Teaching efficacy of undergraduate PE students; what are the key predictors and what can PE educators learn from this?

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Introduction: Teaching efficacy describes the belief in a teacher's ability to promote learning and this belief is an invaluable asset for all teachers. This study examined the contextual influences that predict the teaching efficacy of first-year undergraduate PE students wishing to enter teacher training programs.

Method: Using a mixed methods study design, 168 PE students completed an online questionnaire and 16 of these participants took part in semi-structured focus groups. The data collection procedures investigated students' perceptions of PE teaching efficacy and examined students' awareness of how their involvement in PE or sports influenced their decision to study PE.

Results: Teaching experiences and role model influences were the key predictors of students' perceived PE teaching efficacy.

Discussions: We recommend that higher education PE programs should facilitate theoretically informed reflective learning opportunities to enable students to understand and make sense of the impact of these key predictors. These opportunities will enable students to understand their starting point in PE teaching efficacy and identify the requirements to develop it. The study extends the existing literature by identifying the key predictors of PE teaching efficacy derived from the acculturation experiences of undergraduate PE students.

KEYWORDS

self-efficacy, teaching efficacy, teacher socialization, physical education, teacher education

Introduction

"Teaching efficacy" describes a teacher's belief in their ability to enhance the learning outcomes of students (Lee et al., 2013). Research over the past 40 years has established a positive relationship between a teacher's sense of efficacy and the effective use of teaching and learning strategies (Woolfolk et al., 1990; Humphries et al., 2012; Whittle et al., 2017). In practice, this relationship may manifest through the efficacious teacher(s) confidently designing effective and challenging learning experiences that enable students to attain learning outcomes (Hattie, 2012). Through the establishment of an effective learning environment, students are more likely to engage in learning opportunities (Hattie, 2012). Thus, teaching efficacy plays a significant role as part of a virtuous cycle of effective teaching.

Recent empirical evidence has further established the relationship between collective teaching efficacy, e.g., among staff within a school or department, and the benefits this has on student learning. For example, collective teacher efficacy has been found to have the greatest influence on student achievement, with an effect size of 1.57 (Hattie, 2016). The

average effect size is 0.40 and any effect size above zero suggests that achievement has been raised by an intervention (Hattie, 2016). In comparison, self-reported student grades (1.33) and teacher estimates of achievement (1.29) ranked in second and third place as factors influencing student achievement. Hence, greater collective teacher efficacy is considered to strongly influence student outcomes (Knoblauch and Woolfolk Hoy, 2008; Donohoo, 2016; Hattie, 2016; Bertills et al., 2018). These findings provide evidence to support the importance of developing teaching professionals' teaching efficacy.

Background

Developing teaching efficacy is complex because teacher self-efficacy is dynamic and situationally specific, enhanced, or thwarted depending on an individual's experiences. For example, PE teaching efficacy is a multidimensional concept consisting of both self-efficacy (Bandura, 1977) levels and efficacy beliefs regarding several pedagogical skills and core competencies, e.g., planning, class management, and student assessment in PE contexts (Choi et al., 2020). In addition to the context, the development of a teacher's efficacy takes place over a prolonged period and includes experiences in academic environments, such as time spent as an undergraduate student. It is argued that through these experiences, teachers may gain a deep and critical knowledge of the teaching and learning process and become more efficacious (Swain, 2020). Given the relationship between teaching efficacy and pupil attainment in schools (Lee et al., 2013), there is a need to ensure that teacher educators can foster a high sense of teaching efficacy among their student teachers.

To assist with our understanding of self-efficacy, Bandura (1977) completed a series of classic studies and found that an individual's sense of efficacy develops through a positive evaluation of one's own experiences. These include vicarious observations of models, such as peers, task mastery, and verbal persuasion, from wider social influences (e.g., parents), and physiological responses to situations such as feeling excited (Bandura, 1977, 1986; Zach et al., 2012). It is important to highlight this model because it has enabled researchers to apply these concepts to a variety of occupational settings (Whittle et al., 2017; Gale et al., 2021). Hence, teaching efficacy is task- and/or situation-specific (Humphries et al., 2012; Gale et al., 2021) and requires contextual consideration because a teacher may feel efficacious teaching a particular topic or subject area. To extend this, Flory et al. (2022) explored teaching efficacy among PE teachers and found that teaching efficacy was lower for cultural practices such as responding to learners with English as an additional language. Similarly, Humphries et al. (2012) found that the application of scientific knowledge, planning for skill level differences, and the use of PE-related technology can also influence PE teaching efficacy. In addition, Choi et al. (2020) examined undergraduate PE students' PE teaching efficacy and found variations existed and that these related to their own perceived physical literacy derived from prior PE experiences.

Despite this burgeoning work above, our understanding of the contextual influences on teaching efficacy remains partial for individual subjects such as PE (Bertills et al., 2018; Flory et al.,

2022). Most studies within context have tended to explore PE teaching efficacy (Humphries et al., 2012; Zach et al., 2012; Choi et al., 2020) of participants who are enrolled in an initial teacher training (ITT) program. However, a few studies have examined the efficacy derived from students before ITT. This is of particular concern for those tasked with developing PE teachers who may not appreciate the efficacy of their students and the contextualized sources that influence students' PE teaching efficacy. Similarly, PE educators may lack the means to develop efficacy among their student teachers. Therefore, it is important to identify the sources of PE teaching efficacy and consider how knowledge of this can inform practice within HE to subsequently increase undergraduate PE students' PE teaching efficacy. Accordingly, this study aimed to (a) examine the contextual influences that predict PE teaching efficacy among first-year undergraduate PE students and (b) elucidate the influences on PE teaching efficacy.

Theoretical framework

To assist with an understanding of the teacher development process, teacher socialization in the PE framework (Lawson, 1983) provides a useful theoretical aid. Specifically, the framework describes the contextual phases of development while training to become a PE teacher, and while we recognize that combining this framework with Bandura (1977)'s self-efficacy theory is unusual, it is appropriate for this study to understand how self-efficacy develops within a PE context. Stage one, known as the acculturation phase, describes the experiences before the decision to enter ITT programs (Lawson, 1983). Stage two, the professional phase, occurs when students enter an ITT program and develop values, knowledge, and skills deemed ideal for teaching PE. Finally, stage three, known as the organizational phase, describes how individuals learn the knowledge, values, and skills required within a particular school upon becoming qualified teachers (Templin and Richards, 2014; Richards and and Gaudreault, 2016). Through these stages, research has identified that a variety of social influences and involvements, such as relationships with teachers, prior PE or sports experiences, and demographic and wider cultural factors, can influence a teacher's development (Davey, 2013; O'Leary, 2019; Parkes and O'Leary, 2022).

A recent study on socialization has shown that several social factors can also influence students' rationale for engaging in teaching, sometimes referred to as a subjective orientation (Richards and Padaruth, 2017; Parkes and Hemphill, 2020). For example, in the acculturation phase, many students develop a "teaching orientation" that derives from contextual experiences prior to teacher training. These experiences of working with young children, which involve teaching, planning, and interacting with PE teachers, motivate these students to consider a career in teaching. As a result, these students have a strong belief in the value of delivering high-quality PE. This contrasts with a "coaching orientation" and a "fitness orientation" where students have been influenced by the profession by these prior experiences and are motivated to facilitate extracurricular sports or fitness activities (Richards and Padaruth, 2017; Parkes and Hemphill, 2020). The acculturation phase can, therefore, be powerful in shaping students' beliefs and philosophy toward teaching PE

(Martínez-López et al., 2010; Templin and Richards, 2014; O'Leary, 2019). This is particularly important because undergraduate PE students' experiences and beliefs serve as filters for making sense of teaching experiences throughout their careers (Fletcher et al., 2013; Jayantilal and O'Leary, 2020). However, the relationship between these factors and their influence on PE teaching efficacy has not been detailed. Thus, teacher socialization in the PE framework (Lawson, 1983) is a useful framework to use as a means of further understanding PE teacher efficacy.

Materials and methods

This research aimed to (a) examine the contextual influences that predict PE teaching efficacy among first-year undergraduate PE students and (b) elucidate the influences on PE teaching efficacy. A pragmatic research paradigm, which seeks to positively affect change within a given social context, i.e., the undergraduate PE environment, was utilized. The pragmatic approach is suitable because, while methods, theory, and concepts are rightly open to critique, the findings or actions of such processes can nonetheless support future practice (Jia, 2005; Bishop, 2015). Imbued by this aspiration, this study used a two-phase data collection approach. First, we obtained quantitative data on students' PE/sports teaching experiences, students' perceived level of self-efficacy, and students' perceived level of PE teaching efficacy. Second, we explored these factors in depth through qualitative focus groups.

Participants

To understand the acculturation experiences that predict and influence the development of PE teaching efficacy in first-year students, a sample of 168 PE students took part in the online questionnaire (54% female, $n = 90$; 46% male, $n = 76$). The average age of participants was 19.5 years (M) (SD = 1.98), and 95% of the participants were white British. The sample was recruited through invitations to higher education (HE) institutions across Northern and Central England to a 3-year undergraduate PE program. A total of six HE institutions volunteered to participate in the study. Following this, 16 of the online questionnaire participants who voluntarily provided their email addresses were contacted to participate in a semi-structured focus group. Five focus group activities took place (female respondents, $n = 13$; male respondents, $n = 3$). The average age of participants was 19.5 years (M) (SD = 1.46). Ethical approval was obtained from the author's institution (Ethics Reference 19/SLN/013).

Data collection

Quantitative phase

Data were collected via a questionnaire using an online platform known as online surveys. Questionnaires were completed by students during semester one (September to November 2019), and students were informed that participation was voluntary. This extensive data collection period enabled the lead researcher to visit students at institutions as a method to support them to complete the questionnaire. The questionnaire took 10–15 min to complete and consisted of four sections. Each section required students to respond to ∼ 5–20 questions. Implied consent was assumed upon completion of the questionnaire.

Questionnaire section one: previous teaching or coaching experiences and involvement in sports

In this section, students were asked to report on their level of teaching, coaching, or voluntary experiences because previous literature suggests that prior experiences may influence teaching efficacy (Choi et al., 2020). To explore each of these constructs, a 5-point Likert scale was developed; each construct included at least one item, e.g., a scale of one (no experience) to five (regular weekly experiences). To investigate sports representation and participation, we also used a 5-point Likert scale of one (no engagement in competitive sport) to five (European/World level). Finally, students were asked to consider if they felt their career choice had been influenced by a significant " other" using a 5-point Likert scale of one (strongly disagree) to five (strongly agree). Demographics in this section included age, ethnicity, year of study, and institutional region. These psychometric measures were carefully devised by the research team and informed by previous literature (Rudd et al., 2020; Gale et al., 2021).

Questionnaire section two: general self-efficacy

General self-efficacy (SE) was measured using the validated general self-efficacy scale (NGSES) (Chen et al., 2001). The general self-efficacy scale comprises eight items that require individuals to rate the extent to which they agree with statements on a 5-point Likert scale (one, strongly disagree; five, strongly agree). Examples of items from this measure are, "I can solve most problems if I invest the necessary effort," and "I can remain calm when facing difficulties because I can rely on my coping abilities." The NGSES has shown good reliability, with Cronbach alphas ranging from 0.86 to 0.90 (Chen et al., 2001).

Questionnaire section three: current perceived PE teaching efficacy

PE teaching efficacy was examined using a validated PE teaching efficacy scale developed by Zach et al. (2012). This questionnaire consists of 22 items (21 used in the analysis that was specific to PE) on a scale of 1 (low efficacy) to 10 (high efficacy), split into two factors: challenging, motivating learning, and effective teaching. Examples of items from this scale include, "How confident are you in your ability to make learners have fun and enjoy PE"? "How confident are you in your ability to cope with constraints (such as a lack of space or equipment)?". The PE teaching efficacy scale has been shown to have good reliability (Cohen's kappa 0.83–0.99).

Questionnaire section four: students' perceptions of qualities for successful teaching

To understand students' perceptions of teaching skills and how important they are to be successful teachers, the concluding section of the questionnaire employed a Likert scale previously used in a study to investigate the self-efficacy of teachers in educating students (Lively, 1994). Students rated each statement on a 4-point Likert scale, with one being unimportant and four being extremely important. Examples of items for this scale include, "Ability to plan daily lessons and ability to maintain a climate conducive to learning." There were 12 items in total.

Qualitative phase

Focus groups were used to generate data from participants that provided a collective, rather than an individual in-depth view of PE teaching efficacy and were deemed appropriate for the study (Cohen et al., 2018). Three out of the five focus groups were completed online due to COVID-19 regulations about social distancing. All focus group activities were recorded digitally and transcribed verbatim to support the data analysis procedures (Cohen et al., 2018). The focus group activities lasted between 45 and 90 min (M = 57.6 min, SD = 21.3 min). These activities were completed during the second semester (January and March 2020), and students were informed that participation was voluntary. All participants signed a consent form before the focus group.

At the beginning of the focus group, a range of interactive tasks were used to enable participants to feel at ease when contributing to the discussion. For example, the lead researcher shared their most memorable sporting experience with the focus group participants. This encouraged participants to share and engage in conversation. The questions in the focus groups encouraged students to reflect upon their learning journey in PE/sports. Students were also asked to consider who had been influential in their development. To enable us to expand upon the theoretical underpinnings of this study, we introduced Bandura (1977)'s self-efficacy model to the students and asked them to examine the contextual experiences that may have influenced their journey toward studying PE. Furthermore, we asked students to consider and explain any teaching and learning strategies that they felt required more attention or development using Zach et al. (2012)'s PE teaching efficacy scale.

Data analysis

First, quantitative data were exported from online surveys to the Statistical Package for the Social Sciences (SPSS version 26). A data-screening procedure was completed to check for conspicuous values in the sample, and all non-completed values were removed from the analysis (Pallant, 2013). Following this, total scores for all variables were computed. A one-way ANOVA was used to determine differences in PE teaching efficacy scores across institutions in cases where students' experiences on different programs influenced their PE teaching efficacy scores. To ensure that there was no collinearity between variables, a correlation

analysis was used (Pallant, 2013) with $r < 0.30$ regarded as small, r between 0.31 and 0.50 as medium, and $r > 0.50$ as large (Cohen et al., 2018). Finally, a regression analysis was completed to predict the key variables of PE teaching efficacy. This required all variables to be inputted into the analysis (Pallant, 2013).

For qualitative analysis, data were transcribed verbatim, although pseudonyms were used to protect students' identities. Transcripts were read and reread (Smith and McGannon, 2018), and with Bandura's self-efficacy framework in mind, a deductive thematic approach was undertaken (Clarke and Braun, 2013). NVivo was used to support the sense-making of the data supported by themed mind maps. This allowed the first author to identify meaningful segments and collate responses to form key themes (Clarke and Braun, 2013). Once themes were constructed, a critical friend from within the research team reviewed the deductive thematic analysis process to ensure credibility (Smith and McGannon, 2018). Consistent with the thematic analysis approach, this process continued through several iterations of critically examining the data, themes, and maps, with wider members of the research team encouraging reflexive consideration of the themes (Smith and McGannon, 2018).

To summarize, quantitative rigor was ensured through the use of previously validated scales (Bandura, 1997; Zach et al., 2012). Alternatively, qualitative rigor aspires to credible and trustworthy accounts of experiences. To ensure this, focus groups were informed by relevant theoretical frameworks, and questions were neutral and open, allowing participants time and space to share their experiences. Coding of all focus groups was undertaken by the same researcher and this initial analysis was examined by other members of the team who acted as critical friends. This process involved team members challenging the interpretation of the lead researcher, checking the alignment between codes and data, and refining key themes. This process is consistent with contemporary approaches to rigor in qualitative research (Smith and McGannon, 2018).

Results

Quantitative phase

Section 1 data revealed a mean score of 8.23/15 (SD = 2.62) for the combined teaching, coaching, and voluntary experiences gained by students before university (Table 1). This finding suggests students were moderately involved in their regular experiences working with young children. A mean score of 2.27/5 (SD = 1.41) was found for the sports representation of the students, suggesting that participants mostly played sports at the university level. Finally, a mean score of 3.73/5 (SD 1.08) was found to support students' agreement that their career aspirations had been influenced by a significant other. Section 2 revealed a mean score of 31.62/40 (SD = 3.66) for the level of general efficacy among students. This suggests students were strongly in agreement with their perception of self-efficacy at the beginning of their program. Section 3 findings support that students' perception of PE teaching efficacy was high, with a mean score of 146.16/210 (SD = 40.67). Thus, students reported being confident (70%) in their perception of ability and

TABLE 1 Descriptive statistics of contextual variables.

	Min	Max	M	SD
PE teaching efficacy	21	210	146.16	40.67
Teaching/coaching experience	3	15	8.23	2.62
Sports representation	1	5	2.27	1.41
Role model influence	1	5	3.73	1.08
Self-efficacy	22	40	31.62	3.66
Successful teacher qualities	26	48	41.71	5.23

TABLE 2 Contextual correlation variables.

	1	2	3	4	5	6
1 PE teaching efficacy	*	0.47**	0.31**	0.36**	0.19*	0.1
2 Teaching/coaching experience		*	0.39**	0.19*	0.13	−0.01
3 Sports representation			*	0.14	0.03	0.15*
4 Role model influence				*	0.26**	0.08
5 Self-efficacy					*	0.12
6 Successful teacher qualities						*

**Correlation is significant at the 0.01 level (two-tailed).
*Correlation is significant at the 0.05 level (two-tailed).

skill proficiency within PE at the beginning of their program. Section 4 presented a mean score of 41.71/48 (SD = 5.23) to support that students were in favor of the identified key teaching and learning skills as being highly important to teaching and learning.

Data analysis findings

A one-way ANOVA revealed that there was no significant difference [$F_{(5,160)}$ = 2.11; p = 0.07, ES = 0.06] between mean PE teaching efficacy scores and institutions. Pearson's product–moment correlation results suggested that all contextual variables had a significant low- to a moderately positive relationship with PE teaching efficacy. The highest correlation coefficient value with PE teaching efficacy was the amount of teaching, coaching, or voluntary experiences (r = 0.47) followed by role model influences (r = 0.36) (see Table 2).

The regression investigated the contextual independent variables used throughout the study (self-efficacy, role model influence, sports representation, and perceptions of desirable teaching qualities) with the dependent variable PE teaching efficacy. There was no collinearity. We found two significant predictors for PE teaching efficacy (Table 3, Model 1). The overall model was significant [$F_{(5,159)}$ = 15.34; p < 0.001], explaining 32% of the variance.

TABLE 3 Regression analysis.

Model 1				95.0% CI for B	
		β	Sig.	L/B	U/B
	Teaching/coaching experience	0.37	<0.001	3.68	8.34
	Sports representation	0.12	0.1	−0.66	7.94
	Role model influence	0.26	<0.001	4.71	15.45
	Successful teacher qualities	0.07	0.32	−0.54	1.62
	Self-efficacy	0.06	0.37	−0.85	2.29

Dependent variable: PE teaching efficacy.

Qualitative phase

During the qualitative analysis process, four themes were constructed from the focus group data, and these are outlined below.

Theme 1: teaching and coaching experiences develop an efficacy foundation for a career in teaching

All students who participated in the focus group activities reported that they had been involved in helping to deliver PE/sports in either after-school clubs, during curriculum lessons, or in sports club environments. Students and teachers reported that these experiences had provided feelings of confidence and competence to consider a future career in teaching. One of the main reasons for this installed confidence was that students felt that they were deemed "trustworthy" by members of the PE/sports department. To highlight these claims, we found that students had started teaching/coaching from an early age and developed good relations with school PE departments/sports clubs during acculturation. For example,

> I did gymnastics when I was younger and started helping with school PE and after-school club lessons when I was 14. At age 16, I did my level one gymnastics qualification. I have been coaching for about 5 years now, and this has helped with my confidence and teaching (FG 1).

> In my first year of sixth form, one of the PE teachers went on maternity leave, and they asked me to help run all the teams and after-school clubs. I learned so much, which is one of the reasons I am studying PE now (FG 3).

> I used to help with afterschool football practice with my PE teacher. He let me coach smaller groups. I used to play lots of football outside of school but didn't really[sic] like school. This experience was good for me (FG 4).

> I was a sports leader in my school, and I was asked to help with primary school events like sports days and mini-Olympics. I enjoyed doing this and learned how to work with younger kids (FG 5).

Hence, these learning opportunities and interactions with students from lower year groups have contributed to students' perceptions of their PE teaching efficacy on arrival at university.

Theme 2: Bandura's self-efficacy model provides an understanding of the contextual variables that influence the development of PE teaching efficacy

Students identified sources of their PE teaching efficacy that were derived from three out of the four concepts of Bandura (1997)'s self-efficacy model. These were task mastery experiences, verbal persuasion, and vicarious experiences. Physiological and emotional stress were not identified as being a source of stress for PE teaching. We learned that during PE, teachers provided opportunities for students to master new skills and that this was supported with praise and feedback. For example,

> Teachers observed what I was good at and provided feedback and praise. This made me feel good about myself and my abilities and has given me the confidence to be where I am today (FG 2).

> My coach always broke skills down for me, I learned bit by bit, and this has helped me perform well across a range of practical activities (FG 4).

> Sports was the only thing I was good at. When I got to secondary school, the teachers just pushed me to work hard. It made me feel positive [sic]being good at something, [sic]this made me think about being a PE teacher (FG 5).

These opportunities provided a source of PE teaching efficacy for students as they developed confidence in their practical skills, which is essential to become a PE teacher.

Beyond the efficacy derived from the student's mastering tasks, students affirmed that key individuals (e.g., peers, teachers, and parents) provided a source of efficacy through the form of verbal persuasion. Verbal persuasion is a key source of efficacy within Bandura's self-efficacy theory. Our data suggest it is also a source of PE teaching efficacy. For example,

> Lots of my friends were involved in sports too. This was good for me, as we used to support and encourage one another[sic] (FG 1).

> Encouragement from parents. This was key for me. If I wasn't[sic] encouraged from an early age, I do not think I would have taken part in sports or have any belief in my ability today (FG 3).

> My college tutor in sixth form, he suggested that I should do something along the lines of PE teaching. It meant lots[sic] to me that he thought I could be a good teacher compared to me hearing this from another teacher at the school (FG 4).

> For me, they said that if you wanted to carry on teaching in my current primary school, then you should get a PGCE, so I found this course, and it's[sic] the best route for me (FG 5).

Parental and teacher influence was also a key to students' development of PE teaching efficacy, as identified through the influence of vicarious experiences. For example, parents modeling physically active lifestyles and being actively involved in sports heavily influenced their attraction to and participation in sports. For example,

> I was influenced by my dad. I played cricket and swimming, and I am a hockey player now. He was constantly supporting me, and if it were not for him, I very much doubt I would be involved in sports today. My mum and dad suggested that I would be good at teaching or coaching (FG 1).

> I remember going along to hockey matches that my mum used to play in when I was younger. I used to watch her whilst playing in the park with my sister. I have grown up with [sic]sports, it's[sic] just part of our family and teaching feels right for me (FG 5).

Students across all focus groups agreed that encounters with specific role models, such as teachers and parents, provided vicarious experiences, and these in turn provided a source for PE teaching efficacy. In summary, through the reflection of contextual encounters and experiences, students identified key sources of PE teaching efficacy. These findings support that skills mastery, verbal persuasion, and vicarious experiences, which are components of Bandura (1977)'s self-efficacy model, can be sources of PE teaching efficacy for undergraduate PE students.

Theme 3: students' understanding of previous experiences and anticipated challenges

As newly enrolled PE teaching students, participants in the focus groups reported feeling apprehensive about many aspects of teaching and the key situations that might arise in the classroom. Specifically, students identified that the challenges of engaging all children in learning activities and the ability to teach a wide range of practical activities caused some apprehension. To support these claims, students reported that,

> Maintaining a positive rapport is important and can be challenging. Some children will misbehave because you are just a student, and this can really impact a lesson (FG 1).

> Learning how to structure lessons and making sure that everyone is involved is quite daunting, and it does take me a lot of time to plan. I worry about having enough content in lessons and how to adapt them (FG 2).

> Monitoring pupils' engagement throughout lessons and working in limited spaces scares[sic] me. There is so much to think about. I have been on placement where the teachers put about 90 kids into one sports hall when it rains. It seems manic, but I think the pupils are more active in those lessons because they just played games, bench ball (FG 5).

Conversely, through the collective discussions, students also reported appreciation for their personal and professional

achievements within PE/sports derived from the acculturation that emerged through these reflective conversations. In addition, we also learned that students had started to develop a sense of responsibility for their actions when working with children. For example,

> I had a conversation with a pupil from the changing room to the netball court, and she wanted to know about what sports I played and how I kept my energy up, as she told me I always looked busy. I let her know that I played netball and trained at least once a week with matches at the weekend and that I needed to eat a good[sic] balanced diet (FG2).
>
> I have tried to use appropriate language with children, well, words that they will understand and that will make sense to them. It is a responsibility when you think about it all a bit more. I need to be good (FG 3).
>
> I loved school and loved being involved in sports. I now coach hockey at my local club and I do think these experiences have really helped[sic] to support where I am at[sic] now (FG 4).

Thus, students in all focus groups agreed that teaching is a challenging profession and anticipated future challenges related to the management of learners, resources, and the use of space. However, our findings also support that students' extant career journey was simultaneously a source of teaching efficacy, encompassing both key achievements and a foreboding awareness of the challenges to come.

Theme 4: processes for improving PE teaching efficacy in the professionalization phase

Since starting university, students have reported that the development of subject knowledge has had a positive influence on their confidence and belief in their teaching abilities. This is because they were learning how to implement teaching and learning approaches into their teaching practices either during their early experiences at university, i.e., throughout work-based learning placements, or within a coaching environment. These opportunities have helped them develop innovative ideas, implement a range of model-based practices, and reflect more on their approaches. These points are highlighted through the students' responses. For example,

> University is really helping us develop new ideas, such as how to adapt practice so that all pupils can be involved. I used a smaller ball and racket to help one pupil hit the ball in tennis; a simple thing really helped with my lesson during placement (FG 1).
>
> We learn about the theory in seminars, and then we can put this into practice. I have learned about different teaching styles and used a "buddy check" in some of my lessons during my first-year placement. Pupils gave feedback to each other. The pupils seemed to enjoy this (Jim, FG 2).
>
> In the lectures, we learned a lot about lesson planning. I feel I can add more to my plans now, there are some things I would never have even thought about before (FG 4).

The opportunity to implement theoretical concepts in a practical setting was helpful to students' efficacy and professional development. Students also agreed that during work-based learning placements, they had used both previous experience and recent developments in their subject knowledge, to maximize the quality of their practical teaching sessions and overall placement experience.

Discussion

The contextual influences that predicted PE teaching efficacy were teaching, coaching, volunteer experiences, and role model influence. These experiences and interactions are integral to undergraduate PE students' perceived teaching efficacy prior to university. These findings reinforce Curtner-Smith et al. (2008)'s and Jayantilal and O'Leary (2020)'s views that the acculturation phase is important for the development of PE teachers. To further elucidate the influences on the development of PE teaching efficacy, students reported that the acculturation phase provided positive relationships with role models, such as PE staff, who developed confidence, provided access to conducive learning environments, and introduced desirable skills and attributes required for teaching. These accounts are consistent with Bandura (1977)'s identification of verbal persuasion, mastery experiences, and vicarious experiences as positive influences on self-efficacy. Through these influences, students learned to envision themselves as teachers before beginning any formal teacher training (Lawson, 1983; Richards et al., 2019). While these opportunities enabled the development of subject knowledge and the progression of teaching and learning skills, we suspect that the relationship between teachers and students may have been a key contributor in motivating students to become involved in these activities. They also reported that feedback and encouragement from teachers/coaches were vital in maintaining motivation and pushed them to work hard, which enabled success and belief in their abilities. This relationship is also reported as a source for efficacy by Reverdito et al. (2023) with regard to young individuals engaged in sports. As highlighted above, PE teachers and coaches were also key to the provision of positive experiences where students had opportunities to teach others, such as leading small group activities with lower-grade groups. Hence, from this, we are confident that the development of professional relations between students and educators can influence and promote efficacy, as also found by Sharma and George (2016) when investigating teacher self-efficacy in an inclusive learning environment. Indeed, without exposure to these contextual learning environments, which Monteagudo-Jimenez et al. (2023) also reinforce as being a key to learning, and in addition to students' own experiences of PE and engagement in sports during acculturation (Parkes and Hemphill, 2020), students would arrive at university with few skills and levels of competence for teaching.

Beyond the acculturation phase, students reported that their development of efficacy had improved as a result of higher education experiences, e.g., learning pedagogical models and competencies developed through regular work-based learning experiences. Therefore, these findings reinforce that the development of PE teaching efficacy is not a bounded process that begins with enrollment in higher education. Rather, PE

teaching efficacy is dynamic and progresses from individuals' relational and situated prior experiences. This is consistent with the works of Humphries et al. (2012) and Zach et al. (2012) who further illustrated that PE teaching efficacy, while influenced by the acculturation phase, can develop further during professionalization through exposure to contextual learning experiences, advanced subject matter knowledge, and access to professional networks, as similarly reported by Jayantilal and O'Leary (2020). Thus, PE educators who seek to develop the PE teaching efficacy of students prior to ITT may wish to develop a personalized understanding of the students' previous experiences and use these as the foundations to develop PE teaching efficacy. While students felt optimistic about their PE teaching efficacy at the start of their course, it was clear that they were also beginning to make sense of the much broader challenges that they might encounter throughout their studies. For example, when we discussed with students the key skills and competencies required for teaching, students raised that they had concerns about knowing how to adapt practice and respond to the needs of the students within the classroom. However, we know that greater teaching experience and knowledge of education practices can elevate the self-efficacy beliefs of teachers (Wray et al., 2022) and that this anxiety may be reduced with time. We suspect that the realities of teaching may have not been fully addressed during the participants' acculturation phase in this study and perhaps may have resulted from the limited teaching, coaching, and volunteer experiences presented in our results. Similarly, while the acculturation experiences enabled students to develop a good understanding of how an enjoyable learning environment can promote learning (Hattie, 2016), students informed us that they felt responsible for setting good patterns of behavior through sports, such as fair play. Thus, students began to understand more about their ability to promote student development along with their ability to teach (Rink, 2013; Wray et al., 2022).

What is interesting here, but not yet known, is the relationship between PE teaching efficacy and this developing awareness of the challenges of being a teacher. Critically, we know that through experience, some students in these education programs decided against a career in teaching after completing their work-based placements. This may be because they gain further insight into the role of teaching and become more aware of the intensity and skill requirements of teaching PE and its expectations. For example, the responsibility to provide a love for physical activity, adapting to seasonal changes in weather during outdoor classes, effective use of voice in a large sports facility, and organizing recreational events at school along with planning, preparation, and workload (Brudnik-Dabrowska and Noworol, 2022). These may also be contributing factors as to why early career teachers (ECTs) may leave the teaching profession within the first 5 years of teaching (Lough, 2020). However, among the range of reasons why teachers leave the profession, it is worth considering the role of PE teaching efficacy. For instance, to what extent might high PE teaching efficacy support students through the challenging professional and occupational phases of PE teacher development? Conversely, it is also worth considering whether a repertoire of positive experiences gained during acculturation could mask these challenging realities of teaching and fill students with a "false sense of competence" as they proceed through their university curriculum. Both these

scenarios highlight the importance of effectively monitoring PE teaching efficacy during professionalization by advancing contextualized and conducive learning environments within HE curricula. To this end, the findings of this study will support us in our next endeavor to develop a PE teaching efficacy development model for PE educators. This will provide an understanding of the developmental phases of PE teaching efficacy and the importance of an understanding of students' previous experiences. To support this, we believe that collaborative reflective opportunities between staff and students should take place at the start of a PE program and is essential to the development process (Schunk and Zimmerman, 2013). In addition, there is a need for personalized pedagogical opportunities for students to develop PE teacher efficacy. For example, recognition of key strengths and weaknesses, understanding motivations for teaching (Parkes and Hemphill, 2020), high-quality work-based learning placements (Wray et al., 2022), development of subject matter knowledge, and participation in or belonging to a PE learning community (Jayantilal and O'Leary, 2020).

Conclusions

This mixed methods study identified sources of PE teaching efficacy in undergraduate PE students including teaching, coaching, and volunteer experiences and access to contextual role models. In addition, the findings present an understanding of how these experiences have supported the development of PE teaching efficacy before students enter higher education and during the initial stages of professionalization. Based on this, we believe that it is important for PE educators to be fully aware of the powerful influences of acculturation and that it is important to consider how PE educators can be supported in nurturing these existing skills and competencies. We know that this is important because effective teachers are more likely to have a positive impact on the quality of teaching and learning experiences of students within a school environment (Hattie, 2012; Wray et al., 2022).

However, while we know that these prior experiences influence perceptions of the efficacy of PE teaching at university entry, what we do not know is if and how these perceptions are challenged during the remainder of the students' studies and whether there is any change to these perceptions in the long term. These are important aspects to consider and may provide an opening for researchers to examine the PE teaching efficacy of students before and on completion of an ITT program. This may also provide useful insight into the retention of early career teachers.

Limitations

This study is not without its limitations. We found that 95% of the participants involved in the study identified as being white British, suggesting limited diversity among the respondents. Similarly, although all first-year students at the participating institutions were invited to take part in the study, the data and views generated from this study may only represent those students wishing to progress to ITT. However, the data presented answered

the study's aims; yet some aspects of the study warrant further exploration. For example, the relationship between the amount of teaching, coaching, and volunteer experience and perceptions of teaching efficacy. This is because we are aware that efficacy may vary at different stages of a teacher's career (Gale et al., 2021). In addition, it is felt that an investigation of students' understanding of physical literacy could have been an additional contextual variable to explore, as this has now been shown to be related to PE teaching efficacy (Choi et al., 2020). We recognize that PE teaching efficacy development requires further work such as implementing and evaluating the recommendations for developing a PE teaching efficacy development model proposed herein.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by LJMU's Research Ethics Committee Approval Reference 19/SLN/013. The patients/participants provided their written informed consent to participate in this study.

Author contributions

CM: key author. CC: qualitative support and critical review. JR and RP: quantitative support and critical review.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2023.1166613/full#supplementary-material

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