective (coordination)?	.600**	1.000			
	How do you assess your locomotor speed ability (speed of movement in space)?	.607**	.564**	1.000		
	How do you assess your strength ability?	.591**	.355**	.511**	1.000	
	How do you assess your overall coordination ability?	.541**	.779**	.553**	.459**	1.000

Note: "***" - $P < .01$.

Discussion

Analysing the frequency and relationships between the responses to the two questionnaires regarding experiences in the field of physical education and sports, it is impressing that school, the archetypal of formal learning contexts, did not play a significant role in the educational journeys of the participants. This finding contributed to shaping their perception of their own adequacy in teaching physical education. The quality of an individual's school physical education experiences directly predicts their confidence in teaching the subject itself²⁰. Moreover, personal biography, sports participation, teaching/coaching experience,

Additionally, Spearman's correlations (Table 3) show that participants who positively evaluate one of their motor skills tend to positively evaluate the others as well. All reported correlations are positive, suggesting that the various motor skills (physical efficiency, coordination, strength, speed) are interrelated and tend to reinforce one another in participants' self-assessments. All values are accompanied by double asterisks (**), signifying that the associations are not coincidental and are highly reliable at $P < .01$. The highest correlations, such as $P = .779$ (qualitative coordination vs general coordination), highlight particularly close relationships, while lower values, like $P = .459$ (strength vs general coordination) suggest less powerful but still significant connections.

satisfaction with physical education, and perceived competence for physical activity influence teachers' beliefs, perceptions, and attitudes towards promoting physical activity in schools^{21,22,23}. In particular, 68.79% of the participants in our study self-reported a BMI within the normal range, while 21.05% identified as overweight and 5.26% as obese. These findings are consistent with data from the Italian National Institute of Health and the PASSI surveillance system, which report that 27% of young adults in Italy aged 18 to 34 experience issues with excess weight²⁴. However, these data highlight a certain degree of heterogeneity in the body composition of the sample, suggesting the importance of further analyses that consider BMI in relation

to other factors, such as age, gender, and lifestyle, for a more in-depth understanding of the characteristics of the studied population.

The marginalization of physical and sports education within the school context was also revealed and confirmed during the internship experience, which has the potential to greatly impact teacher training due its specificity in PE teaching²⁵. However, it instead demonstrated a longitudinal trend of insufficient school physical education in the Italian context²⁶. This marginality is evident in the reduction of time allocated to physical education teaching and in the delivery of low-quality physical education lessons. Such issues are the result of institutional and/or teacher-related barriers^{5,6} that make it difficult to implement quality physical education. Morgan²⁷ highlighted these barriers in his study on classroom teachers' perceptions of the biggest barriers to delivering successful physical education programs, examining their impact on both the type and quality of such programs. It is interesting to note that Morgan's²⁷ identified, the five most significant barriers as institutional or outside the teacher's control, such as a lack of facilities and inadequate training. In this context, teachers are perceived as being adversely affected by the significant challenges and systemic problems both educational (school) and training (university) systems.

More than half of the participants perceive their training as adequate to teach PE. However, future teachers express the need to improve to improve their training through additional activities focused on teaching methods of physical and sport disciplines. This expressed need for training in physical activity, an area where everyone already has some personal background of experiences, highlights the prerogative of university workshop training. Such training should not be limited to practical exercises but should also serve as a place for self-determination, self-regulation, autonomy, flexibility, problem-solving and creativity. This approach would aim to maximize the applicability of knowledge and the development of teacher competencies.

It is also interesting to consider that, despite participants predominantly observing the application of the prescriptive method during internship activities in schools, they perceive the heuristic approach^{12,28,29}, that has been adopted in workshop activities, as being more effective in achieving both specific (fundamental motor skills)³⁰ and transversal (soft skills) objectives of physical education. The learning environment created in the Teaching Methods of Physical Activities workshop, as well as through field experience, was characterized by heuristic techniques such as brainstorming, cooperative learning, peer tutoring, role-playing, etc., and circle time. These techniques allowed participants to experiment movement experience that were relevant and meaningful³¹.

Focusing on questions related to the perception of their motor skills adequacy, most students reported, based on a self-assessment, that they possess sufficient or good motor skills, highlighting an adequate perception of their abilities. The positive correlation between the perceived level of physical efficiency, strength, specific and general coordination, and the high correspondence between participants' awareness of their motor skills – such as balance, coordination, strength, and locomotor speed – highlights an integrated vision of their skills, which are perceived as being closely interconnected.

Practical Application

It is important to note that, despite the positive experience derived from participating in a practical workshop that can reverse negative attitudes towards physical education and improve

personal and professional competencies of trainee teachers³², and although it has provided participants with awareness of their motor skills, the limited duration of the workshop to only 6 hours is insufficient for providing generalist teachers with adequate training to teach physical education effectively. Therefore, the training approach should involve a combination of careful planning for the Teaching Methods of Physical Activities workshop, conducted heuristically to build greater confidence and competence³⁰, along with an increase in the number of ECTS assigned to this specific training activity. This would make the training more impactful and robust, facilitating a deeper understanding of education through movement, self-expression through physicality, motor skill development, social interaction, and the ability to teach various subjects using the methodological principles of physical activity didactics³³.

Conclusions

The present study aimed to investigate, through two questionnaires, the perceptions of a group of primary education science students, future generalist teachers, regarding their personal and educational experiences in physical education, as well as their motor skills. The research examined whether there was correspondence between their perception of motor skills in terms of balance, coordination, strength, and speed, and their awareness of these abilities following specific physical testing performed during the Teaching Methods of Physical Activities workshop, which provided students with objective knowledge of their performance.

The relationships that emerged regarding educational and personal experiences, as well as the correspondence between perceptions and awareness of the motor skills of future generalist teachers, confirm the importance of direct and practical experience in university training. This type of training is particularly crucial for developing the awareness needed to feel adequately prepared to teach physical education, an awareness linked to a revised and more informed conception of physical education in schools³⁴.

To prevent the perpetuation of low-quality physical education or the decision by many teachers to avoid teaching physical education altogether, it is essential to address both initial and in-service training of teachers. Such training should aim to equip teachers to approach the teaching in the field of body and movement methodologically and consciously, promoting the development of physical literacy³⁵. It is necessary to reverse the trend of dissatisfaction derived from prior negative or inadequate personal or educational experiences²⁰ by providing meaningful learning opportunities during both initial and in-service training. This can be achieved using heuristic methods^{28,29} and active techniques such as workshops, enabling conscious, relevant, and targeted professional development in the planning, teaching and assessment of physical education and physical activity.

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Ethical Committee approval

This study does not require ethical committee approval as it is

an internal educational project that did not involve the collection of personal, sensitive, or identifiable data from subjects, with all information being anonymized.

ORCID

Francesca D'Elia <https://orcid.org/0000-0003-1441-8101>

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Author-s contribution

The author was responsible for all aspects of the research and publication process. This included the conceptualization and design of the study, the collection and analysis of data, and the interpretation of the results. The author independently developed the manuscript, ensuring a clear presentation of findings, and meticulously addressed all phases of the research process. Furthermore, she handled the preparation, revision, and finalization of the article for submission, as well as all interactions with the journal during the review and publication stages.

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Corresponding information:

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Correspondence to: Prof. Francesca D'Elia

University: Department of Human, Philosophical

and Education Sciences, University of Salerno

Via Giovanni Paolo II, n. 132,

84084 Fisciano (Salerno), Italy

E-mail: fdelia@unisa.it