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What makes a physical education teacher? Personal characteristics for physical education development

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Background. The physical education (PE) teacher is a decisive factor for PE development and teaching. Reflecting on and making the best possible use of the PE teachers' personal resources positively influence teacher effectiveness and student achievement. This requires a comprehensive analysis of PE teachers' personal characteristics.

Aims. Consequently, this study aimed to describe PE teachers by using an aggregated examination of PE teachers' synergistic personal characteristics and analysing gender, age, and school type differences.

Sample. 1,163 German PE teachers (61.9% female; $M = 43.16 \pm 10.8$ years) from six different school types participated in the study.

Methods. Participants completed self-report questionnaires assessing PE teachers' *General Personality Traits*, *General Interests*, and *Motivational Characteristics* (Teacher *Self-Efficacy*, *Enthusiasm*, and *Interests*). Descriptive analyses, between subjects MANOVAs, and univariate ANOVAs with pairwise multiple comparison tests were applied.

Results. Multivariate gender differences occurred for *General Personality Traits* ($\eta^2 = .04$), *General Interests* ($\eta^2 = .07$), and *Motivational Characteristics* ($\eta^2 = .03$); age differences for *General Personality Traits* ($\eta^2 = .03$); school type differences for *General Personality Traits* ($\eta^2 = .05$); and *Motivational Characteristics* ($\eta^2 = .11$). Considering individual dimensions, gender revealed most univariate differences, especially in *General Personality Traits* and *General Interests*. School types revealed most univariate differences in *Motivational Characteristics*.

Conclusion. The educational personnel can (1) make use of the PE teachers' general stable factors by aligning teaching accordingly, for example considering teachers' gender and (2) specifically foster PE teacher personal development regarding *Motivational Characteristics* by, for example adapting teacher education or professional training to the particular school type.

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Physical education (PE) is the only setting in which all school-aged children experience instructed physical activity. In order to meet students' needs and motives to be physically active, PE ideally provides various movement experiences covering different strands, which are presented with different emphases (Kurz, 2000). By this, PE aims to (1) educate students to sports, to prepare and motivate them for a lifelong active lifestyle and (2) educate students through sports, to contribute, for example to students' personal development, and by this to the general educational mandate (Hardman, Routen, & Tones, 2014; KMK, 2019; Kurz, 2008). In order to fulfil this aim and responsibility within ongoing socio-cultural changes including sports culture (Horne, 2013), the PE context requires continuous development based on empirical findings (Lund, 2015; Naul & Scheuer, 2020). Often empirically examined determining factors concerning PE's development are the following four didactical components: (1) contextual factors such as facilities, (2) the lessons' content, typically pre-defined by PE's curriculum, (3) the students as target group, and (4) the PE teacher as the main agent holding the threats together and guiding didactical decisions (Scherler, 2004). Considering the PE teacher seems particularly relevant as: (1) PE's unique opportunities and contextual peculiarities demand a lot from the PE teacher, for example empathetic behaviour in interactions with heterogeneous groups of students. (2) Among the four abovementioned determining factors, the PE teacher is probably the most easily accessible and developable factor, for example in teacher education or teacher professional training where PE teachers strive for continuous personal as well as professional development. (3) General educational research has shown the relevance of the teacher and his or her personality in the educational process in general and in regard to learning outcomes in particular, for example the teacher's positive influence on student achievement (Hattie, 2009). Student achievement in turn is further a typical measure of teacher effectiveness (Kim, Jörg, & Klassen, 2019).

The teacher's role and accompanied chances and challenges regarding his or her effectiveness as a measure of job performance (Gordon, Kane, & Staiger, 2006) are, for example illustrated in the *Utilization of Learning Opportunities Model* (Helmke, 2017), the *Model of Professional Teaching Competence* (Baumert & Kunter, 2013) or the *Multilevel Supply–use Model of Student Learning* (Brühwiler & Blatchford, 2011). The abovementioned models explicitly address the teacher's personality as essential component of teaching. Kim et al.'s (2019) meta-analysis confirmed this understanding. They further proclaim to identify vital factors of the teacher's personality. Mayr (2014) has examined relevant person-related factors which led him to a definition of the teacher's personality. He proclaims the synergy of relatively stable *General Personality Traits* and *General Interests* as well as less stable *Motivational Characteristics* as essential components of the teacher's personality. Mayr's (2014) understanding follows an encompassing view and by this serves as starting point to identify characteristics of vital factors of the teacher's personality.

First, *General Personality Traits* are typically understood as five lexically derived domains – *Extraversion*, *Agreeableness*, *Conscientiousness*, *Neuroticism*, *and Openness* (Big Five) – used to describe a person's general personality (John, Donahue, & Kentle, 1991; John, Naumann, & Soto, 2008). The Big Five are commonly studied in the occupational context, for example as influencing factors of mood (Berkovich & Eyal, 2019) or as predictors of job performance and consequently applied in job selection processes, also within the teaching profession (Kim et al., 2019). *Extraversion*, *Conscientiousness*, and *Openness* positively correlate with teacher effectiveness (Kim et al., 2019) or job satisfaction (Ranasinghe & Kottawatta, 2016) and negatively with

burnout (Kim et al., 2019). *Conscientiousness* is also positively associated with teachers' retention (Bastian, McCord, Marks, & Carpenter, 2017). Contrarily, *Neuroticism* and *Agreeableness* are considered as less favourable for the teaching profession. *Neuroticism* negatively impacts teachers' mood (Berkovich & Eyal, 2019) or promotes burnout (Cramer & Binder, 2015), and *Agreeableness* negatively impacts teacher effectiveness as well as student achievement (Kell, 2019).

Second, *General Interests* are typically understood and measured within Holland's (1994) RIASEC theory stating that people search for vocational environments suiting their abilities and interests. A fit between environment and interest is beneficial for staying in the teaching profession (Swanson, 2012). Holland classified six interest orientations – *Realistic*, *Investigative*, *Artistic*, *Social*, *Enterprising*, and *Conventional* (RIASEC) – and located the teaching profession in the *Social* sector. Consequently, people deciding for and flourishing in the teaching profession typically obtain a pronounced *Social* (S) interest. *General Personality Traits* and *General Interests* are relatively stable, which allows describing a teacher's inherent characteristics and make use of them when teaching by considering, for example their relationships to student outcomes.

Third, *Motivational Characteristics* are understood as profession- and situation-specific developable facets (Baumert & Kunter, 2011). Studies examining teacher *Motivational Characteristics*, which positively influence learning outcomes, have shown the importance of the following three facets: *Teacher Self-Efficacy* (Pfitzner-Eden, Thiel, & Horsley, 2014), *Teacher Enthusiasm* (Kunter, Frenzel, Nagy, Baumert, & Pekrun, 2011), and *Teacher Vocational Interests* (Schiefele, Streblow, & Retelsdorf, 2013).

Research has shown a positive relationship between *Teacher Self-Efficacy* and teacher effectiveness as well as student achievement (Caprara, Barbaranelli, Steca, & Malone, 2006; Hoy & Spero, 2005; Klassen & Chiu, 2010; Klassen & Tze, 2014; Skaalvik & Skaalvik, 2007; Zee & Koomen, 2016). Several studies (Klassen & Chiu, 2010; Klassen, Tze, Betts, & Gordon, 2011; Pfitzner-Eden et al., 2014) have proven a three-factor structure of *Teacher Self-Efficacy*, consisting of teachers' competence in *Instructional Strategies*, *Classroom Management*, and *Student Engagement*. Teachers' competence in *Instructional Strategies*, for example positively correlates with academic adjustment (Zee & Koomen, 2016). Teachers' *Classroom Management* competence positively affects students' adaptive academic development (Lazarides, Buchholz, & Rubach, 2018) and teachers' psychological well-being (Zee & Koomen, 2016).

Teacher Enthusiasm shows positive relationships with, for example teacher effectiveness and student achievement (Kunter, Klusmann, et al., 2013), or students' eagerness to learn (Bleck, 2018). Studies often distinguish between *Subject* and *Teaching Enthusiasm* (Kunter et al., 2011) and have shown positive relationships especially between *Teaching Enthusiasm* and teachers' occupational well-being (Kunter et al., 2011), classroom management competence (Bleck, 2018), instructional quality (Kunter et al., 2008), and student enjoyment (Kunter, Baumert, et al., 2013).

Teacher Vocational Interests have also shown positive relationships with instructional strategies (Schiefele & Schaffner, 2015). Schiefele et al., (2013) have revealed a three-factor structure distinguishing between *Subject*, *Didactic*, and *Educational Interests* and highlighted that teachers' *Educational Interests*, for example are related to student motivation (Schiefele & Schaffner, 2015). On the teacher side, Schiefele and Schaffner (2015) have shown that *Didactic* and *Educational Interests* are negatively related to burnout.

The research on *Teacher Self-Efficacy*, *Teacher Enthusiasm*, and *Teacher Vocational Interests* in relation to learning success outcomes on the teacher and the student side, as

well as their proven complementary interrelationships, supports their joint inclusion as *Motivational Characteristics* in Mayr's (2014) understanding of the teacher's personality, which can be applied to the PE setting and PE teachers' personality specifically.

So far, studies have only examined the factors individually. However, following Mayr (2014), an aggregated and holistic examination of the teacher's personality would be desirable in order to comprehensively describe the teacher's personality and show possible relationships between the factors. This knowledge can be used in teachers' professional development starting with student–teacher recruitment and education, which influence teacher effectiveness (Darling-Hammond, 2017). Mayr's (2012) supply–use model of teacher education explains how teachers achieve and develop professional competence and by this effectiveness. In Mayr's (2012) model, which follows a multifaceted understanding of teacher competence, teacher personality contributes to teachers' professional development process and consequently affects teaching behaviour as well as well-being.

The model further highlights the context dependency of the development process. The abovementioned studies examining individual aspects of the teacher's personality have mostly considered the school context in general or a classroom-based school subject in particular. PE takes on a special role within the school curriculum. It differs substantially from traditionally classroom-based school subjects, for example considering its context, content, or teacher–student interaction processes, which consequently poses special challenges to teachers (Schweer, 2017) and by this PE teacher education. The abovementioned context specificity along with PE's peculiarities speak for (1) analysing the PE teacher in the PE context specifically and (2) considering the subject's peculiarities and demands when interpreting findings on teachers' personal characteristics in order to concretize the description of PE teachers and deduce PE-specific teaching strategies, also on teacher education level.

Physical education teachers themselves, teacher educators, or education politicians benefit from knowing the configuration and relationships of PE teachers' personal characteristics. Reflecting on and making the best possible use of existing personal resources allows to align teacher education accordingly or specifically foster development processes. This requires a detailed description of PE teachers' personal characteristics. Further differentiating between genders, age groups, and school types enhances the description and allows deducing even more detailed implications for PE research and teaching. Consequently, our study aims to describe PE teachers by using an aggregated examination of personal characteristics and analysing gender, age, and school type differences.

Methods

Study design

The project [ANONYMIZED] was conducted in cooperation with [ANONYMIZED] and focused on student motivation in school PE. [ANONYMIZED] analysed person-related factors of PE teachers and students relevant for PE teaching in general and student motivation in particular. [ANONYMIZED] encompassed a quantitative, cross-sectional study, including a teacher and student self-report questionnaire survey. [ANONYMIZED] examined PE teachers of all school types (N = 1,163/61.9% female/ M = 43.16 ± 10.8 years) and secondary school students from classes seven to ten (N = 1,740/58.1% female/M = 14.39 ± 1.44 years) [ANONYMIZED]-wide from April 2018 to March 2019. Participant recruitment took place via the [ANONYMIZED] and its

partners, educational institutions, social media, personal contacts, and local press. The responsible educational ministries in each participating [ANONYMIZED] had approved the study. All participants provided their informed written consent. All governmental rules on data privacy and protection as well as the ethical principles of the Declaration of Helsinki were respected. This paper focuses on the teacher data.

Participants

Physical education teachers with teaching experience between 0 and 45 years (M = 14.42 ± 10.41 years) were considered for the analysis. 62.7% were recruited via the [ANONYMIZED], 21.6% via educational institutions (e.g. colleagues or schools' management), 7.9% via social media, 6.1% via personal contacts and 1.8% via local press. Regarding participation format, 70.9% participated online, 29.1% via paper-pencil. The analysed PE teachers were divided into three different age groups (younger: 20–34 years; M = 31.01 ± 0.78 years; 27.8%/middle-aged: 35–49 years; M = 43.19 ± 4.51 years; 42.3%/older: 50–65 years; M = 57.25 ± 4.15 years; 29.9%) and six different school types (primary: 13.4%/lower secondary: 21.1%/comprehensive secondary: 15.1%/higher secondary: 40.1%/special: 2.9%/vocational: 7.4%). Each participant could clearly be assigned to one group.

Measures

PE teachers' personal characteristics were examined using five different validated scales. Table 1 provides a detailed description of the five scales regarding their characteristics and internal consistency. Additionally, we assessed socio-demographic data: gender, age (year/month of birth), and school type (considering the present teaching position). Following Oppenheimer, Meyvis, and Davidenko's (2009) guidelines, we included two attention checks and one instructional manipulation check in the questionnaire.

Data analysis

First, in order to provide a descriptive overview of PE teachers' personal characteristics in the different subgroups, we calculated means and standard deviations of the PE teachers' *General Personality Traits*, *General Interests*, and *Motivational Characteristics* for gender, age, and school type and excluded missing values case wise. Second, in order to investigate whether PE teachers' *General Personality Traits*, *General Interests*, and *Motivational Characteristics* (dependent variables) differed between genders, age groups, and school types (independent variables), we conducted multivariate analysis of variance (MANOVA) functions for each of the aforementioned dimensions. Prior to the analysis, we checked MANOVA assumptions by applying Pituch and Stevens's (2016) guidelines and excluded missing values list-wise (Graham, 2009). If MANOVA models yielded significant results, we calculated follow-up univariate analyses of variance (ANOVAs) for each subscale individually (Huberty & Morris, 1989). We corrected for unbalanced data following Fox's (2016) recommendations and used Dunnett–Tukey–Kramer (Dunnett, 1980) pairwise multiple comparisons as post-hoc tests to investigate group differences on the factor variables. To quantify the findings' magnitude, we calculated effect sizes (η^2) – .01 representing a small, .06 a moderate, and .14 a large effect (Cohen, 1988) – as well as 95% confidence intervals (95% CI). RStudio (Version 1.2.5033, RStudio Inc., Boston, MA, USA) was used for data analysis.

Table 1. Measures: PE teachers' personal characteristics

Inventory	Authors (year)	Dimensions (items per dimension)	Cronbachs α	Rating levels	Sample item
General Personality Traits					
Big Five Inventory-2-Short	Rammstedt et al. (2018)	Openness (6) Conscientiousness (6) Extraversion (6) Agreeableness (6) Neuroticism (6)	.67 .75 .67 .63 .77	1 'Strongly disagree' – 5 'Strongly agree'	I am outgoing, sociable
General Interests					
General Interest Scale	Bergmann, Eder, and Mayr (2016)	Realistic (1) Investigative (1) Artistic (1) Social (1) Enterprising (1) Conventional (1)		1 'I am not at all interested in/I really don't like doing . . .' – 9 'I am totally interested in/I totally like doing . . .'	Realistic, e. g. working with machines or devices . . .
Motivational Characteristics					
Scale for Teacher Self-Efficacy	Pfitzner-Eden et al. (2014)	Instructional Strategies (4) Classroom Management (4) Student Engagement (4)	.77 .86 .79	1 'Not at all certain I can do' – 9 'Absolutely certain I can do'	. . . being able to motivate students that show little interest in class
Teacher Enthusiasm Scale	Kunter et al. (2011)	Teaching Enthusiasm (5) Subject Enthusiasm (5)	.90 .82	1 'Strongly disagree' – 4 'Strongly agree'	I enjoy teaching
Vocational Teacher Interests Scale	Schiefele et al. (2013)	Subject Interest (6) Didactic Interest (5) Educational Interest (4)	.76 .76 .79	1 'Not at all true' – 4 'Very true'	I am especially interested in educational aspects of the teaching profession

Results

Descriptive overview

Table 2 highlights descriptive statistics ($M \pm SD$) of the analysed variables in order to fulfil our research aim of describing PE teachers by an aggregated examination of their personal characteristics.

Gender, age, and school type differences

Table 3 shows gender, age, and school type differences in order to enrich the description. The conducted MANOVAs – *General Personality Traits*, *General Interests*, and *Motivational Characteristics* – revealed statistically significant differences with small to moderate effects. Follow-up ANOVAs only showed significant differences with small effects.

Gender differences

Gender differences occurred in all MANOVA models: 3–7% of multivariate variance of *General Personality Traits*, *General Interests*, and *Motivational Characteristics* was associated with gender. Univariate differences occurred in four dimensions of *General Personality Traits*, five dimensions of *General Interests*, and three dimensions of *Motivational Characteristics*. Female PE teachers scored higher than male PE teachers on *Extraversion* (95% CI [−0.16, −0.02]), *Agreeableness* (95% CI [−0.18, −0.06]), *Conscientiousness* (95% CI [−0.27, −0.11]), and *Neuroticism* (95% CI [−0.34, −0.19]). Regarding *General Interests*, *Realistic* (R) (95% CI [0.90, 1.56]) and *Investigative* (I) (95% CI [0.14, 0.69]) tasks appealed to males more than females, *Artistic* (A) (95% CI [−1.32, −0.72]) and *Social* (S) (95% CI [−0.85, −0.45]) tasks vice versa. Considering *Motivational Characteristics*, males felt more competent in *Classroom Management* (95% CI [0.11, 0.41]), whereas females showed higher *Didactic* (95% CI [−0.25, −0.11]) and *Educational Interest* (95% CI [−0.25, −0.10]).

Age differences

Age differences occurred only for *General Personality Traits*: 3% of multivariate variance of *General Personality Traits* was associated with age. Univariate differences occurred in two dimensions of *General Personality Traits*. Younger PE teachers were significantly more agreeable than middle-aged (95% CI [−0.23, −0.07]) and older PE teachers (95% CI [−0.23, −0.05]) but significantly less open than middle-aged (95% CI [0.02, 0.24]) and older PE teachers (95% CI [0.12, 0.37]).

School type differences

School type differences occurred for *General Personality Traits* and *Motivational Characteristics*: 5–11% of multivariate variance of *General Personality Traits* and *Motivational Characteristics* was associated with school type. Univariate differences occurred in two dimensions of *General Personality Traits* and five dimensions of *Motivational Characteristics*. PE teachers in special schools were significantly more agreeable than PE teachers in vocational schools (95% CI [0.05, 0.58]). Lower (95% CI [−0.41, −0.03]) and higher secondary school PE teachers (95% CI [−0.42, −0.08]) were

Table 2. Means and standard deviations of PE teachers' personal characteristics for genders, age groups, and school types

		Gender		Age			School type					
	Total N = 1,163	Female n = 720	Male n = 436	Younger n = 313	Middle-aged n = 477	Older n = 337	Primary n = 150	Lower Secondary n = 237	Comprehensive secondary n = 169	Higher Secondary n = 449	Special n = 33	Vocational n = 83
General Personality Traits												
Extraversion	3.68 ± 0.55	3.71 ± 0.56	3.62 ± 0.53	3.70 ± 0.56	3.66 ± 0.55	3.68 ± 0.55	3.63 ± 0.57	3.75 ± 0.58	3.65 ± 0.51	3.69 ± 0.56	3.52 ± 0.45	3.62 ± 0.48
Agreeableness	4.05 ± 0.47	4.10 ± 0.45	3.98 ± 0.48	4.15 ± 0.45	4.00 ± 0.46	4.01 ± 0.47	4.10 ± 0.44	4.03 ± 0.43	4.01 ± 0.48	4.08 ± 0.48	4.23 ± 0.35	3.92 ± 0.50
Conscientiousness	3.97 ± 0.60	4.04 ± 0.58	3.86 ± 0.61	3.95 ± 0.63	3.94 ± 0.60	4.06 ± 0.54	3.96 ± 0.59	4.02 ± 0.60	3.79 ± 0.61	4.04 ± 0.58	3.94 ± 0.65	3.92 ± 0.60
Neuroticism	2.23 ± 0.60	2.32 ± 0.58	2.06 ± 0.58	2.23 ± 0.57	2.24 ± 0.62	2.19 ± 0.59	2.33 ± 0.58	2.25 ± 0.58	2.25 ± 0.62	2.17 ± 0.59	2.06 ± 0.55	2.23 ± 0.66
Openness	3.57 ± 0.63	3.60 ± 0.62	3.53 ± 0.64	3.46 ± 0.64	3.59 ± 0.61	3.70 ± 0.62	3.55 ± 0.65	3.56 ± 0.60	3.51 ± 0.65	3.63 ± 0.64	3.74 ± 0.64	3.46 ± 0.56
General Interests												
Realistic	5.22 ± 2.58	4.76 ± 2.55	5.99 ± 2.45	5.12 ± 2.52	5.26 ± 2.61	5.26 ± 2.62	4.65 ± 2.55	5.19 ± 2.48	5.22 ± 2.63	5.30 ± 2.62	6.15 ± 2.36	5.61 ± 2.56
Investigative	5.33 ± 2.13	5.18 ± 2.15	5.59 ± 2.06	5.39 ± 2.11	5.30 ± 2.12	5.30 ± 2.16	4.97 ± 2.18	4.88 ± 2.09	5.37 ± 2.08	5.66 ± 2.09	5.31 ± 2.15	5.48 ± 2.11
Artistic	5.53 ± 2.32	5.91 ± 2.24	4.89 ± 2.33	5.45 ± 2.32	5.62 ± 2.32	5.51 ± 2.34	5.88 ± 2.16	5.38 ± 2.33	5.37 ± 2.40	5.70 ± 2.30	5.27 ± 2.29	4.78 ± 2.44
Social	7.47 ± 1.43	7.71 ± 1.29	7.06 ± 1.55	7.69 ± 1.33	7.38 ± 1.44	7.33 ± 1.51	7.65 ± 1.29	7.40 ± 1.45	7.49 ± 1.27	7.45 ± 1.49	7.73 ± 1.66	7.27 ± 1.53
Enterprising	6.84 ± 1.83	6.92 ± 1.80	6.71 ± 1.88	6.88 ± 1.76	6.75 ± 1.89	6.93 ± 1.83	6.66 ± 1.84	6.84 ± 1.89	6.79 ± 1.78	6.91 ± 1.85	6.92 ± 2.08	6.90 ± 1.55
Conventional	5.34 ± 2.29	5.38 ± 2.32	5.26 ± 2.24	5.63 ± 2.31	5.17 ± 2.28	5.23 ± 2.24	4.88 ± 2.25	5.21 ± 2.39	5.22 ± 2.22	5.63 ± 2.23	5.35 ± 2.15	5.33 ± 2.48
Motivational Characteristics												
Teacher Self-Efficacy												
Instructional Strategies	7.10 ± 0.95	7.11 ± 0.95	7.07 ± 0.94	7.00 ± 0.90	7.10 ± 0.99	7.21 ± 0.92	7.17 ± 0.93	7.17 ± 0.95	6.94 ± 0.96	7.09 ± 0.90	7.44 ± 1.13	7.00 ± 1.06
Classroom Management	7.11 ± 1.18	7.01 ± 1.19	7.28 ± 1.13	7.05 ± 1.13	7.10 ± 1.22	7.21 ± 1.16	7.12 ± 1.13	7.26 ± 1.16	6.85 ± 1.23	7.16 ± 1.14	7.10 ± 0.99	6.94 ± 1.41
Student Engagement	6.63 ± 1.06	6.67 ± 1.06	6.58 ± 1.07	6.62 ± 0.98	6.59 ± 1.05	6.72 ± 1.18	6.99 ± 0.97	6.57 ± 1.16	6.46 ± 1.01	6.61 ± 1.03	6.98 ± 1.15	6.47 ± 1.04
Teacher Enthusiasm												
Teaching Enthusiasm	3.50 ± 0.46	3.52 ± 0.46	3.46 ± 0.47	3.57 ± 0.41	3.47 ± 0.49	3.45 ± 0.48	3.61 ± 0.39	3.44 ± 0.51	3.47 ± 0.48	3.51 ± 0.45	3.54 ± 0.54	3.39 ± 0.41
Subject Enthusiasm	3.37 ± 0.48	3.38 ± 0.48	3.36 ± 0.47	3.43 ± 0.43	3.34 ± 0.50	3.34 ± 0.49	3.33 ± 0.48	3.31 ± 0.50	3.39 ± 0.48	3.42 ± 0.44	3.22 ± 0.58	3.36 ± 0.51
Teacher Interests												
Subject Interest	3.40 ± 0.43	3.40 ± 0.44	3.39 ± 0.41	3.43 ± 0.39	3.38 ± 0.45	3.39 ± 0.45	3.35 ± 0.44	3.37 ± 0.42	3.39 ± 0.39	3.45 ± 0.43	3.19 ± 0.57	3.34 ± 0.43
Didactic Interest	3.11 ± 0.55	3.18 ± 0.54	3.00 ± 0.54	3.12 ± 0.54	3.11 ± 0.55	3.12 ± 0.55	3.21 ± 0.48	3.07 ± 0.53	3.05 ± 0.55	3.15 ± 0.57	3.06 ± 0.55	3.01 ± 0.53
Educational Interest	3.17 ± 0.54	3.23 ± 0.51	3.06 ± 0.57	3.15 ± 0.52	3.12 ± 0.57	3.26 ± 0.51	3.33 ± 0.47	3.18 ± 0.54	3.12 ± 0.56	3.12 ± 0.54	3.48 ± 0.49	3.06 ± 0.59

Table 3. Gender, age, and school type differences of PE teachers' personal characteristics

	Gender				Age				School type			
	p	η^2	*F*	Post-hoc	*p*	η^2	*F*		*p*	η^2	*F*	Post-hoc
General Personality Traits	.006	.04	7.56		.006	.03	2.78		.004	.05	1.92	
Extraversion	.016	.01	5.87	f > m								
Agreeableness	.001	.01	10.82	f > m	<.001	.02	9.56	y > m-a y > o	.026	.01	2.55	s > v
Conscientiousness	<.001	.02	18.21	f > m					.005	.02	3.41	ls > cs hs > cs
Neuroticism	<.001	.04	44.16	f > m								
Openness					<.001	.02	10.72	m-a > y o > y				
General Interests	<.001	.07	11.97									
Realistic	<.001	.04	44.89	m > f								
Investigative	.005	.01	7.88	m > f								
Artistic	<.001	.04	37.95	f > m								
Social	<.001	.05	46.04	f > m								
Enterprising	.041	.00										
Conventional												
Motivational Characteristics	<.001	.03	3.75						<.001	.11	2.53	
Teacher Self-Efficacy												
Instructional Strategies												
Classroom Management	<.001	.02	14.80	m > f					.005	.02	3.35	ls > cs
Student Engagement									<.001	.03	4.85	p > ls p > cs p > hs p > v
Teacher Enthusiasm												
Teaching Enthusiasm									.017	.01	2.78	p > ls p > v

Continued

Table 3. (*Continued*)

	Gender				Age			School type			
	p	η^2	*F*	Post-hoc	*p*	η^2	*F*	*p*	η^2	*F*	Post-hoc
Subject Enthusiasm											
Teacher Interests											
Subject Interest								.010	.00		
Didactic Interest	<.001	.02	18.03	f > m							
Educational Interest	<.001	.02	17.59	f > m				<.001	.03	5.48	p > cs p > hs p > v s > ls s > cs s > hs s > v

Note. $p < .05$ = significant differences; η^2 = effect sizes; *F* = ratios of variances; Post-hoc = results of pairwise multiple comparisons.
cs = comprehensive secondary; f = female; hs = higher secondary; ls = lower secondary; m = male; m-a = middle-aged; o = older; p = primary; s = special; v = vocational; y = younger.

significantly more conscientious than colleagues in comprehensive secondary school. Lower secondary school PE teachers felt more competent in *Classroom Management* compared to comprehensive secondary school PE teachers (95% CI [−0.79, −0.04]). Primary school PE teachers felt more competent in *Student Engagement* in comparison to lower secondary (95% CI [0.08, 0.75]), comprehensive secondary (95% CI [−0.87, −0.19]), higher secondary (95% CI [0.09, 0.65]), and vocational school PE teachers (95% CI [0.32, 0.16]). Primary school PE teachers revealed significantly more *Teaching Enthusiasm* than lower secondary (95% CI [0.03, 0.31]) and vocational school colleagues (95% CI [−0.40, −0.05]). Primary school PE teachers revealed more *Educational Interest* than comprehensive secondary (95% CI [−0.38, −0.03]), higher secondary (95% CI [0.07, 0.35]), and vocational school PE teachers (95% CI [−0.51, −0.03]). Special school PE teachers were more interested in educational aspects in comparison to comprehensive secondary (95% CI [0.01, 0.61]), lower secondary (95% CI [0.04, 0.69]), higher secondary (95% CI [0.08, 0.65]), and vocational school colleagues (95% CI [0.08, 0.77]).

Overall, gender showed multivariate differences in all MANOVA models whereas age only showed multivariate differences in one model. Considering the individual factors' dimensions, gender revealed the most univariate differences, especially considering *General Personality Traits* and *General Interests*. School types however revealed the most univariate differences in *Motivational Characteristics*.

Discussion

Our aim was to describe PE teachers by their configuration of personal characteristics and accompanied gender, age, and school type differences. Results indicate that PE teachers are rather agreeable but little neurotic. They are mostly interested in *Social* and *Entrepreneurial* tasks, feel especially competent in *Instructional Strategies* and *Classroom Management*, are very enthusiastic regarding their profession, and interested in the subject PE. Genders differed distinctly, especially considering rather stable *General Personality Traits* and *General Interests*. Age groups revealed the least differences whereas PE teachers of different school types differed especially in less stable *Motivational Characteristics*.PE teachers' configuration of personal characteristics.

General Personality Traits

Physical education teachers in our sample reveal higher scores on *Extraversion*, *Agreeableness*, and *Conscientiousness* and lower scores on *Neuroticism* and *Openness* in comparison to a [ANONYMIZED] population norm sample (Rammstedt, Danner, Soto, & John, 2018). In comparison to teacher samples from the United States (Rockoff, Jacob, Kane, & Staiger, 2011), Australia (Kim, Dar-Nimrod, & MacCann, 2017), and Serbia (Djigic, 2018), our PE teacher sample obtains similar scores on *Extraversion*, *Agreeableness*, and *Conscientiousness* but lower scores on *Neuroticism* and *Openness*. Aware of the fact that cultural differences might have an impact on the results, these comparisons indicate that teachers in general obtain a teacher-specific configuration of the Big Five personality traits *Extraversion*, *Agreeableness*, and *Conscientiousness*. PE teachers in particular stand out due to their lower *Neuroticism* and *Openness*. Low *Neuroticism* is often understood as emotional stability, which has been shown to correlate negatively with teacher mood (Berkovich & Eyal, 2019), teacher burnout, and positively with, for example teacher effectiveness, student achievement (Kell, 2019), or student performance self-efficacy

(Kim et al., 2017). Emotional stability in turn indicates teaching behaviour that conveys security, facilitates establishing trust, and obtains higher stress resistance (John et al., 2008; Mount, Barrick, & Stewart, 1998). Emotional stability seems particularly relevant in PE lessons, for example because of diverse learning environments with often unclear outcomes, which require intensive interaction or trust between teachers and students. Further, higher stress resistance might be conducive to adapt to PE's context conditions, for example implying increased noise levels or voice impact (König, 2008).

The detected gender differences and accompanied effects across the five domains are in line with previous research and considered typical (Rammstedt, Kemper, Klein, Beierlein, & Kovaleva, 2013; Weisberg, Deyoung, & Hirsh, 2011). Female PE teachers' higher *Extraversion* and *Conscientiousness* indicate on the one hand that they might be especially attracted to the teaching profession and prone to perform well in the educational context. Especially *Extraversion* and *Conscientiousness* have been shown to positively influence their own (Kim et al., 2019; Scheepers, Lombarts, van Aken, Heineman, & Arah, 2014) as well as their students' performance (Kokkinos, Panayiotou, & Davazoglou, 2005). On the other hand, female PE teachers might put more time, effort, and because of their higher *Agreeableness* also emotions into their professional routine. Further, female PE teachers are less satisfied with, for example resources, recognition at work, capabilities as well as their quality of work (Mäkelä, 2014). Consequently, female PE teachers' pronounced emotionality, lower satisfaction with personal competencies and higher *Neuroticism*, seems to indicate a higher burnout risk (Kim et al., 2019; Zawadzka, Kościelniak, & Zalewska, 2018).

Younger PE teachers' higher score on *Agreeableness* and middle-aged as well as older PE teachers' higher scores on *Openness* are contrary to age differences detected in earlier studies with a German and an English population norm sample (Donnellan & Lucas, 2008). Younger PE teachers appear more empathetic, thoughtful, and trustful in comparison to their older colleagues, which in turn seem to be more aesthetically sensitive, curious, and creative. PE's contextual requirements and accompanied personal demands, which potentially develop with teaching experience, might explain differences on *Agreeableness*. Lower *Openness* scores, in our sample in general and among young PE teachers in particular, might be explicable with the items' phrasing, following a Big Five typical narrow consideration of *Openness* – embracing aesthetic sensitivity, intellectual curiosity, and creative imagination. PE teachers, in comparison to other professions, might less embody this intellectually oriented *Openness* understanding. Overall, we found very few significant age as well as school type differences. This speaks again for a PE teacher-specific configuration of *General Personality Traits*, which is unaffected by their setting specialization and characterizes them as distinct group of teachers that requires targeted consideration.

General Interests

Our sample obtains a *SEA* interest profile (Holland, 1966) and therefore strongest interest in *Social* (S) followed by *Enterprising* (E) and *Artistic* (A) tasks. This differs only slightly from the *SAE* profile, which has been shown, for example in the teacher take out of Holland's (1966) original sample, Bergmann's (2003) Austrian primary school teacher–student sample, Swanson's (2008, 2012) samples of language teachers in the United States and Canada as well as Kaub, Karbach, Spinath, and Brünken's (2016) arts and language teacher sample in Germany. The *SAE* profile is typical for the teaching profession. Pronounced interest in *Social* (S), *Enterprising* (E), and *Artistic* (A) tasks is further

positively related to teachers' efficacy and retention (Swanson, 2012). Klassen et al., (2018) identified organization – in Holland's (1966) interest theory depicted in the *Enterprising* (E) domain – as universally essential non-cognitive teacher attribute. *Enterprising* (E) interests are beneficial for a teacher's task to lead and bring students to achieve set goals within the educational mandate. Our sample's pronounced *Enterprising* (E) interest within their *SEA* profile speaks for their effectiveness, retention, and by this, lower burnout risk, which again seems favourable considering PE's inherent context conditions The *Enterprising* (E) interest might particularly suit PE's subject specialty and accompanied requirements, for example high level of organization, management, and supervision.

Female PE teachers' higher scores on *Social* (S) and *Artistic* (A) suggest that – similar to their results on the Big Five – considering their personality they are more inclined to the teaching profession with its typical *SAE* profile than male PE teachers (*SER* profile) are. Females in turn might flourish more in this environment. Males' higher interest in *Realistic* (R) and *Investigative* (I) tasks implies their interest in teaching practical–technical or investigative-oriented lesson units. The detected differences within our PE teacher sample might explain the predominance of female teachers in primary school (UNESCO Institute for Statistics, 2020), where educational and social, but also artistic and creative tasks are more in the focus than, for example technical or knowledge related investigative tasks.

While Holland's (1966) individual interest dimensions do not differ between age groups in our PE teacher sample, profiles do. Middle-aged and older PE teachers obtain a more teacher-typical interest profile (*SEA*), whereas younger colleagues (*SEC* profile) attribute more interest to *Conventional* (C) tasks (preferring structure and order) than to *Artistic* (A) tasks. Younger PE teachers might feel more secure and benefit from following clear structures (Greenberg & LoBianco, 2019) because of their lack of experience. The fact that individual interest dimensions do not differ between school types matches Brudnik's (2007) results as well as Holland's (1966) theory in general. Holland (1966) broadly defines professional environments: The profession teaching depicts a professional environment and by this attracts people with certain interest orientations, but not the specific school type.

Motivational characteristics

Teacher self-efficacy

Compared to Pfitzner-Eden's (2016) sample of advanced preservice teachers, PE teachers in our sample score higher on *Instructional Strategies* and *Classroom Management* but similar on *Student Engagement*. Our sample's distribution among the three dimensions is in line with Klassen et al.'s (2009) results of teachers from six different countries. Pfitzner-Eden's (2016) and Ma and Cavanagh's (2018) preservice or student–teacher samples however reveal lower values on *Classroom Management* in comparison to *Instructional Strategies* and *Student Engagement*. The fact that student–teacher samples differ from our sample and from other teacher samples, underlines Martin, McCaughtry, Kulinna, and Cothran's (2009) finding that *Teacher Self-Efficacy* is influenced by experience and therefore developable.

The comparisons further point out that over all teacher samples, among the three *Teacher Self-Efficacy* dimensions, teachers feel the least competent regarding *Student Engagement*. Possible reasons could be *Student Engagement's* dependency on the students, which might influence teachers' competence experience and estimation.

Student Engagement is not so much favoured by experience but by the students' characteristics, for example their motives to be physically active or their motivational alignment. This assumption might also explain accompanied school type differences. Primary school PE teachers, for example feel more competent in *Student Engagement*. They face a student group that is generally easier to please and more motivated towards school or learning in general and school PE or activity in particular (Ntoumanis, Barkoukis, & Thøgersen-Ntoumani, 2009). Therefore, primary school teachers might find it even easier to engage students in their lessons and by this also motivate them for lifelong physical activity – part one of PE's aims.

Further, *Classroom Management* competence is closely related to the promotion of a learning enhancing classroom climate. This in turn positively influences student development (Jennings & Greenberg, 2009) and by this contributes to part two of PE's aims. Our results indicate that *Classroom Management* is more pronounced in males who possibly have a stricter teaching style. *Classroom Management* is further more demanded as well as difficult at comprehensive secondary schools with rather heterogeneous student groups.

Teacher enthusiasm

Our sample's *Subject Enthusiasm* is comparable to Kunter et al.'s (2008) math teacher sample – both samples reveal higher values than Mahler, Großschedl, and Harms's (2017) sample of secondary school biology teachers. Our results speak for PE teachers' generally high affiliation with their subject. This seems to be essential to achieve PE's aims, especially to engage previously non-active students.

Furthermore, our sample's *Teaching Enthusiasm* is similar to German secondary school homeroom teachers' (Aldrup, Klusmann, Lüdtke, Göllner, & Trautwein, 2018) and German preservice teachers' (Holzberger, Kunter, & Philipp, 2016) *Teaching Enthusiasm*. Burić and Moè's (2020) sample of Croatian high-school teachers of different subjects revealed higher *Teaching Enthusiasm* than our sample whereas Kunter, Klusmann, et al., (2013), Kunter et al., (2008) samples of math teachers and Mahler et al.'s (2017) sample of secondary school biology teachers obtained less *Teaching Enthusiasm*. PE teachers' high *Teaching Enthusiasm* might be because of the close interaction with their students, along with students' enthusiasm for the subject in general as well as their excitement during the lesson in particular. After all, PE is still a very popular school subject (Cárcamo, 2012).

Comparing both interest dimensions, our sample, Mahler et al.'s (2017) and Lazarides et al.'s (2018) sample revealed higher scores on *Teaching Enthusiasm* than *Subject Enthusiasm*. Our sample's high *Teaching Enthusiasm* seems beneficial as especially for *Teaching Enthusiasm* positive relationships with student enjoyment (Kunter, Klusmann, et al., 2013) and their learning progress (Kunter et al., 2011) have been shown. Primary school PE teachers obtain especially high *Teaching Enthusiasm*, which matches primary school's focus on educational aspects.

Teacher interests

Our sample's *Subject Interest* is higher than the *Subject Interest* of Schiefele et al.'s (2013) sample of teachers from different school types and Schiefele and Schaffner's (2015) primary school teacher sample. Kunter et al., (2011) described *Subject Interest* as topic-related and therefore, because of curricular requirements, for example less applicable in lesson planning. PE teachers' relatively high interest in the subject PE is a good

prerequisite and basis to build on when developing more task-related aspects in the daily teaching routine.

Our sample's *Didactic Interest* is similar to Schiefele et al.'s (2013) sample and Retelsdorf, Butler, Streblow, and Schiefele's (2010) German teacher sample, but lower than the Israeli sample in Retelsdorf et al.'s (2010) sample and Schiefele and Schaffner's (2015) German primary school teacher sample. PE teachers also reveal slightly lower *Educational Interest* in comparison to Schiefele et al.'s (2013) and Schiefele and Schaffner's (2015) sample. Overall, differences to other teacher samples, especially regarding *Didactic* and *Educational Interest* are rather small and indicate a professionally uniform interest configuration with similar values on all three dimensions.

Female PE teachers' higher *Didactic* and *Educational Interest* possibly also explains the higher proportion of women in (1) primary schools (UNESCO Institute for Statistics, 2020), which might suit their interest orientations more than other school types, and (2) voluntary teacher professional training, as they generally strive to develop their competencies. However, male PE teachers might be generally more confident and therefore feel less need for professional development. This assumption matches Mäkelä's (2014) findings highlighting that male PE teachers are more satisfied with, for example their capabilities and quality of work than female colleagues. Primary and special school teachers' distinctly different *Educational Interest* in relation to most of the other school types highlights the schools' special requirements and accompanied tasks, for example the importance of the educational aspect and personal work with the students. This result matches their pronounced *Teaching Enthusiasm* and further implies that special personalities choose to work in these environments – matching their personal needs and professional interests.

Overall, comparisons have highlighted (1) the viability of *Motivational Characteristics* and (2) a rather teaching-specific manifestation with similar results for different teacher groups. In summary, PE teachers of different school types differ more regarding their *Motivational Characteristics* than their *General Personality Traits* and *General Interests*. This underlines the abovementioned assumption that PE teachers, regardless of their school type, on the one hand have a typical constellation of stable general characteristics. On the other hand, they differ regarding *Motivational Characteristics*, which are developable during their career in order to match the chosen professional setting.

Practical implications

1. Making use of what is out there: Personal resources for effective PE teaching

Personality questionnaires in study selection and job application procedures

General Personality Traits, *General Interests*, and *Teacher Enthusiasm* questionnaires can support students' choice of studies. On the one hand, questionnaire results can clarify their fit with the teaching profession in general. On the other hand, such measurements can guide their decision for a subject specialization within the teaching degree. Particularly, *Subject Enthusiasm's* items adapted to the available subject specialization option (e.g. PE) with a reflection upon the results, can further guide prospective candidates in their decision for a subject. Researchers in Australia and the UK (Bowles, Hattie, Dinham, Scull, & Clinton, 2014; Rose, English, & Finney, 2014) have proposed to

include personal characteristics measurements in the teacher application process. Guiding the decision for the teaching profession in order to achieve a fit between the applicants' personal resources and professional demands seems relevant in order to decrease teacher burnout and increase the longevity in the profession. This process further clarifies personal suitability in general and job-related strengths or weaknesses in particular. Guiding the decision for the subject PE or a certain school type seems relevant to increase PE teachers' effectiveness. On a critical side, applying personality questionnaires in student selection processes possibly does not do justice to *General Personality Traits'* culture specificity and by this might imply discrimination (Berkovich & Eyal, 2019). Further, they should probably solely serve as orientation in the light of the fact that there are beneficial configurations of personal characteristics but no ideal teacher personality type (Weinert & Helmke, 1996).

Different gender – different chances for PE?

The amount of gender differences within PE teachers' personal characteristics implies that it is beneficial to adapt teaching to the individual resources. *Agreeableness*' positive impact on student-reported teacher personal support (Kim & MacCann, 2017) can, for example explicitly, be useful in lesson sequences that require teacher–student interactions. Here, male PE teachers could benefit from reflecting consciously on their planned and conducted actions because of their lower *Agreeableness* values. Further, female PE teachers might have to consider their *Conscientiousness* configuration when planning and giving lessons as PE often demands flexibility in teaching. Female PE teachers' higher *Neuroticism* can be an indicator for them to think of (1) how they successfully deal with and prevent work-related stress – also in relation to their higher *Extraversion* – and (2) how they can assure security and trust in their lessons so that their rather low emotional stability does not affect the students' perception in the lesson. Male PE teachers' pronounced *Classroom Management* competence and lower *Extraversion* suggest that they embody less activity but authority. Therefore, they might feel especially comfortable when giving responsibility to their students, for example in student-centred lesson units. Overall, PE teachers should be encouraged to reflect on and make use of their person-related strengths when teaching.

Sharing competencies

Further, PE teachers should be aware of their personality's impact on teaching outcomes and accompanied differences, which our study highlighted. PE teachers have to apply this knowledge successfully in their teaching behaviour and, if possible, share their competencies with colleagues. Teachers with a higher interest in *Realistic* (R) – practical-technical – tasks can support colleagues with different interests and competencies, for example in *Social* (S), *Didactic* and *Educational* aspects, and vice versa. Lower *Neuroticism* and higher *Classroom Management* and accompanied teaching behaviour, which conveys security and trust, speak for competence in teaching risk-oriented lessons. PE teachers who are less confident in this regard can, for example observe and exchange experiences with colleagues obtaining a more favourable configuration of these dimensions. Additionally, age differences on Big Five *Agreeableness* and *Openness* can be considered when sharing competencies. Younger PE teachers with pronounced *Agreeableness* might feel more competent in teaching student groups which particularly require understanding and gentle behaviour, and share strategies in this regard. Older PE

teachers' greater *Openness* may prove beneficial, as they seem especially interested in new ideas both, from colleagues and students, and in turn share this new-gained knowledge. Already Macdonald (1999) has highlighted that PE teachers of different career stages differ and profit from each other: Experienced PE teachers' professional satisfaction, for example can positively affect their colleagues. Mäkelä and Whipp (2015) further highlight the relevance of personal development for successful collaboration between colleagues – for example younger and more experienced PE teachers –, which in turn positively impacts their quality of work-life and by this their satisfaction as well as PE's quality in general. Whipp and Pengelley (2016) support this relevance by showing the influence of collegial mentoring on personal and professional skills of PE teachers of different career stages. By sharing their competencies, PE teachers can play to their strengths and cooperate in order to be successful together but also protect their individual resources.

2. Developing of what is out there: Personal resources for professional progress

Adaptations to PE teacher education

Woods and Lynn (2014) have highlighted the relevance of individual dispositions as well as professional preparation programmes for PE teachers' career progression in general or their professional and personal skills, for example self-efficacy, in particular. *Teacher Self-Efficacy* beliefs can especially be shaped early in a teacher's career and can impact teaching quality at an early stage (Huber, Fruth, Avila-John, & López Ramírez, 2016; Tschannen-Moran & Hoy, 2007). Therefore, especially our results regarding *Teacher Self-Efficacy* can affect PE teacher education at university. The detected gender differences might, for example speak for differentiating between genders in PE teacher education or at least know about differences and include this knowledge in the programme design. PE teacher education could, for example offer *Classroom Management* competence training or stress-coping classes to students who feel the need for further training in this regard. Applicable strategies to practise and improve *Classroom Management* should be made available early in the studies and practised, for example in teaching work experiences in school. This allows to orient the strategies towards the schools' conditions and requirements (Mahler et al., 2017), for example particularly heterogeneous student groups in comprehensive secondary schools. PE teacher education is further the right phase to trigger *Didactic* and *Educational Interest*. Thereunder, teacher educators should aim to offer courses that also attract male students by highlighting the practical relevance of didactical and educational aspects for their teaching career. Detected school type differences confirm the mostly separate training of PE teacher–students specializing in different school types. Further, differences between the examined groups highlight the necessity for PE teacher education as well as professional development programmes to facilitate versatile experiences (O'Sullivan, 2006), which prepare different personalities of PE teachers with diverse experiences for varying student groups. Additionally, it is important that offered experiences and applied teaching strategies in PE teacher education are based on practical experiences from in-service PE teachers (Richards, Gaudreault, & Woods, 2016) and purposefully implemented in order to actually achieve change within PE student–teachers' beliefs and actions. This requires curricula, which include the abovementioned strategies, as well as PE teacher educators, which consciously communicate the curricula's specifications and set an example of successful

teaching and learning processes (Mordal-Moen & Green, 2012). Within this, Mordal-Moen and Green (2012) highlight the necessity of coordinating and bringing together the beliefs of PE teacher educators and PE student–teachers. This requires continuous reflection of both key players, responding to, for example socio-cultural changes and by this initiating development. Only if PE teacher educators set their students an example of reflecting personal resources, PE teachers will be motivated to personal as well as professional reflection and development.

Adaptations to PE teacher professional training

During later stages of PE teachers' careers, professional development offers are often voluntary. Here especially, it is essential to consider PE teachers' personal characteristics as basis for targeted professional development (O'Sullivan, 2006; Parker, Patton, & Tannehill, 2012) and communicate the necessity to focus on personal development as well as foster ongoing reflection of personal resources in self-study phases or professional training courses. This seems especially important in the light of the fact that insufficient personal as well as professional development is decisive causes to leave the PE teaching profession (Mäkelä & Whipp, 2015). Teacher professional training courses have to include knowledge about and implications of teachers' personal aspects in addition to content-related or didactic aspects. This supports teacher effectiveness and ideally ensures longevity in the profession. Our results indicate that professional training offerings should cleverly combine didactical and educational with practical contents. PE teachers of different school types should receive school type tailored courses, adapted to the challenges the different contexts pose. PE teacher professional training should therefore aim for a good fit between teachers' personal characteristics and the school type's requirements.

Strengths and limitations

[ANONYMIZED] is the only [ANONYMIZED]-wide empirical investigation of school PE in the last decade. Further, the study's sample size, detailed demographics, and comprehensive examination of PE teachers' personality represent its strengths. Besides the study's strengths, we would like to mention its limitations. Thereunder, it cannot be ruled out that there was some unintended bias in the sample with most participants being recruited via the [ANONYMIZED] and therefore being most likely either members of the [ANONYMIZED] or voluntary participants in their professional training programme. Further, participation in the study was voluntary, offered mostly through associations or school administrations such as principals. Therefore, the sample possibly includes a high percentage of PE teachers who are already committed and motivated to contribute to their personal, but also to PE's general development. Last, due to the variety of advertising channels and the possibility to participate online, we cannot provide a response rate.

Conclusion

Physical education teachers should know their personality – including accompanied job-related strengths or weaknesses – and should continuously reflect on it. Knowledge of what makes a PE teacher is essential for successful teaching. PE teacher educators should also know the PE teachers' personal resources and requirements to specifically design their programme and address development opportunities. Personality-oriented teacher

education should cover the first phase of teacher education at universities but also the second or third phase of PE teachers' professional development. The results indicate that not only the PE context seems to be exceptional when compared to classroom-based school subjects, but also the PE teacher seems to obtain a special constellation of characteristics, which favour teaching in this context. PE teachers' gender, or at least their gender-immanent socialization, seems to explain their personality distinctly, especially considering *General Personality Traits* and *General Interests*. Different school types seem to demand and attract special personalities, especially considering developable *Motivational Characteristics*.

General Personality Traits and *General Interests* therefore have a predominantly directional function. Less stable *Motivational Characteristics* particularly offer development opportunities in order to adapt to and fit within the chosen teaching context.

We suggest five focus areas for future research. First, in addition to PE teachers' self-reported data, considering the students' perception of the examined personal characteristics of PE teachers could elaborate the gained picture. Other researchers have also proclaimed to compare both perceptions (Connelly & Hulsheger, 2012; Göncz, 2017; Kim & MacCann, 2017). Further, this could provide an answer to the question of whether the frequently pursued PE teacher allocation – for example female teacher teaching female students – is favourable.

Second, research should consider health outcomes in order to enlarge the existing knowledge and by this achieve a better fit between the person PE teacher and PE's context-specific demands. This fit in turn on the one hand contributes to PE teachers' well-being and consequently to student well-being (Harding et al., 2019). On the other hand, it positively affects student enjoyment as well as achievement (Bajorek, Gulliford, & Taskila, 2014) and by this benefits the achievement of PE's aims.

Third, longitudinal studies would add value to the existing cross-sectional results by showing how, for example *Motivational Characteristics* develop in the course of the teaching career, including teacher education. This is in line with Ernst (2017) as well as Miethling and Krieger (2004), for example who have highlighted the importance of the PE teachers' biography.

Fourth, in addition to the individual consideration of personal characteristics, it would be insightful to see how they interact by, for example applying clustering methods, which detect different PE teacher types. This knowledge expands the understanding of the PE teachers' personality. It might further reduce the complexity of providing implications for all five personal characteristics individually by pooling similar teacher types together. This facilitates concrete practical implementations as PE teachers can, for example assign themselves to a pattern and base their actions on it.

Fifth, we can confirm the opportunity which personal characteristics offer in PE teacher selection or orientation processes and proclaim further research in this regard under the premise of PE's special alignment and context-specific peculiarities.

To sum up, our study has highlighted the need to consider PE teachers' personality in research and has shown options for implementing the gained knowledge in PE teacher education and professional training. We proclaim to consider the two introduced implication options: (1) *Making use of what is out there*, and (2) *Developing of what is out there*. The suggested future research and implications for teaching will contribute substantially to the scientific community and will help the educational personnel to make use of the formulated *starting points*, which personal characteristics offer for successful PE teaching.

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Conflicts of interest

All authors declare no conflict of interest.

Author contributions

Melina Schnitzius (Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Visualization; Writing – original draft; Writing – review & editing) Alina Kirch (Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Visualization; Writing – review & editing) Sarah Spengler (Conceptualization; Methodology; Project administration; Writing – review & editing) Simon Blaschke (Formal analysis; Writing – review & editing) Filip Mess (Conceptualization; Methodology; Project administration; Supervision; Writing – review & editing).

Data availability statement

Sharing data compromises legal requirements (data protection requirements within the framework of ministerial permits).

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