

Article

Teacher Age and Didactic Preferences in Team Sports Pedagogy: Evidence from Slovak Physical Education Teachers

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Abstract

Team sports are an important component of physical education (PE), and teachers' instructional decisions shape students' learning experiences and outcomes. This study examined associations between teacher age and didactic preferences in team sports pedagogy among 1856 Slovak PE teachers. A cross-sectional survey design was used, and participants were categorized into three age groups (≤ 30 years, 31–50 years, and ≥ 51 years). Associations between age and didactic preferences were analyzed using chi-square tests, adjusted standardized residuals, and ordinal and multinomial logistic regression models. Significant age-related differences were identified for didactic approach ($\chi^2_{(4)} = 14.67$, $p = 0.005$, $V = 0.063$), teaching style ($\chi^2_{(4)} = 15.25$, $p = 0.004$, $V = 0.064$) and methodological-organizational form ($\chi^2_{(8)} = 21.71$, $p = 0.006$, $V = 0.076$), although effect sizes were small. Teachers aged ≤ 30 years had higher odds of preferring a technical rather than combined approach than teachers aged 31–50 years ($OR = 1.958$, 95% CI = 1.344–2.852, $p < 0.001$) and teachers aged ≥ 51 years ($OR = 1.563$, 95% CI = 1.019–2.399, $p = 0.041$). Teachers aged 31–50 years showed stronger preferences for practical rather than command teaching styles than both younger ($OR = 1.455$, $p = 0.018$) and older teachers ($OR = 1.386$, $p = 0.023$). Pearson's chi-square test did not identify significant associations with teaching-unit duration ($p = 0.052$); however, ordinal logistic regression indicated significant overall age-group effects ($p = 0.022$). No significant age-related association was observed for preferred game activity ($p > 0.05$). The findings indicate that teacher age is associated with selected didactic preferences in team sports instruction. Although the observed associations were small, they may reflect variation in professional socialization and teaching experience and may have implications for PE teacher education and professional development.



Academic Editor: Gerald Griggs

Received: 23 June 2026

Revised: 17 August 2026

Accepted: 18 August 2026

Published: 20 August 2026

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Keywords: didactic preferences; physical education; teachers; Slovakia; teacher age; team sports pedagogy

1. Introduction

Team sports are prominent components of school physical education (PE) curricula worldwide (Ward et al., 2022). Through participation in sports such as football, basketball, and volleyball, students can develop motor competence, tactical awareness, cooperation skills, social responsibility, and positive attitudes toward lifelong physical activity (Casey & MacPhail, 2018; Schüller & Demetriou, 2018; B. Wang & Chen, 2021;

Halmová & Kanásová, 2025; Divinec et al., 2025; Šiška et al., 2024, 2026). Beyond their physical and health-related benefits, team sports provide pedagogical contexts in which students learn to make decisions, solve problems, communicate effectively, and collaborate with others in dynamic situations (Li et al., 2018; Rodríguez-Macías et al., 2021; Breed et al., 2025). Consequently, the educational value of team sports depends not only on curriculum content but also on the instructional decisions made by teachers during the teaching process (Banville et al., 2021; Adamčák et al., 2023b).

Teachers occupy an important position in the educational process because they determine how curricular objectives are translated into learning experiences (Scanlon et al., 2021; Adamčák et al., 2023a; Rovňanová, 2023). In team sports instruction, teachers make ongoing didactic decisions about the duration of instructional units, selection of teaching approaches, use of teaching styles, organization of learning activities, and emphasis placed on particular game-related skills and tactical concepts (Sgrò et al., 2022; González-Valero et al., 2024). These decisions can influence students' engagement, motivation, learning outcomes, and overall perceptions of PE (Fernandez-Rio & Iglesias, 2024). Understanding the factors that shape these pedagogical choices is therefore important for improving the quality and effectiveness of PE instruction.

Research in sport pedagogy has traditionally focused on the effectiveness of various instructional approaches used in team sports. In recent decades, increasing attention has been given to game-based pedagogies, including Teaching Games for Understanding (TGfU), Game Sense, Play Practice, and Sport Education, which emphasize tactical awareness, decision-making, and learner-centered instruction (Farias et al., 2022; Breed et al., 2025). These approaches contrast with traditional technique-oriented models that prioritize isolated skill acquisition and teacher-directed learning (Kinnerk et al., 2018; Abad Robles et al., 2020). Although numerous studies have demonstrated the educational benefits of game-based approaches, research also indicates that teachers often combine technical and tactical methods rather than adhering exclusively to a single pedagogical model (Shen & Shao, 2022; Fernandez-Rio & Iglesias, 2024). Such variability highlights the importance of examining the characteristics that influence teachers' didactic preferences.

Teacher age is one factor that may shape instructional decision-making. Age is more than a demographic characteristic; it is often associated with professional experience, occupational socialization, exposure to educational reforms, and participation in different systems of teacher preparation (Adamakis & Zounhia, 2016; Rovňanová & Nemcová, 2017; Hushman et al., 2020). Whereas age may reflect generational differences, exposure to educational reforms, and different systems of teacher preparation, teaching experience more reflects accumulated professional practice, pedagogical knowledge, and classroom experience. These factors may be associated with differences in teachers' perceptions of effective teaching, their willingness to adopt pedagogical innovations, and their preferences regarding instructional strategies (Richards et al., 2018; Koh et al., 2022). In the present study, teacher age, professional experience, career stage, and professional socialization are treated as related but distinct concepts. Age refers to chronological age; professional experience refers to accumulated teaching practice; career stage refers to a teacher's position within the professional trajectory, and professional socialization refers to the processes through which professional beliefs and practices develop. Because age was directly examined, the other constructs are considered possible explanatory contexts rather than equivalents of age.

Despite growing interest in teacher characteristics, the relationship between teacher age and pedagogical behavior remains theoretically complex and empirically unresolved. One perspective suggests that younger teachers are more likely to embrace innovative and learner-centered instructional approaches because they have completed their professional preparation during periods characterized by constructivist and competency-

based educational reforms (Richards et al., 2018; Koh et al., 2022; Beni et al., 2025; Christodoulides et al., 2025). Recent graduates may therefore be more familiar with contemporary pedagogical concepts promoted within PE teacher education programs, including student-centered learning, reflective practice, and tactical teaching approaches (Silva et al., 2021; Breed et al., 2025). An alternative perspective emphasizes professional experience rather than chronological age. Examining teaching experience alongside chronological age may provide a broader understanding of factors associated with teachers' didactic preferences. Teachers of similar ages may differ substantially in their length of professional practice, while teachers of different ages may have comparable levels of teaching experience. From this perspective, experienced teachers may possess more developed pedagogical content knowledge, stronger classroom management skills, and greater capacity to adapt instruction to contextual demands (Chang et al., 2020; Nesbitt et al., 2021).

Within PE, available research suggests that teachers' instructional choices are influenced by professional experience, socialization, and contextual conditions, although direct evidence regarding teacher age remains limited. PE teachers have been shown to make different curricular decisions in response to instructional priorities and student needs, while variability has been observed in the use of game-based approaches in the Spanish context (Banville et al., 2021; García-López et al., 2019). Research on novice and early-career teachers further indicates that translating student-centered and game-based pedagogies into classroom practice can be challenging despite exposure to these approaches during teacher education (Silva et al., 2021; Farias et al., 2022). Differences associated with professional experience have also been reported in teachers' instructional planning (Koni & Krull, 2018). In Slovakia, differences in PE teachers' curriculum preferences have been identified according to length of pedagogical practice (Adamčák et al., 2023b). More recent research has examined gender and regional differences in teachers' perspectives on basketball instruction (Beťák et al., 2025). However, these studies have not specifically examined whether teacher age is associated with multiple dimensions of team-sport pedagogy, including didactic approach, teaching style, methodological-organizational form, thematic-unit duration, and preferred game activities. This represents an important gap, particularly within the Central and Eastern European context.

The Slovak educational context provides a suitable setting in which to investigate these questions. Similar to many European countries, Slovakia has undergone substantial curricular and educational reforms over the past two decades, including the growing emphasis on competency-based learning and student-centered educational practices (Kubalíková & Kacian, 2016; Bendíková, 2018; Beťák et al., 2025; Luptáková et al., 2025). Teachers from different generations may therefore enter the profession under substantially different educational conditions. Examining age-related differences among Slovak educators may therefore contribute to understanding how educational reforms are reflected in classroom practice (Kubalíková & Kacian, 2016; Bačová & Gadušová, 2023).

Despite the growing recognition of teacher characteristics as important determinants of educational processes, large-scale studies examining the relationship between teacher age and didactic preferences in team sports remain scarce, particularly in Central and Eastern Europe (CEE). Addressing this gap may provide important evidence for teacher education, professional development programs, and curriculum implementation strategies aimed at improving the quality of PE; therefore, the present study examined the relationship between teacher age and selected didactic preferences in team sports pedagogy among 1856 Slovak educators. Specifically, the study addressed the following research question: Do teacher age groups differ in their preferred thematic-unit duration, didactic approach, teaching style, methodological-organizational form, and preferred game activities in team sports instruction? Based on theoretical assumptions concerning professional socialization,

generational differences in teacher preparation, and accumulated teaching experience, the following hypothesis was formulated: teacher age group would be significantly associated with teachers' didactic preferences in team sports instruction, including the duration of thematic units, didactic approach, teaching style, methodological-organizational form, and preferred game activities.

2. Materials and Methods

2.1. Study Design

This study employed an analytical cross-sectional observational survey design to examine associations between teacher age and didactic preferences in team sports pedagogy among PE teachers in Slovakia. Teacher age group was treated as the primary explanatory variable, whereas the five dimensions of didactic preference—duration of thematic units, didactic approach, teaching style, methodological-organizational form, and preferred game activities—were treated as outcome variables. The design was used to determine whether the distributions of these didactic preferences differed across the three predefined teacher age groups.

Cross-sectional designs collect information on variables in a defined population at a particular point or period in time and are appropriate for examining associations between characteristics without manipulating the study conditions (X. Wang & Cheng, 2020). Accordingly, this design enabled the assessment of age-related differences in educational practices within the large teacher sample during the study period. The study was observational and non-experimental: no intervention was introduced, and all variables were assessed using self-reported questionnaire data collected under natural educational conditions.

2.2. Participants and Sampling

The study included 1856 PE teachers employed in primary and secondary schools across Slovakia. Eligible participants were qualified PE teachers who were currently employed at primary or secondary schools in Slovakia and involved in teaching team sports as part of PE instruction. Eligible teachers were recruited through a nationwide survey using a voluntary non-probability sampling procedure (Wiśniowski et al., 2020; Lehdonvirta et al., 2021). Invitations to participate were distributed through EduPage, a school communication platform (aSc Applied Software Consultants, Bratislava, Slovakia) (Vodičková et al., 2023; Kostičová et al., 2024), and professional contacts were made to maximize regional and institutional representation. The invitation was distributed to approximately 1200 primary and secondary schools across Slovakia through EduPage and professional contacts. Because subsequent dissemination to eligible PE teachers was managed at the school level, the exact number of individual teachers who received the invitation was unavailable; consequently, an individual-level response rate could not be calculated. The final sample included teachers from different school types, educational levels, and geographical regions of the country. Participants were categorized into three age groups: ≤ 30 years ($N = 353$; 19.0%), 31–50 years ($N = 1012$; 54.5%), and ≥ 51 years ($N = 491$; 26.5%). The age-group classification was established to reflect early-career, mid-career, and late-career stages of professional development and to enable the examination of potential generational differences in pedagogical preferences. The three age groups (≤ 30 , 31–50, and ≥ 51 years) were defined as pragmatic categories representing younger, middle-aged, and older teachers. Although these groups may approximately correspond to early-, mid-, and later-career phases, career stage is more directly determined by teaching experience and professional trajectory rather than chronological age alone (Day & Gu, 2007).

The sample consisted of 1075 male teachers (57.9%) and 781 female teachers (42.1%). Most respondents were employed in public schools (77.1%), while 15.2% worked in private

schools and 7.7% in church-run schools. Regarding educational level, 873 teachers (47.0%) taught in primary schools and 983 teachers (53.0%) in secondary schools. The regional distribution was balanced, with 909 teachers (49.0%) from western Slovakia and 947 teachers (51.0%) from eastern Slovakia. Furthermore, 1390 teachers (74.9%) were employed in urban schools and 466 teachers (25.1%) in rural schools.

Associations between age group and sociodemographic characteristics were examined using chi-square tests (Table 1). No statistically significant differences were identified for gender ($\chi^2(2) = 1.57, p = 0.456$), school type ($\chi^2(4) = 6.59, p = 0.159$), school level ($\chi^2(2) = 2.09, p = 0.352$), school region ($\chi^2(2) = 1.86, p = 0.394$), or school residence ($\chi^2(2) = 3.48, p = 0.176$). These findings indicate that the age groups were comparable with respect to the examined sociodemographic variables, thereby reducing the likelihood that observed age-related differences in didactic preferences were confounded by sample composition.

Table 1. Association between teachers’ age group and sociodemographics.

Sociodemographics [N (%)]	Category	≤30 Years	31–50 Years	≥51 Years	χ^2 (df)	p
Gender	Male	194 (18.0)	593 (55.2)	288 (26.8)	1.57 (2)	0.456
	Female	159 (20.4)	419 (53.6)	203 (26.0)		
School type	Public	258 (18.0)	793 (55.4)	380 (26.6)	6.59 (4)	0.159
	Private	69 (24.5)	141 (50.0)	72 (25.5)		
	Church-run	26 (18.2)	78 (54.5)	39 (27.3)		
School level	Primary	154 (17.6)	482 (55.2)	237 (27.1)	2.09 (2)	0.352
	Secondary	199 (20.2)	530 (53.9)	254 (25.8)		
School region	Western	165 (18.2)	510 (56.1)	234 (25.7)	1.86 (2)	0.394
	Eastern	188 (20.1)	502 (53.7)	257 (27.5)		
School residence	Urban	275 (19.8)	760 (54.7)	355 (25.5)	3.48 (2)	0.176
	Rural	78 (16.7)	252 (54.1)	136 (29.2)		

N = number of participants; χ^2 = Pearson’s chi-square statistic; df = degrees of freedom; p = probability value.

2.3. Data Collection and Measures

Data were collected between January and May 2025, corresponding to the second half of the 2024/2025 school year. This period was selected to ensure stable instructional conditions in PE, minimizing potential influences associated with the beginning of the school year, teacher adaptation processes, and end-of-year administrative demands. The survey was administered nationwide among PE teachers employed in Slovak primary and secondary schools. To maximize participation and accommodate institutional preferences, a mixed-mode questionnaire design was adopted, combining both online and paper-based data collection procedures (Millar & Dillman, 2011). Of the 1856 respondents, 1534 (82.7%) completed the questionnaire electronically, whereas 322 (17.3%) completed the paper-based version. Online completion predominated across all age groups, accounting for 311 of 353 respondents aged ≤30 years (88.1%), 840 of 1012 respondents aged 31–50 years (83.0%), and 383 of 491 respondents aged ≥51 years (78.0%). Thus, although the proportion of paper-based responses increased modestly with age, electronic administration remained the predominant mode of data collection in all age groups. Mixed-mode survey designs have been shown to improve accessibility, increase response rates, and reduce coverage error across diverse respondent groups (De Leeuw, 2018).

Most questionnaires were distributed electronically through EduPage, a school communication platform (aSc Applied Software Consultants, Bratislava, Slovakia), which is widely used in the Slovak educational system (Vodičková et al., 2023; Kostičová et al., 2024). In schools preferring face-to-face administration, paper-based questionnaires were dis-

tributed during staff meetings and professional development activities. Participants completed the questionnaire independently without the presence of school management personnel to reduce social desirability bias, common method bias, and perceived institutional pressure, which are recognized concerns in self-report educational research (Dodou & de Winter, 2014). All responses were collected anonymously, and no personally identifiable information was recorded.

Participation was voluntary. Before completing the questionnaire, respondents received detailed information regarding the aims of the study, the anonymous nature of participation, data protection procedures, and their right to withdraw at any stage without consequences. Informed consent was obtained electronically before accessing the online questionnaire and in writing for paper-based administration. The use of electronic consent was considered appropriate given the minimal-risk nature of the study and anonymous survey design, which is consistent with contemporary ethical recommendations for online educational survey research (J. Harriss et al., 2024).

The survey instrument was developed specifically to examine PE teachers' didactic preferences in team sports instruction. The questionnaire consisted of two sections. The first section collected sociodemographic and professional information, including gender (male, female), age (≤ 30 years, 31–50 years, ≥ 51 years), school type (public, private, church-run), educational level (primary, secondary), school region (Western Slovakia, Eastern Slovakia), and school residence (urban, rural). Age group served as the primary independent variable in the present study, while the remaining variables were used to characterize the sample and assess group comparability. Because years of teaching experience were not included in the analysis, age groups were treated as approximate indicators rather than definitive classifications of career stage. The second section assessed the teachers' didactic preferences in team sports pedagogy across five dimensions reflecting key instructional decisions commonly discussed in contemporary sport pedagogy literature (Casey & MacPhail, 2018; Ward et al., 2022; Fernandez-Rio & Iglesias, 2024). Respondents were instructed to select the option: (a) duration of thematic teaching units, (b) didactic approach, (c) teaching style, (d) methodological-organizational form, and (e) game activity emphasis during team sport instruction.

Duration of thematic units was measured using three response categories: ≤ 10 teaching hours, 11–16 teaching hours, and ≥ 17 teaching hours. Didactic approach was operationalized through three pedagogical orientations: game-based approach, technical approach, and combined approach. Teaching style was assessed through three categories: practical style, command style, and other styles. Methodological-organizational forms included game exercises, preparatory games, preparatory exercises, actual (full) games, and "do not know". Game activity preference was categorized as individual activities, game systems, or combinations of individual activities and game systems.

Respondents were instructed to indicate the option that best reflected their typical instructional practice rather than an idealized theoretical preference. The use of single-item categorical indicators was considered appropriate because the assessed variables represented discrete and directly observable didactic decisions (e.g., preferred didactic approach, teaching style, or methodological-organizational form), rather than multidimensional latent constructs requiring psychometric scale development. The response categories were defined on the basis of established concepts in sport pedagogy and were subsequently subjected to expert evaluation to assess their relevance, clarity, and correspondence with the intended didactic domains (Allen et al., 2017).

To establish content validity, the questionnaire was reviewed by a panel of university scholars specializing in PE pedagogy, curriculum studies, and sport didactics ($N = 6$), together with experienced in-service PE teachers ($N = 10$) (Artino et al., 2014; Koo & Yang, 2025). Following expert review, a pilot study was conducted with 38 PE teachers who were not included in the final sample. Feedback indicated that the questionnaire was comprehensible and appropriate for the target population. Minor linguistic revisions were subsequently made to improve clarity and readability prior to large-scale administration. The pilot study supported the comprehensibility, clarity, and practical applicability of the instrument for assessing didactic preferences in team sports instruction. Because the didactic-preference variables were operationalized as distinct categorical indicators rather than as items forming unidimensional psychometric scales, internal consistency coefficients such as Cronbach's α were not considered appropriate. Test-retest reliability could not be assessed because the pilot questionnaire was administered only once.

2.4. Ethical Considerations

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (D. Harriss et al., 2019). Ethical approval was granted by the Ethics Committee of the Artistic-Pedagogical Council, Faculty of Performing Arts, Academy of Arts in Banská Bystrica (Approval No. 014, FMU-AU/2024; 18 December 2024). All research procedures were reviewed to ensure compliance with established ethical standards for research involving human participants.

2.5. Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics (Version 27.0; IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the characteristics of the sample and the distribution of teachers' didactic preferences. Categorical variables were presented as absolute frequencies (N) and percentages (%).

To address the research question and test the study hypothesis, differences in each of five didactic-preference outcomes were examined across the three teacher age groups. Associations between teachers' age groups (≤ 30 years, 31–50 years, and ≥ 51 years) and categorical variables were examined using Pearson's chi-square (χ^2) tests of independence. The magnitude of associations was quantified using Cramér's V , with values of approximately 0.10, 0.30, and 0.50 interpreted as small, medium, and large effects, respectively. When significant chi-square associations were identified, adjusted standardized residuals (ARs) were examined to determine which cell frequencies contributed most strongly to the observed associations. Consistent with established recommendations, absolute adjusted residual values greater than 1.96 were considered statistically significant at the 0.05 level.

To further investigate age-related differences in didactic preferences while accounting for the categorical structure of outcome variables, regression analyses were conducted. Ordinal logistic regression models were applied to variables with naturally ordered response categories (duration of thematic teaching units), whereas multinomial logistic regression models were used for nominal outcome variables (didactic approach, teaching style, methodological-organizational form, and game activity preference). Age group served as the independent predictor in all models. Regression results were reported as odds ratios (ORs) with corresponding 95% confidence intervals (CIs), providing estimates of both effect magnitude and precision. The proportional-odds assumption was evaluated using the test of parallel lines. Overall model fit was assessed using likelihood-ratio chi-square statistics and Nagelkerke pseudo- R^2 . All statistical tests were two-tailed, and statistical significance was established at $p < 0.05$. Given the achieved sample size ($N = 1856$), the sensitivity analysis was used to characterize the smallest associations detectable with ad-

equate statistical power. At $\alpha = 0.05$ and 80% power, the sample was sufficient to detect Cramér's V values of approximately 0.080 for tests with 4 degrees of freedom and 0.090 for tests with 8 degrees of freedom. The study followed current reporting recommendations for observational survey research and statistical analyses in educational research journals.

3. Results

Table 2 presents the distribution of didactic preferences by age group and the results of the chi-square tests. Significant associations were identified between age and didactic approach ($\chi^2(4) = 14.67$, $p = 0.005$, $V = 0.063$), teaching style ($\chi^2(4) = 15.25$, $p = 0.004$, $V = 0.064$), and methodological-organizational form ($\chi^2(8) = 21.71$, $p = 0.006$, $V = 0.076$). No significant age-related differences were found for the duration of teaching units ($\chi^2(4) = 9.40$, $p = 0.052$, $V = 0.050$) or preferred game activity ($\chi^2(4) = 8.59$, $p = 0.072$, $V = 0.048$). Although several associations were statistically significant, their effect sizes were small (Cramér's $V = 0.063$ – 0.076).

Table 2. Distribution of didactic preferences according to age group and results of chi-square tests.

Variable [N (%)]	Category	≤30 Years	31–50 Years	≥51 Years	χ^2 (df)	p	V
Duration of teaching unit	≤10 h	164 (46.5)	410 (40.5)	229 (46.6)	9.4 (4)	0.052	0.050
	11–16 h	146 (41.4)	473 (46.7)	217 (44.2)			
	≥17 h	43 (12.2)	129 (12.7)	45 (9.2)			
Didactic approach	Game-based	120 (34.0)	359 (35.5)	188 (38.3)	14.67 (4)	0.005 **	0.063
	Technical	55 (15.6)	89 (8.8)	50 (10.2)			
	Combined	178 (50.4)	564 (55.7)	253 (51.5)			
Teaching style	Practical	261 (73.9)	828 (81.8)	373 (76.0)	15.25 (4)	0.004 **	0.064
	Command	72 (20.4)	157 (15.5)	98 (20.0)			
	Other	20 (5.7)	27 (2.7)	20 (4.1)			
Methodological-organizational form	Game exercise	123 (34.8)	409 (40.4)	204 (41.5)	21.71 (8)	0.006 **	0.076
	Preparatory game	57 (16.1)	182 (18.0)	79 (16.1)			
	Preparatory exercise	89 (25.2)	169 (16.7)	74 (15.1)			
	Actual game	45 (12.7)	160 (15.8)	88 (17.9)			
	Do not know	39 (11.0)	92 (9.1)	46 (9.4)			
Game activity	Individual activity	206 (58.4)	535 (52.9)	274 (55.8)	8.59 (4)	0.072	0.048
	Game system	45 (12.7)	175 (17.3)	62 (12.6)			
	Combination	102 (28.9)	302 (29.8)	155 (31.6)			

N = number of participants; χ^2 = Pearson's chi-square statistic; df = degrees of freedom; V = Cramér's V effect size; ** = significance (p) < 0.01.

No significant association ($p > 0.05$) was observed between age groups and the preferred duration of team sport teaching units. Across all age categories, the most frequently reported teaching-unit duration was 11–16 h, ranging from 41.4% among teachers aged ≤30 years to 46.7% among those aged 31–50 years. Approximately two-fifths of respondents in each age group preferred units lasting ≤10 h, whereas only 9.2–12.7% reported units lasting 17 h or longer.

A significant association was found between teacher age and preferred didactic approach. The combined approach was the most frequently selected option across all age groups, reported by 50.4% of teachers aged ≤30 years, 55.7% of teachers aged 31–50 years, and 51.5% of teachers aged ≥51 years. The game-based approach was reported by approximately one-third of respondents and showed a slight increase with age (34.0%, 35.5%, and 38.3%, respectively). In contrast, preference for the technical approach was highest among teachers aged ≤30 years (15.6%), compared with 8.8% among teachers aged 31–50 years and 10.2% among teachers aged ≥51 years.

Teacher age was also significantly associated with teaching style. The practical teaching style was the dominant preference in all age groups, accounting for 73.9% of teachers aged ≤ 30 years, 81.8% of teachers aged 31–50 years, and 76.0% of teachers aged ≥ 51 years. The command style was reported by approximately one-fifth of teachers in the youngest and oldest groups (20.4% and 20.0%, respectively) but less frequently among teachers aged 31–50 years (15.5%). Other teaching styles accounted for only a small proportion of responses (2.7–5.7%).

Significant age-group differences were identified in preferred methodological-organizational forms. Game exercises were the most often reported form across all age groups, ranging from 34.8% to 41.5%. Preparatory games accounted for approximately 16–18% of responses. The largest age-related difference was observed for preparatory exercises, which were reported by 25.2% of teachers aged ≤ 30 years compared with 16.7% of teachers aged 31–50 years and 15.1% of teachers aged ≥ 51 years. The proportion of teachers preferring actual (full) games increased gradually with age, from 12.7% among the youngest teachers to 17.9% among the oldest teachers.

No significant differences were found among age groups in preferred game activities ($p > 0.05$). Individual activities were the most frequently selected option in all age categories (52.9–58.4%), followed by combinations of individual activities and game systems (28.9–31.6%). Exclusive emphasis on game systems was reported by 12.6–17.3% of respondents.

To identify the categories contributing most strongly to significant chi-square associations, adjusted standardized residuals were examined (Table 3). For the didactic approach, teachers aged ≤ 30 years reported the technical approach significantly more often than expected ($AR = 3.50$), whereas teachers aged 31–50 years selected this approach less frequently than expected ($AR = -2.56$).

Table 3. Significant adjusted residuals contributing to age group differences.

Variable	Statistics	≤ 30 Years	31–50 Years	≥ 51 Years
Technical approach	AR	3.50	−2.56	0.21
Practical style	AR	−1.73	2.99	−1.59
Command style	AR	1.63	−2.61	1.62
Other (style)	AR	2.30	−0.238	0.44
Game exercise	AR	−2.05	1.12	1.01
Preparatory exercise	AR	2.87	−1.54	−1.36

AR = adjusted standardized residual. *Absolute AR* = >1.96 indicates significant deviations from expected frequencies at $p < 0.05$.

Regarding teaching style, teachers aged 31–50 years reported practical teaching styles more frequently than expected ($AR = 2.99$) and command styles less frequently than expected ($AR = -2.61$). In contrast, teachers aged ≤ 30 years were overrepresented in the category of other teaching styles ($AR = 2.30$).

For methodological-organizational forms, teachers aged ≤ 30 years reported preparatory exercises more frequently than expected ($AR = 2.87$) and game exercises less frequently than expected ($AR = -2.05$). No other adjusted residuals exceeded the threshold for statistical significance.

The ordinal and multinomial logistic regression models presented in Table 4 further examined age-group differences in teaching preferences.

Table 4. Ordinal and multinomial logistic regression models examining age-group differences in teaching variables, including all estimated age-group contrasts.

Variable	Comparison	<i>B</i>	<i>SE</i>	<i>OR</i>	95% <i>CI</i>	<i>p</i>
Duration of teaching unit ¹						
	≤30 vs. 31–50 years	−0.204	0.119	0.815	0.646–1.029	0.086
	≤30 vs. ≥51 years	0.065	0.134	1.068	0.821–1.388	0.625
	31–50 vs. ≥51 years	0.270	0.105	1.309	1.066–1.608	0.010 **
Didactic approach ²						
Technical vs. combined	≤30 vs. 31–50 years	0.672	0.192	1.958	1.344–2.852	<0.001 **
	≤30 vs. ≥51 years	0.447	0.219	1.563	1.019–2.399	0.041 *
	31–50 vs. ≥51 years	−0.225	0.192	0.798	0.548–1.164	0.242
Game-based vs. combined	≤30 vs. 31–50 years	0.057	0.136	1.059	0.811–1.383	0.673
	≤30 vs. ≥51 years	−0.097	0.152	0.907	0.673–1.223	0.523
	31–50 vs. ≥51 years	−0.155	0.118	0.857	0.680–1.079	0.188
Teaching style ³						
Practical vs. command	≤30 vs. 31–50 years	−0.375	0.159	0.687	0.503–0.939	0.018 *
	≤30 vs. ≥51 years	−0.049	0.175	0.952	0.676–1.342	0.780
	31–50 vs. ≥51 years	0.326	0.143	1.386	1.047–1.834	0.023 *
Practical vs. other	≤30 vs. 31–50 years	−0.854	0.303	0.426	0.235–0.771	0.005 **
	≤30 vs. ≥51 years	−0.357	0.326	0.700	0.369–1.327	0.274
	31–50 vs. ≥51 years	0.497	0.302	1.644	0.911–2.969	0.099
Methodological-organizational form ⁴						
Game exercise vs. preparatory exercise	≤30 vs. 31–50 years	−0.560	0.167	0.571	0.412–0.791	0.001 **
	≤30 vs. ≥51 years	−0.691	0.194	0.501	0.343–0.734	<0.001 **
	31–50 vs. ≥51 years	−0.130	0.164	0.878	0.637–1.210	0.426
Game activity ⁵						
Individual activity vs. game system	≤30 vs. 31–50 years	0.404	0.186	1.497	1.040–2.157	0.030 *
	≤30 vs. ≥51 years	0.035	0.216	1.036	0.678–1.583	0.871
	31–50 vs. ≥51 years	−0.369	0.165	0.692	0.500–0.957	0.026 *
Individual activity vs. combination	≤30 vs. 31–50 years	0.131	0.141	1.140	0.865–1.503	0.352
	≤30 vs. ≥51 years	0.133	0.157	1.143	0.839–1.555	0.397
	31–50 vs. ≥51 years	0.002	0.124	1.002	0.787–1.277	0.986

B = regression coefficient; *SE* = standard error; *OR* = odds ratio; *CI* = confidence interval; *ORs* = are reported with 95% *CI*s; * = significance (*p*) < 0.05; ** = significance (*p*) < 0.01; *ORs* compare the first specified age group with the second specified age group for the indicated outcome-category contrast. For multinomial models, the second outcome category in each contrast was treated as the reference category. For the ordinal model, higher outcome values indicate longer teaching-unit duration. ¹ Ordinal model: likelihood-ratio $\chi^2_{(2)} = 7.66$, *p* = 0.022; Nagelkerke pseudo-*R*² = 0.005; test of parallel lines $\chi^2_{(2)} = 1.94$, *p* = 0.380. ² Didactic approach: likelihood-ratio $\chi^2_{(4)} = 13.66$, *p* = 0.008; Nagelkerke pseudo-*R*² = 0.009. ³ Teaching style: likelihood-ratio $\chi^2_{(4)} = 14.86$, *p* = 0.005; Nagelkerke pseudo-*R*² = 0.011. ⁴ Methodological-organizational form: likelihood-ratio $\chi^2_{(8)} = 20.78$, *p* = 0.008; Nagelkerke pseudo-*R*² = 0.012. ⁵ Game activity: likelihood-ratio $\chi^2_{(4)} = 8.66$, *p* = 0.070; Nagelkerke pseudo-*R*² = 0.005.

For teaching-unit duration, the ordinal logistic regression model showed a significant improvement over the intercept-only model ($\chi^2_{(2)} = 7.66$, *p* = 0.022), with a Nagelkerke pseudo-*R*² of 0.005. The test of parallel lines was not significant ($\chi^2_{(2)} = 1.94$, *p* = 0.380), indicating that the proportional-odds assumption was satisfied. The multinomial regression models showed significant overall model fit for the didactic approach ($\chi^2_{(4)} = 13.66$, *p* = 0.008, Nagelkerke pseudo-*R*² = 0.009; teaching style, $\chi^2_{(4)} = 14.86$, *p* = 0.005, Nagelkerke pseudo-*R*² = 0.011; and methodological-organizational form, $\chi^2_{(8)} = 20.78$, *p* = 0.008, Nagelkerke pseudo-*R*² = 0.012). The overall model for preferred game activity was not statistically significant ($\chi^2_{(4)} = 8.66$, *p* = 0.070, Nagelkerke pseudo-*R*² = 0.005).

For the duration of teaching units, teachers aged 31–50 years had significantly higher odds than teachers aged ≥ 51 years of reporting longer teaching units ($OR = 1.309$, 95% $CI = 1.066$ – 1.608 , $p = 0.010$). No significant differences were observed between teachers aged ≤ 30 years and those aged 31–50 years ($OR = 0.815$, 95% $CI = 0.646$ – 1.029 , $p = 0.086$) or between teachers aged ≤ 30 years and those aged ≥ 51 years ($OR = 1.068$, 95% $CI = 0.821$ – 1.388 , $p = 0.625$).

For the didactic approach, the multinomial model indicated significant overall age-group differences. Teachers aged ≤ 30 years had higher odds of preferring the technical rather than combined approach compared with teachers aged 31–50 years ($OR = 1.958$, 95% $CI = 1.344$ – 2.852 , $p < 0.001$) and teachers aged ≥ 51 years ($OR = 1.563$, 95% $CI = 1.019$ – 2.399 , $p = 0.041$). The difference between teachers aged 31–50 years and those aged ≥ 51 years was not statistically significant ($OR = 0.798$, 95% $CI = 0.548$ – 1.164 , $p = 0.242$). No significant age-group differences were observed for game-based versus combined approaches (all $p > 0.05$).

For teaching style, teachers aged ≤ 30 years had lower odds than teachers aged 31–50 years of preferring the practical rather than command style ($OR = 0.687$, 95% $CI = 0.503$ – 0.939 , $p = 0.018$), whereas teachers aged 31–50 years had higher odds than teachers aged ≥ 51 years of preferring practical rather than command styles ($OR = 1.386$, 95% $CI = 1.047$ – 1.834 , $p = 0.023$). Teachers aged ≤ 30 years had lower odds than teachers aged 31–50 years of preferring practical rather than other teaching styles ($OR = 0.426$, 95% $CI = 0.235$ – 0.771 , $p = 0.005$). The remaining age-group contrasts were not statistically significant.

Regarding methodological-organizational forms, teachers aged ≤ 30 years had lower odds of preferring game exercises relative to preparatory exercises than teachers aged 31–50 years ($OR = 0.571$, 95% $CI = 0.412$ – 0.791 , $p = 0.001$) and teachers aged ≥ 51 years ($OR = 0.501$, 95% $CI = 0.343$ – 0.734 , $p < 0.001$). The difference between teachers aged 31–50 years and those aged ≥ 51 years was not statistically significant ($OR = 0.878$, 95% $CI = 0.637$ – 1.210 , $p = 0.426$).

For game activity, teachers aged ≤ 30 years had significantly higher odds than teachers aged 31–50 years of preferring individual activities relative to game systems ($OR = 1.497$, 95% $CI = 1.040$ – 2.157 , $p = 0.030$), whereas teachers aged 31–50 years had significantly lower odds than teachers aged ≥ 51 years for the same contrast ($OR = 0.692$, 95% $CI = 0.500$ – 0.957 , $p = 0.026$). The comparison between teachers aged ≤ 30 years and those aged ≥ 51 years was not statistically significant ($OR = 1.036$, 95% $CI = 0.678$ – 1.583 , $p = 0.871$). No significant age-group differences were observed for individual activities relative to combinations of individual activities and game systems (all $p > 0.05$). The significant individual contrasts for game activity should be interpreted cautiously because the overall multinomial model was not statistically significant ($\chi^2_{(4)} = 8.66$, $p = 0.070$, Nagelkerke pseudo- $R^2 = 0.005$). For teaching-unit duration, however, the ordinal regression model was statistically significant ($\chi^2_{(2)} = 7.66$, $p = 0.022$), despite the non-significant Pearson chi-square test ($p = 0.052$), reflecting the additional use of the ordered structure of the outcome in the ordinal model.

4. Discussion

The present study examined associations between teacher age and didactic preferences in team sports pedagogy in 1856 Slovak PE teachers. Pearson's chi-square analyses identified significant ($p < 0.05$) age-group associations with didactic approach, teaching style, and methodological-organizational form, whereas the corresponding associations with teaching-unit duration and preferred game activity were not statistically significant ($p > 0.05$). Ordinal regression nevertheless indicated a significant overall age-group effect for teaching-unit duration, while the overall multinomial model for game activity remained

non-significant ($p > 0.05$). Specifically, significant associations were found for didactic approach ($\chi^2(4) = 14.67$, $p = 0.005$, $V = 0.063$), teaching style ($\chi^2(4) = 15.25$, $p = 0.004$, $V = 0.064$), and methodological-organizational form ($\chi^2(8) = 21.71$, $p = 0.006$, $V = 0.076$) (Table 2); however, Cramér's V values indicated small effects, suggesting that the relationship between teacher age and didactic preferences was weak. This interpretation is consistent with contemporary PE research emphasizing that teachers' instructional decisions are shaped by multiple interacting factors, including professional socialization, teaching experience, curriculum traditions, institutional expectations, and continuing professional development (Richards et al., 2018; Scanlon et al., 2021; Banville et al., 2021).

The results indicated that teachers aged ≤ 30 years had higher odds of preferring the technical rather than combined approach than both teachers aged 31–50 years and those aged ≥ 51 years. The adjusted residual for the ≤ 30 -year age group of teachers was significant and positive for the technical approach ($AR = 3.50$), whereas the 31–50-year group was underrepresented in this category ($AR = -2.56$). Regression analysis confirmed this pattern: teachers aged ≤ 30 years had higher odds of preferring the technical rather than combined approach than teachers aged 31–50 years ($OR = 1.958$, 95% $CI = 1.344$ – 2.852 , $p < 0.001$) and teachers aged ≥ 51 years ($OR = 1.563$, 95% $CI = 1.019$ – 2.399 , $p = 0.041$). This finding is important because it challenges the assumption that younger teachers (≤ 30 years) automatically adopt more student-centered, game-based pedagogies. Although recent teacher education programs often emphasize tactical, constructivist, and learner-centered approaches, one possible explanation is that early-career teachers may perceive technical instruction as providing clearer organization, easier classroom control, and more predictable lesson management (Silva et al., 2021; Farias et al., 2022; Mustell et al., 2024). However, classroom-management needs and teachers' reasons for selecting particular instructional approaches were not directly assessed in the present study; therefore, this interpretation should be regarded as a tentative explanation rather than an established mechanism.

Another important finding was the predominance of the combined approach across all age groups. It was selected by 50.4% of teachers aged ≤ 30 years, 55.7% of teachers aged 31–50 years, and 51.5% of teachers aged ≥ 51 years. This suggests that Slovak PE teachers generally do not separate technical and tactical instruction rigidly (García-Ceberino et al., 2020). Instead, many appear to integrate skill practice, game exercises, and tactical learning. This aligns with current evidence that hybrid and model-based approaches are increasingly common in PE and that effective team sports pedagogy often requires flexible integration of technical execution, decision-making, cooperation, and game understanding (Shen & Shao, 2022; Fernandez-Rio & Iglesias, 2024; Breed et al., 2025).

Teacher age was associated with differences in teaching style. The practical teaching style was the dominant preference in all age groups and was most common among teachers aged 31–50 years (81.8%). Adjusted residuals showed that this group reported practical styles more often than expected ($AR = 2.99$) and command styles less frequently than expected ($AR = -2.61$). Regression analysis further indicated that teachers aged 31–50 years were more likely to prefer the practical rather than command style than both younger teachers ($OR = 1.455$, 95% $CI = 1.065$ – 1.987 , $p = 0.018$) and older teachers ($OR = 1.386$, 95% $CI = 1.047$ – 1.834 , $p = 0.023$) (Table 4). One possible interpretation is that the stronger preference for practical teaching styles among teachers aged 31–50 years may be associated with greater professional confidence or accumulated classroom experience, potentially allowing them to organize practical learning environments with less reliance on directive command-based instruction (Chang et al., 2020; Nesbitt et al., 2021; Ward et al., 2022). However, professional confidence and teaching experience were not directly examined as explanatory mechanisms in the present study, and this interpretation therefore remains tentative.

The findings for methodological-organizational forms suggest that younger teachers (≤ 30 years) may have a stronger preference for structured instructions. Teachers aged ≤ 30 years reported preparatory exercises more often than expected ($AR = 2.87$) and game exercises less often than expected ($AR = -2.05$). Regression analysis supported this pattern: teachers aged ≤ 30 years had lower odds of preferring game exercises relative to preparatory exercises than teachers aged 31–50 years ($OR = 0.571$, 95% $CI = 0.412$ – 0.791 , $p = 0.001$) and teachers aged ≥ 51 years ($OR = 0.501$, 95% $CI = 0.343$ – 0.734 , $p < 0.001$) (Table 4). This pattern is consistent with the higher preference for technical approaches among younger teachers and may indicate that early-career teachers prioritize isolated or preparatory practice before moving to more complex game situations (Harvey et al., 2015; García-López et al., 2019). While preparatory exercises are useful for developing basic motor and sport-specific skills, contemporary game-based approaches argue that learning is strengthened when technical actions are embedded in decision-rich game contexts (Kinnerk et al., 2018; Abad Robles et al., 2020; González-Valero et al., 2024).

Pearson's chi-square analysis did not identify a statistically significant association between age group and teaching-unit duration ($\chi^2_{(4)} = 9.40$, $p = 0.052$, $V = 0.050$) (Table 2). Across all age categories, the most frequent preference was 11–16 teaching hours, selected by 41.4% of teachers aged ≤ 30 years, 46.7% of teachers aged 31–50 years, and 44.2% of teachers aged ≥ 51 years. This consistency suggests that teaching-unit duration may be influenced by curriculum organization and school scheduling in addition to individual pedagogical preference (Rikard & Banville, 2005; Banville et al., 2021; Soares et al., 2021). However, the ordinal logistic regression model indicated a significant overall age-group effect ($\chi^2_{(2)} = 7.66$, $p = 0.022$), and teachers aged 31–50 years had higher odds than teachers aged ≥ 51 years of reporting longer teaching units ($OR = 1.309$, 95% $CI = 1.066$ – 1.608 , $p = 0.010$). The difference between the chi-square and ordinal regression results may reflect the ordinal model's use of the ordered structure of the response categories. Nevertheless, the very small Nagelkerke pseudo- R^2 (0.005) indicates that age explained little variation in preferred teaching-unit duration; therefore, the finding should be interpreted cautiously (Koni & Krull, 2018; Feu et al., 2019).

No significant association was found between age and preferred game activity ($\chi^2_{(4)} = 8.59$, $p = 0.072$, $V = 0.048$) (Table 2). Individual activities were the most common preference in all groups: 58.4% among teachers aged ≤ 30 years, 52.9% among teachers aged 31–50 years, and 55.8% among teachers aged ≥ 51 years. Combinations of individual activities and game systems were also frequently reported. These findings suggest broad agreement that team sports instruction should develop both individual competencies and collective tactical understanding (González-Valero et al., 2024; J. Wang et al., 2024). Such a balance is consistent with contemporary perspectives on team sports pedagogy, where individual skill, tactical decision-making, cooperation, and game systems are viewed as interconnected rather than separate learning domains (Li et al., 2018; Rodríguez-Macías et al., 2021; Choi et al., 2022). Although two individual age-group contrasts reached statistical significance, the overall multinomial model for game activity was not statistically significant ($\chi^2_{(4)} = 8.66$, $p = 0.070$, Nagelkerke pseudo- $R^2 = 0.005$). These individual contrasts should therefore be interpreted cautiously and should not be considered evidence of a robust overall age-related association with preferred game activity.

Despite their small magnitude, the observed effect sizes may still be theoretically meaningful. Although several differences were statistically significant, the Cramér's V values ($V = 0.063$, 0.064 , and 0.076) indicate very weak associations; therefore, teacher age alone should not be considered a determining factor in didactic preference; rather, the observed age-group differences should be interpreted as modest tendencies that may also reflect career stage, teaching experience, professional biography, teacher education background,

and exposure to educational reforms (Pels et al., 2022). This is particularly relevant in Slovakia, where PE has been influenced by curricular transformations, competency-based reforms, and changing expectations regarding student-centered instruction (Kubalíková & Kacian, 2016; Bendíková, 2018; Bačová & Gadušová, 2023; Luptáková et al., 2025).

The findings also have potential implications for PE teacher education and professional development. Early career teachers may benefit from targeted support in translating game-based and student-centered pedagogical concepts into manageable classroom practice (Silva et al., 2021; Zhang et al., 2024). Mid-career teachers may represent an important group for peer mentoring and professional exchange, given their stronger reported preference for practical and less command-oriented instruction (Salters & Scharoun Benson, 2022); however, the present findings should not be interpreted as evidence that this preference results from greater professional confidence. Older teachers may contribute valuable experiential knowledge while benefiting from professional learning opportunities focused on contemporary tactical and hybrid models; therefore, these age-group patterns may provide tentative indications for professional development, but age or career stage should not be used as the primary basis for differentiation. Professional learning opportunities should instead consider teachers' individual pedagogical needs, experience, beliefs, professional development history, and school context, with career stage treated as only one of several relevant factors (Casey & MacPhail, 2018; Hernando-Garijo et al., 2021; Beni et al., 2025; Christodoulides et al., 2025).

Several limitations should be considered. The analytical cross-sectional design permits the identification of associations between teacher age and didactic preferences but does not establish temporal relationships or support causal inference. Self-reported preferences may also differ from teachers' actual instructional behavior in lessons. The voluntary non-probability sampling procedure may have introduced self-selection bias, as teachers who chose to participate may differ systematically from those who did not participate. Because the pilot questionnaire was administered only once, temporal reliability could not be evaluated using the test–retest procedure. In addition, age was used as the main grouping variable, but teaching experience, professional development history, school culture, and pedagogical beliefs were not directly modeled. Future research should therefore use observational designs, mixed-method approaches, and multilevel analyses to examine how teacher age interacts with experience, school context, and teacher education background. Despite these limitations, the large national sample provides valuable evidence that teacher age is associated with selected didactic preferences in Slovak team sports pedagogy, although the practical magnitude of these differences remains small.

5. Conclusions

This study investigated associations between teacher age and didactic preferences in team sports pedagogy among 1856 Slovak PE teachers. Pearson's chi-square analyses identified significant age-group associations with didactic approach ($\chi^2_{(4)} = 14.67$, $p = 0.005$, $V = 0.063$), teaching style ($\chi^2_{(4)} = 15.25$, $p = 0.004$, $V = 0.064$), and methodological-organizational form ($\chi^2_{(8)} = 21.71$, $p = 0.006$, $V = 0.076$), whereas the associations with teaching-unit duration ($\chi^2_{(4)} = 9.40$, $p = 0.052$) and preferred game activity ($\chi^2_{(4)} = 8.59$, $p = 0.072$) were not statistically significant. Ordinal regression nevertheless indicated a significant overall age-group effect for teaching-unit duration ($\chi^2_{(2)} = 7.66$, $p = 0.022$), although the explained variation was very small (Nagelkerke pseudo- $R^2 = 0.005$). Overall, the observed associations were weak, indicating that teacher age alone accounted for little variation in didactic preferences.

The results showed that younger teachers (≤ 30 years) had higher odds of preferring the technical rather than combined approach than teachers aged 31–50 years ($OR = 1.958$, 95% $CI = 1.344$ – 2.852 , $p < 0.001$) and teachers aged ≥ 51 years ($OR = 1.563$, 95% $CI = 1.019$ – 2.399 , $p = 0.041$), and they reported preparatory exercises more frequently than expected ($AR = 2.87$). Teachers aged 31–50 years showed a stronger preference for practical rather than command teaching styles compared with both younger and older teachers. Across all age groups, the combined didactic approach remained the dominant pedagogical preference, being reported by approximately half of respondents (50.4–55.7%).

These findings suggest that the observed relationships between age and didactic preferences may also reflect variation in professional socialization, teaching experience, and exposure to educational reforms. In terms of practical perspective, the observed age-group differences may help inform professional learning opportunities, but the very small effect sizes do not support differentiating professional development on the basis of age alone. Career stage should therefore be considered alongside teachers' experience, pedagogical beliefs, professional development history, and school context. Although teacher age was associated with selected didactic preferences, the small effect sizes indicate that instructional choices are likely influenced by a broader set of contextual and professional factors. Future research should therefore employ longitudinal and observational designs to examine how age interacts with teaching experience, professional development, pedagogical beliefs, and school environments in shaping instructional practice in PE.

Author Contributions: Conceptualization, M.M. and Š.A.; methodology, M.M., Š.A., R.K. and S.A.; validation, M.M. and Š.A.; formal analysis, M.M., Š.A., R.K. and S.A.; investigation, M.M., Š.A. and R.K.; resources, S.A.; data curation, Š.A.; writing—original draft preparation, M.M., Š.A., R.K. and S.A.; writing—review and editing, M.M., Š.A., R.K. and S.A.; visualization, M.M.; supervision, Š.A.; project administration, M.M., Š.A., R.K. and S.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of the Artistic-Pedagogical Council, Faculty of Performing Arts, Academy of Arts in Banská Bystrica (Approval No. 014, FMU-AU/2024; 18 December 2024).

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

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author.

Acknowledgments: The authors thank all participating PE teachers and the schools that supported questionnaire distribution.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

PE	Physical Education
TGfU	Teaching Games for Understanding
CEE	Central and Eastern Europe

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