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Reihe Junge
Sportwissenschaft



Melina Isabelle Schnitzius

Teachers Matter

Developing Physical Education
by Inspecting the Key Players

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**Reihe Junge
Sportwissenschaft**

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*“Great teachers are neither born nor made
but they may develop”*

Theo Bergen

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Summary

Physical education in schools is the only physical activity offering setting that reaches all school-aged children and by this receives special importance in conveying the joy and benefits of physical activity. Physical education is the only school subject involving bodily movement and by this benefits the healthy development of the whole person. Only with the aid of physical education, holistic education can be achieved. Holistic education in the physical education context involves two key players: physical education teachers as educators and students as the ones to be educated. Concretizing the educational process, physical education's curricula ascribe the subject a dual mandate: *education to sport* and *education through sport*. Students should experience the joy of movement, acquire relevant physical skills, find their meaning in sport, and within this ideally develop intrinsic motivation for physical activity in physical education and beyond. Further, physical education's contextual and contentual peculiarities promote learners' personal as well as social development through physical activity.

In this process, physical education teachers receive an important role by making sure to align teaching offerings to learners' needs in order to support the aspired development process. Physical education teachers' effectiveness is thereby often measured by the teaching outcome student achievement and approached by teachers' professional competence. It is further closely linked to their own occupational well-being and by this related to society's health. Effective physical education teachers are neither born nor made but they may develop. This development process requires knowledge about personal characteristics determining teaching behavior but also knowledge about students' requirements in order to adapt teaching and accompanied development processes. The teaching and learning process thereby has been shown to be context-specific and dependent on teachers as well as learners interacting within a given context under accompanied conditions.

The dissertation thesis has taken on this task by analyzing physical education teachers' as well as students' personal characteristics in the physical education context. In its theoretical part it has summarized and analyzed studies considering the physical education teachers' or students' personality in the physical education context in order to detect applied personality understandings but also research questions and related outcomes within existing studies. In its subsequent and linked empirical part, the thesis has analyzed data of the self-executed *SuM PLuS* study, covering 1,163 physical education teachers of all career stages as well as their students of class seven to ten ($N = 1,740$) across Germany.

The analyses relevant for the dissertation thesis' aim of describing teachers (main aim) and students (subordinate aim) in the physical education context by an aggregated examination of their personal characteristics comprise one part of *SuM PLuS*' encompassing examination. The study examined further person-related factors on the teacher and the student side, which supplement the data on personal characteristics. Within this, the study also links teachers and students by examining teachers' *provided basic needs support* and students' *perceived basic needs satisfaction*. In total, the study allows describing physical education's key players by various factors, which in turn implies impact on educational as well as PE research and consequently affects the subject's development. The thesis contributes to *SuM PLuS*' aim of analyzing person-related factors on the teacher as well as the student side determining student motivation in physical education by its analyses of personal characteristics. Further aspects of the study *SuM PLuS* and accompanied research possibilities will be explained in detail in the thesis' outlook.

The developed descriptions of different groups of physical education teachers and students represent new knowledge in educational research in general as well as research on teaching physical education in particular. Results and accompanied implications are discussed in relation to different stages of physical education teachers' career and therefore transferred to physical education teacher education, teaching in schools as well as teacher professional training. Involving all stages and initiating cooperation between stakeholders increases the results' meaningfulness and impact.

More precisely, on the teacher side, physical education teachers profit from knowing their personal characteristics by deliberately making use of them when teaching or regarding vocation-specific motivational characteristics develop within the possible range in e.g., teacher education or professional training. On the student side, the thesis offers valuable anchors, which influence physical education teachers' lesson planning and design in order to adequately address and by this motivate their students.

Overall, the thesis gains sensitivity for teachers' and students' personal characteristics – among physical education teachers but also teacher educators –, which should be continuously reflected on and deliberately applied in the educational process. The extend as well as profound and comprehensive character of the overarching study *SuM PLuS* further highlight the thesis' possibility to raise awareness for physical education's abovementioned outstanding contribution to society, e.g., considering health. It offers valuable anchors for stakeholders in the educational process as well

as future researchers in the educational context in general or in the physical education context in particular. A corresponding dissertation thesis focuses mainly on the students and by this represents a valuable counterpart to this thesis.

1 Introduction

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1.1 General Introduction

1.2 Background

1.2.1 Paradigms in Research on Teaching

1.2.2 Models of Teaching

1.2.3 Physical Education Teaching

1.2.4 Critique of Current Research

1.2.5 Aims

Teachers matter – especially since Hattie’s (2009) meta-analysis addressing the questions *What works best – what matters in education?* the teacher’s role in the educational process has taken the center stage. Hattie’s (2009; 2018) results have influenced the work of educational researchers as well as practitioners in teacher education institutions and schools. Hattie (2009) analyzed the influence of 138 factors on student achievement and grouped them into six domains: the teacher, the student, the home, the school, the curriculum, and approaches to teaching. The two domains with the greatest relative influence were the teacher and the student. Hattie (2003; 2009; 2018) further highlighted the importance of a positive teacher-student interaction for effective teaching and learning. In order to improve educational processes at school, researchers and practitioners therefore need to consider both key players – teachers and students.

Under the slogan *Let’s focus on what matters* this dissertation thesis deals with physical education (PE)’s key players. More precisely, it analyzes PE teachers’ and students’ personal characteristics. The primary focus hereby is on the PE teacher, whereas a corresponding dissertation thesis primarily focuses on the student(s). Both dissertation theses are part of the research project *Sportunterricht und Motivation: Personbezogene Faktoren von LehrerInnen und SchülerInnen als Determinanten der Schülermotivation/Physical Education and Motivation: Teachers’ and Students’ Person-Related Factors as Determinants of Student Motivation (SuM PLuS)*.

1.1 General Introduction

Educational research aims to optimize educational processes in general and research on teaching and learning instructional processes in particular. Under this influence, schools and teachers experience “a seemingly never-ending and always increasing set of expectations [...] intended to improve teaching and learning” (Hall et al., 2018, p. 1). Improved teaching and learning is typically understood as teaching quality measured by the initiation and sustainability of learning processes (Helmke, 2017). Helmke (2017) therefore states *good teaching is effective teaching*. Teaching is commonly defined by the object of mediation – content matter – and the thereby interacting subjects – in the school context teachers and students (Reh & Wilde, 2016). Terhart (2009) describes teaching as a process in which teachers try to expand learners’ given knowledge, expertise, and skills. Teaching therefore requires two players: a person teaching and someone being taught. All aspects of teaching fall under the theory of didactics, which aims to describe the *what* and *how* of (successful) teaching

(Wallin, 1988) and by this to provide desirable teaching strategies. Research on didactics therefore considers the teaching-studying-learning process (Kansanen & Meri, 1999). The teacher is the guiding player and successful teaching commonly described by the term teacher effectiveness.

The didactic triad or triangle is a long-established internationally followed graphical representation of teaching originating in the 19th century (Herbart, 1806). It describes the triadic relationship of teacher, student(s), and the subject matter – representing one triangle apex each. The didactic triangle has been framework for a large number of studies in the field of didactics and has often been stated as basis for more complex and differentiated models of teaching (Hudson & Meyer, 2011). Its simplicity on the one hand, has made it very popular and widely applicable but requires differentiation or concretization to enable concrete implications for complex and holistic teaching and learning situations. Further, its context-independence has triggered discussions. Specific disciplines therefore have adapted the triangle's depiction. Scherler (2008) e.g., has modified the didactic triangle for PE teaching and has postulated a process model of teaching in the form of a didactic star (see Fig. 1). Here the PE teacher is depicted as central player holding the threads together by continuously and simultaneously considering students, subject as well as context matter when teaching. Within this task, teachers strive for a fit between a) the presentation of content and the subject matter of movement, play, and sport; b) the lesson's organization and the school's framework conditions; c) the teacher-student interaction; and d) all three abovementioned actions of teaching. PE teachers have to guarantee this quadruple fit and by this take center stage in PE teaching.

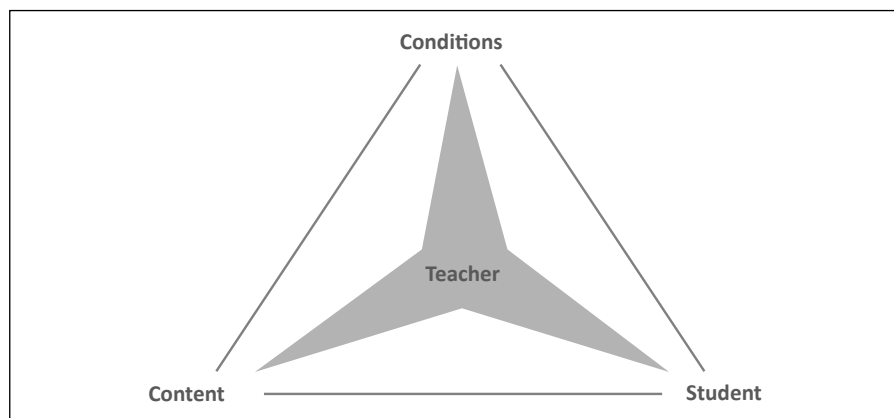


Figure 1: Didactic Star (Note. Adapted from Scherler, 2008)

Conditions and content are predefined and mostly given. Teaching depends on how PE teachers and students make use of or act within contextual circumstances and interpret as well as design content specifications. This places special emphasis on the key players' role in educational research. Further, it underlines the fact that models, regardless of their subject-specific modifications, postulate the importance of the teacher-student relationship. Both are key players of teaching and according to Hattie (2009) factors, which allow quality improvement and change as well as development. Thies (2017) refers to the quality of the teacher-student relationship as essential for positive outcomes on the student side (e.g., student motivation, learning achievement, social adjustment). Further, Roorda et al.'s (2011) meta-analysis highlights a positive impact of the (affective) quality of the teacher-student relationship on students' engagement and performance in the lessons. The teacher-student relationship therefore is essential for optimizing teaching and learning processes.

Bauer (2017) further highlights the context-specificity of the interaction process. Different school subjects trigger different perceptions and demand different actions of the interacting players. As highlighted above, Scherler (2008) e.g., specifically considered the PE context, which varies distinctly from other mostly classroom-based school subjects. This variation brings along chances and challenges for teachers trying to guide learning processes. PE teachers act within the subject's content standards aiming to fulfil the accompanied educational mandate. PE's mandate is characterized by a dual function (*Doppelauftrag*): *education to sport* – in and outside school, while and after students' school career – and *education through sport* – contributing to students' holistic development within the general educational mandate. PE teachers have to bring the mandate in accordance with the curriculum as well as the subject's prerequisites and demands on the one hand and their own as well as their students' requirements on the other hand. Students' intrinsic motivation for physical activity within PE serves as indicator of successful PE teaching but also trigger for students' lifelong physical activity and therefore constitutes the basis for the mandate's fulfilment. By analyzing teachers' and students' characteristics and thus concretizing knowledge about the key players' requirements in the teaching and learning process, teaching can be oriented towards the learners and by this motivation achieved. This speaks for considering PE teachers and students in empirical research on teaching PE.

SuM PLuS attends to this demand. *SuM PLuS* aims to profoundly describe PE teachers as well as students in the PE context individually, compare their particular perceptions and discover motivation enhancing factors. By this, *SuM PLuS* contributes

to research on teaching in general, to research on teaching PE in particular and consequently to PE's development. *SuM PLS* analyzes PE teachers and students. This dissertation thesis is embedded within *SuM PLS* and includes the following four peer-reviewed articles – two considering the PE teacher (main aim) in first authorship and two considering the student in the PE context (subordinate aim) in second authorship.

The Physical Education Teacher

Article 1: Schnitzius, M., Kirch, A., Mess, F., & Spengler, S. (2019). Inside out: A scoping review on the physical education teacher's personality. *Frontiers in Psychology, 10*, Article 2510. [https://doi:10.3389/fpsyg.2019.02510](https://doi.org/10.3389/fpsyg.2019.02510)

Article 2: Schnitzius, M., Kirch, A., Spengler, S., Blaschke, S., & Mess, F. (2021). What makes a physical education teacher? Personal characteristics for physical education development. *British Journal of Educational Psychology*. [https://doi:10.1111/bjep.12415](https://doi.org/10.1111/bjep.12415)

Students in Physical Education

Article 3: Kirch, A., Schnitzius, M., Mess, F., & Spengler, S. (2019). Who are our students? Understanding students' personality for refined and targeted physical education. A scoping review. *Frontiers in Sports and Active Living, 1*(31). [https://doi:10.3389/fspor.2019.00031](https://doi.org/10.3389/fspor.2019.00031)

Article 4: Kirch, A., Schnitzius, M., Spengler, S., Blaschke, S., & Mess, F. (2020). Knowing students' characteristics: Opportunities to adapt physical education teaching. *Frontiers in Psychology, 12*, Article 619944. [https://doi:10.3389/fpsyg.2021.619944](https://doi.org/10.3389/fpsyg.2021.619944)

1.2 Background

Concepts of effective teaching have developed and by this changed over the course of time. Concurrently, research on teaching, e.g., research questions and methods have differed. The respective epistemological interest of a research approach, the underlying methodology, and the applied methods depict different research paradigms (Herzmann & König, 2016). The (development of the) teacher's role within these paradigms of the teaching profession as well as the relevance of the particular context of teaching is necessary to understand the current research focus in research on teaching and by this contributes to the theoretical basis of this dissertation thesis.

1.2.1 Paradigms in Research on Teaching

Up until the 1960s, research on effective teaching predominantly concentrated on the teacher and aimed to describe the ideal teacher. Differences in teacher effectiveness were traced back to teachers' personality – commonly described by stable non-cognitive traits and complemented by further factors determining teachers' actions (Herzmann & König, 2016). The so-called personality paradigm was only partly held as correlations between the teacher's personality traits and positive teaching outcomes, e.g., student achievement were only weak (Herzmann & König, 2016; Krauss & Bruckmaier, 2014).

Research on effective teaching from the 1960s, inspired by behaviorism, aimed to identify teaching behavior (process), which enhances student learning and performance (product). The main focus in this process-product paradigm was still on the teacher but shifted from teacher personality to behavior (Krauss & Bruckmaier, 2014).

Influenced by the cognitive turn in psychology, researchers in the following process-mediation-product paradigm starting in the 1970s focused mainly on the learner and analyzed students' perceptions as well as cognitions. Student motivation and emotions e.g., were considered mediators of effective teaching (Vogler, 2020). Further, the teacher-student interaction gained attention and the focus shifted from only considering the teacher to considering teacher and learner.

In the expert paradigm starting in the 1980s, the teacher was back on the center stage of research on effective teaching. The focus was set back from interaction to transaction considering inner-psychological processes within teachers' cognitions. Teacher effectiveness was explained by teacher expertise – knowledge and abilities gained in teacher education and developed in teaching practice (Bromme, 2008). In this paradigm, research shifted away from identifying ideal characteristics or behaviors to analyzing effective teachers and their professional development. By this, the organization and quality of teacher education gained interest. The teaching profession was less seen as restricted to privileged personalities but more as development process (Herzmann & König, 2016). Internationally, research on teaching at this time was influenced by a demand for professionalization and its characterization (Vogler, 2020). At this time, Shulman (1987) developed the term pedagogical content knowledge, i.e., subject-specific didactic knowledge relevant for initiating and maintaining learning processes. This as well influenced teacher education (Vogler, 2020). The teacher's knowledge and abilities were considered as the most relevant aspects of

effective teaching. This influenced the development of the term teacher professional competence and accompanied research, which started around the turn of the century. Professional competence widened the existing understanding and included knowledge as well as abilities but also personal and motivational characteristics influencing teacher effectiveness (Baumert & Kunter, 2013). Considering teachers' professional competence has guided research on effective teaching from then on. This current research focus has been influenced and shaped by the abovementioned previous paradigms: In the tradition of the process-product paradigm, researchers aim to identify optimal patterns in teaching behavior leading to an increase in learners' performance. Methods have been refined by e.g., including context variables (Türling, 2014). In the light of the expert paradigm, teachers' internal prerequisites such as knowledge and abilities are included in the understanding of professional competence and have been shown to be relevant characteristics for e.g., satisfaction in teaching and longevity in the profession (Mayr, 2014). Teacher personality research experienced a renaissance in the light of the professional debate partly because positive relationships to outcomes on the teacher side, e.g., satisfaction in teaching were shown (Mayr, 2014). Definitions of teacher professional competence therefore include motivational orientations and self-regulatory skills besides professional knowledge or abilities (Brunner et al., 2006) and imply the different paradigms' influence. Pirner (2012) speaks of a complementary character while Krauss and Bruckmaier (2014) highlight the paradigms' theoretical overlap postulating to understand paradigm shifts as further developments rather than replacement. These developments have influenced teaching's underlying models.

1.2.2 Models of Teaching

Models of teaching and learning processes in general or the teacher's professional competence in particular concretize teachers' professional tasks and depict the teacher's role and influence in teaching and learning. Such models guide researchers and practitioners aiming to optimize teaching and accompanied learning processes. In line with the previously mentioned development of research paradigms and accompanied opportunities but also challenges, models with different emphases exist. The abovementioned graphical representation of the didactic triangle can be seen as basis for the analysis and model building of teaching-learning processes with varying specifications (Baltruschat, 2018). Therefore, models of teaching e.g., focus on teachers, students, context variables, or the interaction of these factors. The model's individual

emphasis determines its suitability for different user groups, research questions, and accompanied implications. This dissertation thesis aims to analyze teachers' and students' personal characteristics. Based on previous research, it follows an aggregated compilation of characteristics, focusing primarily on the teacher and secondarily on the student.

1.2.2.1 Teacher and Student Role in Models of Teaching and Learning

Kollar and Fischer's (2019) *conceptual framework model for the analysis and promotion of teaching and learning processes* (see Fig. 2) provides the theoretical basis in which this dissertation's contribution to research on teaching can be classified. It bases on Helmke and Weinert's (1997) *supply-use model of the effectiveness of teaching processes* but rearranges the model's components and by this shifts its focus and aim. Kollar and Fischer's (2019) model includes two intertwining paths: a teacher path (top half) and student path (bottom half). It is hierarchical and can be read from left to right. Teachers' and students' entry requirements in the far left are the basis for teaching and learning processes and accompanied results. It is therefore essential to describe teachers and students and know their requirements in order to initiate or

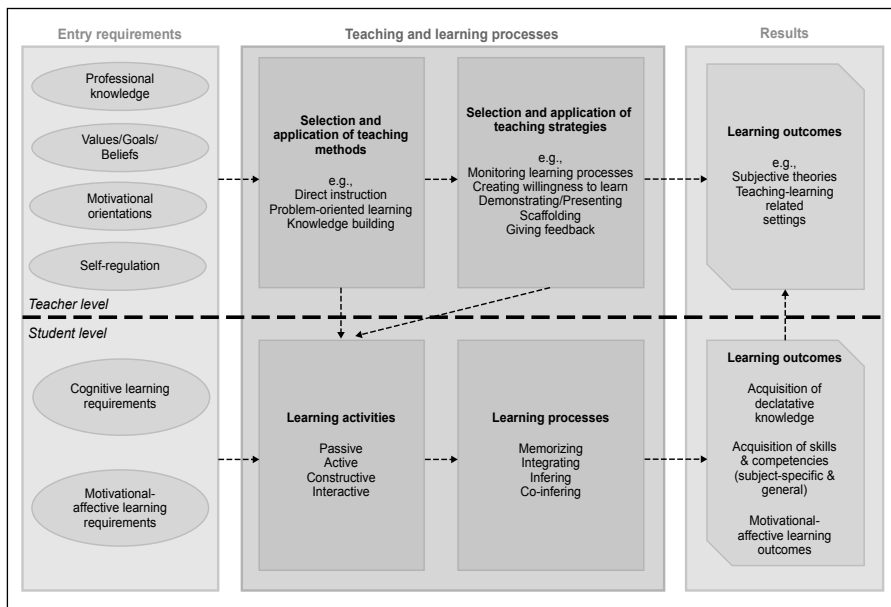


Figure 2: *Conceptual Framework Model for the Analysis and Promotion of Teaching and Learning Processes* (Note. Adapted from Kollar & Fischer, 2019)

perceive teaching and learning processes. The arrows connecting teacher and student path indicate the relationship between and dependency of teachers and students. The tripartite division indicates the current consideration of conditions, process-related as well as product-related variables within teaching and learning processes and by this highlights the abovementioned influence of previous paradigms.

Conditions on the far left consider personal requirements of the key players and take on a descriptive character in the style of the personality paradigm. Conditions further include cognitive characteristics – knowledge and abilities – and by this notice the expert paradigm’s alignment. The general orientation towards professional characteristics on the teacher side represents the current understanding of teacher professional competence, including both personal characteristics as well as cognitive knowledge and abilities (Baumert & Kunter, 2013). This understanding has influenced research on teacher professionalism especially in the last three decades.

On the student side, Kollar and Fischer’s (2019) model highlights the importance of cognitive as well as motivational-affective personal characteristics such as interests (Lewalter & Krapp, 2004), goal orientations (Hulleman et al., 2010), or ability self-concept (Wolter & Hannover, 2014). Teaching and learning processes in the middle and results in the right part of the model indicate the influence of a process-product consideration with its specification towards mediation by including learners’ motivational processes and perception of learning. Teachers’ and students’ entry requirements have an influence on teaching effectiveness via the organization of and behavior within teaching and learning processes (Kollar & Fischer, 2019). This dissertation thesis targets the starting level – teacher and student characteristics – in order to lay the foundation for what happens in teaching-learning processes and by this affect accompanied results. Teaching and learning processes as well as resulting products will be subject of the thesis’ discussion as well as practical implications.

1.2.2.2 Teacher Professional Competence

Extracting the teacher path from Kollar and Fischer’s (2019) model and by this specifically focusing on one key player, orients this dissertation thesis’ work on a second but teacher-specific model within the current research paradigm. In the light of research on teacher expertise and the concept of competence within education, teacher professional competence unites the abovementioned paradigms’ orientations (Türling, 2014) and is commonly considered in current research on teaching. Teachers’ continuous professional development is further regarded as essential contributor to e.g., teacher effectiveness (European Commission, 2013). Based on Shulman’s

(1987) work and related research within the expert paradigm, researchers redefined and modelled teachers' professional competence ever since (Vogler, 2020). Empirical research on teacher competence follows generic competence models (Herzmann & König, 2016). This dissertation thesis bases on Blömeke et al.'s (2015) understanding of teachers' professional competence as continuum (see Fig. 3).

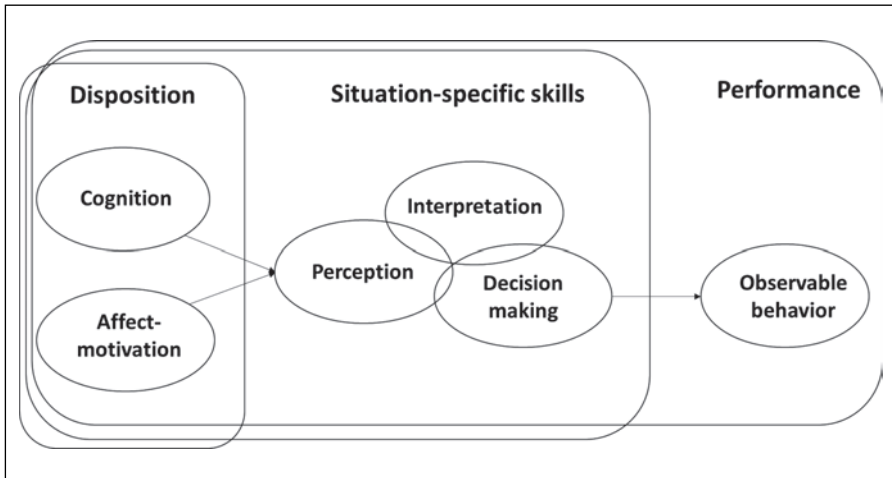


Figure 3: Competence as Continuum (Note. Blömeke et al., 2015)

The authors conceptualize competence as set of characteristics relevant for the teaching profession. According to the model, dispositions affect situation-specific skills, which find expression in teaching behavior and by this performance. Starting point for evaluating teachers' competence therefore is an analytical measurement and examination of teachers' dispositions, which are divided into cognitive as well as affective-motivational characteristics interacting in and underlying teaching-related skills such as perception, interpretation, and decision-making. Teachers' personal dispositions mediated by situation-specific skills enable teachers' professional behavior. The skills' context-specificity highlights the importance of considering different teaching situations and conditions when analyzing and interpreting teachers' effectiveness. Emphasizing the situational complexity of teaching sets this model apart from other models of teacher professional competence. The model's hierarchical character illustrates the role of dispositions as basis of teacher actions.

The thesis takes up the model's idea by aiming to provide a description of teachers' personal characteristics. Further, the overarching project *SuM PLuS* is oriented

towards the model’s generic character highlighting the influence as well as relationship of teachers’ personal requirements and behavior within professional situations. *SuM PLuS* focuses on the PE context and in line with Kollar and Fischer’s (2019) model also considers students experiencing and benefiting from teachers’ professional competence. Mayr (2012) concretizes the process of competence acquisition and professional development by means of a *supply-use model of teacher education* (see Fig. 4).

With this model, he tries to explain how teachers achieve and develop professional competence and by this effectiveness. He concludes by formulating approaches to optimize teacher development processes and by this teaching quality. In his model, following the abovementioned multifaceted understanding of teacher competence, teacher personality, abilities as well as knowledge determine the professional development process and consequently have an impact on teaching behavior as well as well-being. Similar to Blömeke et al.’s (2015) understanding, Mayr’s (2012) model highlights the influence of the context on teachers’ professional development but also performance.

Teachers’ professional competence affects different stages of a teacher’s career. It is seen as result of teacher education but also as predictor of teaching, which in turn

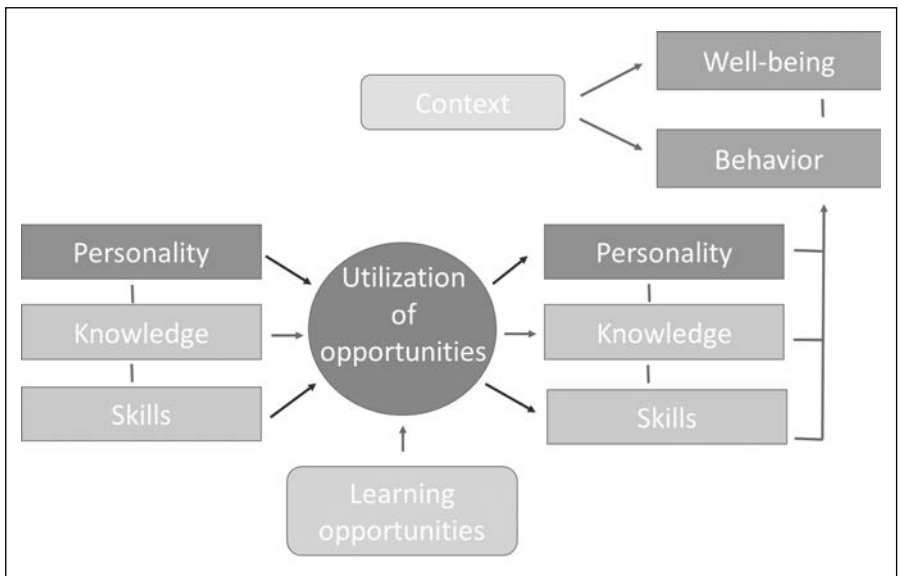


Figure 4: Supply-Use Model of Teacher Education (Note. Adapted from Mayr, 2012)

affects student academic achievement as well as personal development (Herzmann & König, 2016; König, 2010). Acquisition processes of teacher professional competence in teacher education can be applied to teachers' professional development in later career stages. The European Commission (2013) in this regard highlights teacher education's outstanding role in setting the basis, raising the awareness for, and initiating professional development. Further, the individual teacher's role within and responsibility for this process is highlighted and among others described by the task of learning to feel as teachers (European Commission, 2013), which depends on teachers' person-related factors.

1.2.2.3 Teacher Personal Characteristics

Within the consideration of teachers' person-related factors, Mayr (2014) ascribes special importance to the teacher's personality and proclaims a wide understanding of personality. Mayr and Neuweg (2006, p. 183) define teacher personality as set of relatively stable dispositions which are relevant for behavior, success, and well-being in the teaching profession and by this determine teacher professional competence. They further differentiate the term dispositions into general cognitive and non-cognitive personality traits, general interests as well as motivational characteristics. Teacher personality is therefore described by both stable as well as less stable developable characteristics.

Considering cognitive and non-cognitive personality traits and by this describing teachers by rather stable characteristics is in line with the personality paradigm. Due to their low influenceability and thus changeability, stable characteristics obtain limited possibilities for practical implications. Stable characteristics allow to describe the teacher and orientate his or her actions accordingly. Stable cognitive as well as non-cognitive characteristics have been shown to positively predict job performance, also in the teaching profession (Kim & Burić, 2019). By identifying and analyzing stable traits, teachers can thus be shown strengths and weaknesses within their personal characteristics. The positive relationships together with the possibility of analyzing strengths and weaknesses have contributed to stable characteristics' use in aptitude tests for teacher training. Some countries, e.g., Austria and Australia, partly consider stable teacher personal characteristics among others as guidance criteria in the selection or employment of teaching staff. Due to their limited influenceability and only weak correlations to teaching or learning outcomes, a wide understanding of teacher personality, also including motivational characteristics, becomes important for the analysis and accompanied impact of teacher professional competence.

Motivational characteristics, e.g., *teacher self-efficacy*, *teacher interests* or *teacher enthusiasm* have been shown to correlate reliably positively with outcomes on the teacher and the student side, e.g., teacher effectiveness or student achievement (e.g., Caprara et al., 2006; Hoy & Spero, 2005; Klassen & Chiu, 2010; Klassen & Tze, 2014; Kunter, Klusmann, et al., 2013; Mayr, 2014; Skaalvik & Skaalvik, 2007; Zee & Koomen, 2016). Further, they can predict occupational or psychological well-being (Kunter et al., 2011; Zee & Koomen, 2016). Motivational characteristics are developable and therefore offer opportunities for teacher educators as well as teachers themselves to influence their dispositions and by this the quality of their actions. Motivational characteristics further depend on the context and therefore should be considered for teachers of different school subjects individually.

1.2.3 Physical Education Teaching

The abovementioned models depict the context-specificity within the teaching and learning process. PE takes on a special role within the school curriculum. It differs substantially from traditionally classroom-based school subjects in its context as well as content requirements posing challenges to its key players (Gerber, 2015). This speaks for a) analyzing the PE teacher and students in the PE context specifically even though there is research on both key players in the educational context in general (e.g., Bromme & Haag, 2008; Dalbert & Stöber, 2008; Göncz, 2017; Mayr, 2014) as well as research considering teaching and learning in a specific classroom-based subject e.g., mathematics in particular (e.g., Huber & Seidel, 2018; Kunter, Baumert, et al., 2013; Seidel et al., 2020); b) considering the subject's peculiarities and demands when interpreting findings on teachers' and students' requirements in order to deduce PE-specific teaching strategies (Bertram, 2017); and c) examining teachers and students together (Kollar & Fischer, 2019) as well as bringing both players' characteristics together when discussing results or deducing practical implications.

1.2.3.1 Opportunities and Challenges of Physical Education

Context-Related Framework Conditions

The PE context differs substantially from classroom-based school subjects in e.g., the following categories: size and location of teaching area, applied equipment or class arrangement with often single-gender organization. On the one hand, PE's context-related peculiarities offer chances, e.g., representing a compensation to tra-

ditional learning settings within school and allowing special development opportunities as part of students' educational process (Bailey et al., 2009). On the other hand, PE's context represents a challenge to its key players. Teachers and students have to find their role within the subject's context individually as well as within accompanied group or interaction-processes, which vary significantly from classroom settings by e.g., implicitly demanding more trust or closeness (Gerber, 2015; Heemsoth, 2019).

Facilities or equipment and accompanied teaching methods as well as content go along with an increased risk of accidents and injury (Gerber, 2015). PE teachers have to guarantee the subject's immanent movement as well as development experiences and at the same time provide safe learning scenarios satisfying different groups of learners. This further poses specific challenges to the teacher-student interaction, which is characterized by a greater proximity and higher value of trust than in classroom-based subjects with physically less fearful and risky learning situations.

The PE context allows experiencing distinct learning situations and expressing emotions through physical activities. This process again challenges student-student as well as student-teacher interactions and implicates discipline problems (Balz, 2016). Additionally, the context enables valuable developmental processes, which are closely linked to PE's mandate.

Content-Related Framework Conditions

PE's curriculum concretizes the subject's mandate and thereby demands as well as permits special development or education processes. PE in Germany is among very few subjects that obtain their own subject pedagogy as well as subject didactics (Elflein, 2012). Both disciplines have generated PE's specific mandate, which comprises a dual function: *education to sport and education through sport* (Kurz, 2008). *Education to sport* includes the subject's sporting justification and abovementioned contribution to students' health by triggering motivation for lifelong physical activity. *Education through sport* comprises the subject's non-sporting justification, rectifying its chances and opportunities within the general educational mandate and by this substantially contributing to the general status of the subject. PE offers unique development opportunities specifically fostering students' personality development, which in the generally applied learning equation depends on teachers' decisions along with teachers' professional behavior and by this the teacher-student relationship.

PE's curriculum reform at the turn of the century included an opening in terms of content. Since then, competencies acquired by the learners have guided the teacher in

content decisions and design (Krick, 2006). Therefore, PE's content-related framework conditions are closely bound to the subject's mandate and curriculum as well as its relation to other school subjects and PE's role within the school curriculum. PE is the only school subject that focuses on physical activity. PE by this provides physical development opportunities and promotes motor learning. Klafki (2001) describes movement competence as educational dimension and by this demonstrates PE's exceptional contribution to the general educational mandate. The subject therefore contributes essentially to students' holistic education. PE uniquely affects students' aesthetic education and is characterized by social arrangements as well as collaboration. By this, PE provides anchors to extracurricular and after-school life situations (Opstoel et al., 2019). The subject therefore assigns itself a special educational function, which represents its specialty in comparison to other subjects (Kastrup, 2009). Its exceptional chances are summarized in PE's subject-specific mandate and accompanied themes. Internationally, the World-wide Survey of School Physical Education (North Western Counties Physical Education Association, 2014) assigns four underlying themes to PE: (1) health-related fitness, (2) motor skills, (3) an active lifestyle, and (4) personal as well as social development. This classification of themes, which PE aims to address and achieve, highlights the content-related variety in PE and the accompanied effect on students' life outside the school setting and after their school career.

PE's physical nature further assigns PE a function to contribute to students' health and by this represents a compensation to purely cognitive school subjects and sedentary lifestyles (Huber & Köppel, 2017; Leech et al., 2014). Considering students' physical health and related promotion strategies becomes increasingly important due to an increase in students' physical as well as mental health problems (Biddle et al., 2019; Mauz et al., 2020) and decline in aspects of students' physical fitness, e.g., strength or endurance (Masanovic et al., 2020). Poor physical health in turn affects e.g., students' academic achievement (Ickovics et al., 2014; Shaw et al., 2015). PE in comparison to other activity-related contexts (e.g., sport clubs or gyms) according to Balz (2013) exceptionally contributes to develop lifelong health competence by including cognitive social as well as ecological facets. Due to its mandatory nature, PE as a setting conveying physical activity, reaches all school-aged children. Its unique role in this permanent and sustainable health behavior (change) is summarized and explained in the transcontextual model (Polet et al., 2019), illustrating how development processes and experiences in PE affect lifelong health behavior. The model's success depends on and demands PE teachers as promoter of students' health. Within this role, PE

teachers have to offer a variety of movement possibilities (Balz, 2016), which allow students to find their meaning in sport in the PE setting as well as outside school. PE's obligatory character along with e.g., developmental-psychological peculiarities are among the reasons for decreasing student motivation in PE over the course of the school career (Ntoumanis et al., 2009). This in turn is a stress factor for teachers (Altenberger, 2005), which negatively influences teaching and by this learning.

In conclusion, PE's peculiarities in general and its special position within the school curriculum pose specific challenges to its key players. These challenges go along with a demand to know their dispositions (Albert et al., 2017). The subject further demands the teacher-student relationship and thus requires a thorough analysis of both players' prerequisites in the context of PE planning. Following Scherler's (2008) didactic star, in order to address the abovementioned problems and motivate students in and for PE, it is necessary to examine and describe teachers and students in the PE context. By a comprehensive image of their own as well as their students' dispositions, PE teachers can successfully guide the learning process.

1.2.3.2 Physical Education Teachers

In Germany, secondary school teachers are traditionally educated as two subject teachers. The personal requirements of a mathematics and PE teacher, therefore have to be analyzed for each subject individually and can take different effects in mathematics than in PE. According to Kastrup (2009), PE teachers themselves acknowledge the subject's manifold nature and meaning by highlighting the possibilities of imparting sport motor skills as well as educational aspects, e.g., personality development. PE's abovementioned context- and content-related framework conditions pose challenges to PE teachers and are considered as stress factors. Specific stress factors of PE teachers have been in the focus of research on teaching PE (e.g., Heim, 1999; Kastrup et al., 2008; König, 2004; Mäkelä et al., 2014; Miethling, 2004; Thomas et al., 2019; Voltmann-Hummes, 2008; von Haaren-Mack et al., 2020). Stress factors are, among others, unsatisfactory facilities and equipment, the curriculum's scope and accompanied demands, or the low status of both PE in general and the PE teaching profession in particular (Mäkelä et al., 2014; von Haaren-Mack et al., 2020). Further, lack of respect from colleagues, students, or the public (Balz, 2016), difficulties in teacher-student interaction, e.g., disciplinary or motivational problems (König, 2004), grading problems, or high physical demands of teachers through e.g., high noise levels (Heim, 1999) are commonly identified as stress factors. PE teachers' stress perception has an effect on their well-being and health (Balz, 2016). The

gained knowledge allows to describe PE teachers' demands and possibly deduce implications or analyze relationships with personal characteristics. In order to conduct such analyses, PE teachers' characteristics need to be defined and the characteristics' manifestations described. A fit between PE teachers' personal characteristics and the subject's context-specific demands, positively influences PE teachers' well-being and consequently students' well-being (Harding et al., 2019). On the other hand, teachers' well-being positively influences student enjoyment as well as achievement (Bajorek et al., 2014) and by this benefits the achievement of PE's aims. In line with the subject's overall status, PE teachers' role and status differs from classroom teachers (e.g., Hardman, 2008; Miethling, 2007; Sáenz-López et al., 2011; Thomas et al., 2019). Subjectively they are regarded as less hard-working by the school community (Zalech & Rutkowska, 2014). They are continuously exposed to these interpretations and accompanied justification processes. The abovementioned dual mandate clarifies PE's opportunities and rectifies its status as mandatory school subject. The mandate's demands challenges the teacher's subject as well as didactic knowledge and their abilities. The mandate's inherent aim to trigger student motivation for sport requires knowledge of students' motivational orientations and, within this, students' *motives to be physically active*. These motives have found their way into the PE curriculum as pedagogical perspectives and guide PE teachers' lesson planning as well as teaching. PE teachers e.g., constantly aim to offer various movement activities presented under different pedagogical perspectives. Pedagogical perspectives have been derived from the empirical derivation of *motives to be physically active*. They represent an orientation for PE teachers to offer multiperspective lessons, which in turn try to attract as many groups of students as possible. Pedagogical perspectives therefore serve to engage students in the lessons but by this also highlight sporting opportunities for and meaning attributions within out-of-school settings. This in turn ideally brings students to be active in school as well as outside school, ideally lifelong. The success of the accompanying concept *Mehrperspektivität* immensely depends on the teacher and ideally assures that every pupil finds his own meaning in sport during PE lessons.

In addition and even within multiperspective content offerings, PE teachers face the challenge to offer individualized teaching, which is oriented towards the learners' needs. This in turn requires thorough planning as well as careful and flexible teaching or reflection of lessons (Döhring & Gissel, 2016). Due to teachers' and students' previous experiences with sport, the understanding of sport and expectations towards it can collide (Gerber, 2015). PE teachers have to reflect on their own sporting interests,

abilities, and knowledge and continuously match their own abilities, experiences, and expectations with their students'. PE teachers consider this as challenge and report it among other abovementioned factors as vocational stressor (Thomas et al., 2019). Here again, PE teaching behavior is challenged in the interaction with students and depends on careful and multilevel considerations of requirements.

Models of planning teaching PE particularly acknowledge the importance of teachers' and students' requirements. Döhring and Gissel's (2016) *ABC of lesson planning* e.g., is typically applied in German PE teaching. On the first level, PE teachers among other things, analyze their own prerequisites in order to align further teaching decisions. PE teachers' requirements therefore affect PE teachers' actions as well as development and are closely linked to their professional competence. PE teachers' professional competence – including cognitive but also motivational and physical expertise – is consistently visible and controllable for students (Gerber, 2015). This particularly demands PE teachers' self-efficacy.

Further aspects requiring teachers' self-efficacy are e.g., PE's inherent risk of accidents and injuries or movement-related dynamics of their students because of larger learning settings (Baumgartner, 2017). PE implies a particularly high degree of uncertainty about the course of the lesson. This again demands certain teacher personality characteristics. Further, the intensified and varied proximity-distance relationship between teachers and students demands personal dispositions such as empathy or compatibleness. Teaching enthusiasm further positively influences students' perception of their teacher's professional competence and in turn their motivation in PE. PE teachers knowing their personal constitution can deliberately apply this knowledge when teaching and interacting with their students.

Research has shown the relevance of a wide understanding of teacher personality including stable as well as rather developable and general as well as vocational characteristics, which constitute their professional competence. In line with the abovementioned models, PE teachers should know their personal characteristics – stable personality traits and interests as well as motivational characteristics – in order to e.g., deliberately make use of this knowledge and accompanied strengths when teaching. If dispositions match the context, then PE teachers are e.g., satisfied and more likely to be effective. In line with Kollar and Fischer's (2019) model, the PE teacher is essential for students' use and perception of offered PE lesson content. This, in turn, is in the hands of the PE teacher himself in the planning and implementation of PE lessons. Knowing students' characteristics, which are relevant in the PE context or additional person-related factors facilitates targeted teaching.

1.2.3.3 Students in the Physical Education Context

In educational research, research on the student in general and across contexts has been very popular in the process-product-paradigm. It then shifted back to the teacher. In the 21st century, students are back in the focus. Hattie's (2003, 2009, 2018) results, ascribing teachers and students essential relevance for student learning have contributed to this shift. Kollar and Fischer's (2019) abovementioned model addresses this relevance by ascribing teachers and students equal importance for teaching outcomes. In addition to teacher requirements, researchers, teacher educators as well as teachers need to consider student requirements as relevant factor of teaching and learning success and accompanied teacher-student interaction processes within lessons. Further, students' personal requirements take on different roles in each subject and therefore need to be considered subject-specifically.

Models of planning teaching PE acknowledge the importance of students' prerequisites. On the first level of Döhring and Gissel's (2016) *ABC of lesson planning*, PE teachers analyze their own but also their students' dispositions. This analysis is the basis for content as well as methodological decisions on further levels. PE in general offers favorable conditions for students' individual development promotion (Neuber, 2008). PE teaching that supports students' personality development consequently affects students' individual education towards solidary and physically literate individuals (Digel, 2013; Prohl, 2010).

The current sport-didactical understanding demands opening PE's organization in the means of accrediting students more responsibility and participation rights (Neuber, 2007). Albert et al. (2017) state that, especially since this educational realignment, PE teachers need to know their students' characteristics in order to align their teaching accordingly. PE's offerings should be oriented towards learners' lifeworld, their interests and needs. Knowing student characteristics which trigger their motivation in PE, is basis for intended development processes within PE's dual mandate. The degree to which PE teaching is oriented towards students' requirements, determines students' motivational regulation within PE lessons and consequently PE's success (Grassinger et al., 2019).

In line with the abovementioned models of teaching and learning, the extent to which students make use of provided opportunities depends on their personal dispositions and how well PE teachers know and consider these. As the quality of learning processes further depends on the fit between the offerings and students' cognitive as well as motivational dispositions, teachers have to consider these and align them with their own experiences and expectations as well as curricular demands.

Student prerequisites determining their motivation in PE are composed of context-independent characteristics constituting students' general personality as well as PE-specific characteristics. First, *general personality traits*, which are considered as predominantly context-independent and implicit, are e.g., positively related to student achievement in or attitudes towards PE (Hayes, 2017) as well as their enjoyment (Lodewyk & Gao, 2018) or anxiety (Lodewyk, 2018) in PE lessons. Second, students' *physical self-concept*, which is considered as explicit sport-specific characteristic, is positively related to student motivation in PE (Murcia, 2012). Third, *achievement motives* determine how students approach and master tasks within PE lessons. A high degree of achievement motivation predicts student achievement in PE as well as physical activity in leisure time (Streso, 2015) and by this the fulfilment of PE's mandate. Fourth, *motives to be physically active*, as triggers of physical activity in general but also in the PE context in particular, allow to design target group-oriented physical activity opportunities (Lehnert et al., 2011) and by this positively influence motivation. As highlighted above, German PE curricula specifically highlight the motives' role within the learning process by implementing pedagogical perspectives (Kurz, 2004), which guide PE's lesson planning and design. Fifth, individual *interest* is considered as relatively stable and as decisive for the development of intrinsic motivation as well as maintenance of lifelong learning (Krapp, 2000). *General personality traits, physical self-concept, achievement motive, motives to be physically active* as well as individual (*sport*) *interest* have shown relations to student motivation in PE and therefore serve to describe students' requirements in the PE context. Individually as well as aggregated they offer reference points for targeted PE teaching aiming to fulfil PE's mandate.

PE is characterized by physical proximity of the students including increased physical contact. In addition, new hierarchies arise due to the objectives and content of the subject. These factors influence student-student interaction and must be taken into account by PE teachers. In addition, emotions and outward appearances become the focus of teaching processes (Gerber, 2015). These go hand in hand with motivational requirements and must be considered by PE teachers in addition to stable characteristics that provide a picture of their learners. Students' interests and motives essentially contribute to their perception of and engagement in PE lessons. PE is influenced by students' heterogeneity of individual attitudes towards the body or sport as well as by differing sport interests and motor abilities. This poses a challenge to PE teachers but also sets a basis for conflicts among students (Gerber, 2015).

PE on the one hand offers great opportunities and potential to contribute to students' personal development. On the other hand, it poses special challenges to PE teachers

and students individually but also their interaction within the lesson. PE teachers benefit from a clear picture of their students, which in turn influences their lesson planning and teaching decisions within the lesson. Therefore, describing students' personal characteristics acts on two levels: 1) delivering starting points for targeted PE teaching and (consequently), 2) positively influencing student achievement as well as students' personal development.

1.2.4 Critique of Current Research

The teacher's and students' role in the teaching and learning process in general has extensively been researched in the past, nationally as well as internationally. This led to the abovementioned integration and representation of the two key players in models of teaching and learning, guided pedagogical and didactical decisions as well as continuous research. Within the consideration of the teacher's and students' role, the importance of personal dispositions has been highlighted (Kollar & Fischer, 2019). Researchers have further emphasized the relationship between the two key players and the interaction of personal characteristics and behavior depending on the setting or situation (Helmke, 2017). The context-specificity included in the applied models in the school context speaks for considering different school subjects individually. Especially, subjects that are rather diverse in nature and by this pose challenges to teachers and students need to be examined individually. As highlighted above, PE embodies such a contextual peculiarity.

Research on effective teaching, considering the outcome of teaching and learning processes, is mostly domain overarching, neglecting contextual peculiarities. The transferability of previous research to the PE context is limited though due to its peculiarities and accompanied challenges.

Models and guidelines commonly include the term teacher or student personality without specifying its meaning and extent. Therefore, it is not clear how exactly the context-specific adaptation is concretized. What is missing, is a review of the current international understanding of PE teacher or student personality in the PE context in particular. Further, studies have mostly focused on individual dispositions or competencies of the key players. What is missing, is a comprehensive analysis based on the representation of general non-cognitive as well as motivational-affective personal dispositions in the presented models.

Considering methods, most studies only consider one key player and neglect their interactive relationship. Further, many studies are case studies with partly insufficient

methodological reporting and small sample sizes. Existing national research in Germany is typically limited to one region, e.g., Bavaria. This methodological shortcoming is possibly due to Germany's federal organization and accompanied difficulties to receive permission to examine teachers and students in schools from different educational ministries simultaneously. In relation to insufficient sample sizes and context narrowness, existing studies do not differentiate between professional groups, e.g., teachers with different stages of experience or teachers from different school types. Such a differentiation would enhance a comprehensive depiction and by this knowledge about PE's key players' personal dispositions. This in turn allows targeted implications geared towards individual groups of students. Existing research typically examines the relationship between individual characteristics of teachers or students and outcomes of teaching. This process-product approach is too narrow and involves situation-specific implications.

1.2.5 Aims

Based on the highlighted desiderata, the following aims can be attributed to this dissertation thesis. Within the aims of this dissertation thesis, general overarching aims as well as primary aims considering research on the PE teacher, and subordinate aims considering research on students specifically can be distinguished.

General Aims

This dissertation thesis aims to contribute to educational research in general and to research on teaching PE in particular. By this, it contributes to PE's further development and consequently its success. PE's success can be measured via the achievement of its allocated educational mandate within the prevailing sport didactical concept: *education to sport and education through sport*. This dissertation thesis' aims consequently influence students' personal development as well as their motivation for lifelong physical activity. Via its contribution to school education's general aim, the thesis therefore also contributes on societal level.

The project *SuM PLuS* aims to comprehensively analyze PE's two key players: teachers and students. Thereunder, the project describes the influence of different variables on the teacher and the student side. Teachers are described by their personal characteristics, occupational well-being, physical activity, teaching behavior as well as sociodemographic characteristics. Students are described by their personal characteristics, perception of PE, sport club activity as well as sociodemographic characteris-

tics (see Table 1 and Table 2 in Section 2.3.2). Further, the project aims to match teacher and student perception of successful teaching behavior by analyzing teacher self-reported *provided basic needs support* and related students' *perceived basic needs satisfaction* as determinants of student motivation in PE. Overall, the project *SuM PLuS*, within the abovementioned general aim of contributing to PE's further development, aims to provide anchors for practitioners allowing targeted and successful PE teaching that generates students' motivation to be physically active.

Main Aims of Dissertation (The Physical Education Teacher)

This dissertation thesis aims to identify, summarize and analyze international research on the PE teacher's personality in order to specify the meaning and extent of the term personality in the PE context. Further, the dissertation thesis aims to describe German PE teachers by an aggregated examination of their personal characteristics as well as by comparisons of different genders, age groups, and school types. By this, the dissertation thesis aims to provide a comprehensive depiction of PE teachers' personal requirements in order to infer about their teaching behavior and by this performance as well as effectiveness. Additionally, this knowledge can affect PE teacher education or professional training.

Subordinate Aims of Dissertation (Students in Physical Education)

Subordinate aims are to identify, summarize and analyze international research on students' personality in the PE context in order to specify the meaning and extent of the term personality. Further, the dissertation thesis aims to describe German students in the PE context by an aggregated examination of their personal characteristics as well as by comparisons between students of different genders, class levels, and school types. This knowledge in turn affects PE teachers' lesson planning and reflection and contributes to student achievement in the PE context.

2 Methods

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Research paradigms and accompanied changes in research perspectives went along with different methods. As abovementioned paradigms partly complement each other and have influenced current research on teaching, it is essential to examine different methodological foci in order to classify and reason the chosen methods in the project *SuM PLuS* in general and thereunder in this dissertation thesis in particular.

2.1 Research on Teaching

2.1.1 Research on Teaching: Methodologies

Helmke (2017) pointed out two different methodological perspectives in research on (qualitative) teaching: a) considering teaching processes and among this relevant teacher dispositions and b) considering products and measuring teaching by its output (Helmke, 2017) – e.g., achieving educational goals. Helmke's (2017) distinction shows the individual paradigm's influence on current empirical research – considering processes as well as products and speaking of teaching quality and by this characteristics of expertise. He distances both approaches from traditional didactics, which defines qualitative teaching as teaching following educational demands. Instead, he proclaims to combine process- and product-oriented approaches. Following process-oriented methods, researchers focus on what teachers do and why. This is influenced by who they are and therefore their personal dispositions. On the other hand, products or outcomes are essential to measure the processes' influence. Teacher effectiveness-research measuring teaching quality by e.g., student achievement therefore has become indispensable since the turn of the millennium in Germany's educational policy (Helmke, 2017).

Within this combination of process and product consideration, two methodological strategies can be further distinguished: the variable- and the person-centered approach (Helmke, 2017). The variable-centered approach is the dominant methodology in educational research, which sets individual characteristics of teachers and teaching into relation with measures of teaching or learning success and by this resembles the process-product paradigm. Relationships are typically presented as correlations. The variable-centered approach analytically decomposes teaching into relevant variables in order to receive a differentiated picture of what works best in teaching. Hattie's (2018) work relating different variables to successful learning can be seen as typically variable-centered. The variable-centered approach assumes that teaching varies between teachers and within teachers in different situations. It

acknowledges the context-specificity of teaching and understands teaching as scientifically founded but learnable competence.

Helmke (2017) advises against following only variable-centered approaches as they do not resemble the complex process of teaching in which teachers and learners interact. Both key players obtain a specific configuration of characteristics, which guide and determine their actions but which are neglected in variable-centered approaches. Helmke (2017) therefore suggests to supplement the variable-centered approach by a person-centered approach which identifies groups of individual experts and examines their dispositions profoundly in order to describe successful individuals. Mayr (2014) highlights the advantages of the person-centered approach and speaks for analyzing and reporting configurations of characteristics of effective teachers. Such a comprehensive description can serve a role model function and guide teachers in their education as well as professional development. By this, it simplifies practical implications. The person-centered approach resembles the personality as well as expert paradigm by following a best-practice approach to identify master teachers. In contrast to the variable-centered analytical approach, the person-centered approach follows a synthetic view of teaching as a whole. Therefore, research on teaching distinguishes between two different levels: a) sub-personal variable level with pure functional relationships and effectiveness relations and b) personal level, assuming the human being a developing, recognizing, and acting individual. Both theoretical levels of analysis should be combined in empirical research (Weinert, 1989). Along with Weinert's (1996) competence definition, it is essential to note that teaching of different teachers or of the same teacher in different situations can vary in regard to certain characteristics. He therefore addresses the context-specificity in addition to teachers' dispositions.

Overall, research on teacher dispositions has led to a more open and wider understanding of teacher personality than in the personality paradigm and highlighted the relevance of teacher personality in a wide sense for teachers' professional competence. This understanding has influenced theoretical models of teaching and learning as well as methods of empirical research. Content and methods of the personality paradigm have gained attention again; distancing from describing the ideal teacher and selecting real teacher personalities by considering only stable traits but aiming to describe teacher requirements profoundly and by this show teachers how they act as teachers that are real in their personality (Dubs, 2009; Gudjons, 2003). This calls for an aggregated examination of teachers' personal characteristics. Further, teachers knowing their personal requirements influence their students' learning outcomes,

which rectifies the combination of process- as well as product-oriented methods and a variable- as well as person-centered approach. Teaching should therefore be regarded as developable competence, which bases on and is influenced by teachers' individual dispositions.

2.1.2 Research on Teaching: Methods

Krauss and Bruckmaier (2014) summarized and compared methods in the different paradigms. In the personality paradigm, researchers applied personality tests or questionnaires to examine teacher personality. Data was typically quantitative and self-reported. In the process-product paradigm, methods changed to lesson observations in order to define teaching behavior which predicts e.g., student achievement. Data was often qualitative and other-reported. In the process-mediation-product paradigm, lesson observations were complemented by student questionnaires in order to include student perception besides observational data on teacher behavior. Mixed-methods approaches were applied and self-reported student outcomes were explained by observational process data. In the expert paradigm, researchers started integrating previous methods and developed professional knowledge tests for teachers (Krauss & Bruckmaier, 2014).

Research on teaching today is characterized by a combination of previously applied methods, e.g., quantitative as well as qualitative approaches. Further, in line with the abovementioned models, research aims to analyze teachers and students together in order to receive an encompassing view and compare different perceptions. Researchers have pointed out strengths of considering other-reports, e.g., students evaluating teachers' personality, and have shown strong associations to teaching and learning outcomes (Bräutigam, 1999; Kim et al., 2018). Examining both key players in one study is rarely achieved though because of its formal effort and constraints.

Research on teachers' personal characteristics specifically is predominantly influenced by personality psychology and therefore typically applies personality tests within questionnaire studies. Research in this regard follows a narrow consideration of individual characteristics neglecting the relationship and combining nature of characteristics, which in total comprise personality. Bardach and Klassen (2020) summarize research considering the relationship between teachers' cognitive characteristics and their effectiveness highlighting that high quality teaching requires a set of several characteristics, cognitive as well as non-cognitive characteristics (e.g., Hamre et al., 2013; Kleickmann et al., 2012; Kunter, Klusmann, et al., 2013; Muijs et

al., 2014). This calls for an aggregated examination of different personal characteristics relevant for the profession-specific context.

2.2 Methods of the Dissertation Thesis

This dissertation thesis combines theoretical as well as empirical research in order to fulfil its research aims. The chosen methodological procedure and applied methods can be classified into existing research and in their combination allow to achieve this dissertation thesis' goals.

2.2.1 Dissertation Thesis Within Methodologies

This dissertation thesis follows a combination of the abovementioned two typically applied research foci in research on teaching – analyzing teachers and students. In its theoretical research, the thesis obtains an innovative character by providing a literature review to a neglected research focus in a new but promising and acknowledged method. In its empirical study, the aggregated assessment of characteristics, which in previous research have been shown to positively predict teaching outcomes, aligns the thesis indirectly with a variable-centered approach, which is implemented in a person-centered manner. The thesis specifically provides the description of the person-centered understanding via descriptive data and analyses of group differences – e.g., comparing PE teachers of different genders, age groups, or school types.

2.2.2 Theoretical Part: Scoping Reviews

In a first step, to evaluate how the often stated but not specified term personality is understood in the PE context, this dissertation thesis includes two scoping reviews – one considering the PE teacher's personality and one considering students' personality in the PE context. Scoping reviews feature a comprehensive coverage (Arksey & O'Malley, 2005). Among possible purposes of a scoping review (Arksey & O'Malley, 2005), the thesis' reviews were guided by the following two: *examine the extent, nature and range of research activity and identify research gaps in existing research*. More precisely, the scoping reviews analyzed the type of empirical literature dealing with the personality of the PE teacher or students in the PE context, understandings of personality, and applied research questions. The gained results have influenced subsequent empirical aspects of the study, e.g., data collection. The reviews' results

therefore partly influenced the decision which variables to include in order to extend the typical but insufficient variable-centered depiction by a person-centered understanding and accompanied methods. Besides concretizing the term personality, the conducted scoping reviews have provided an analysis of existing research, which facilitates the classification of the thesis' results within previous studies. Scoping reviews in general as well as in the educational context in particular have become an increasingly popular method in order to synthesize research evidence (Pham et al., 2014), when addressing exploratory research questions (Colquhoun et al., 2014).

2.2.3 Empirical Part: Measuring Teacher and Student Personal Characteristics

In a second step, teacher and student personal characteristics were examined via questionnaires. The cross-sectional quantitative questionnaire survey provided self-reported data on teachers' and students' requirements. Considering the empirical study and accompanied publications (see Article 2 and Article 4), this dissertation thesis' statistical analyses has included descriptive as well as inferential analyses. In data preparation for descriptive analyses, individual variables were compared on univariate observational level. Missing values were excluded pairwise (Pigott, 2001). Pairwise exclusion is a frequently applied procedure for handling missing values including higher amounts of values compared to list wise data exclusion (Berchtold, 2019). Descriptive analyses were undertaken for the total sample in order to provide an overarching picture of PE teachers' and students' manifestations in the different personal characteristics as well as for groups (genders, age groups/class levels, school types) individually in order to concretize the description.

The following lines of chapter 2.2.3 are also part of Alina Kirch's dissertation thesis chapter 3.4, as the two dissertation theses were developed in collaboration within the research project SuM PLuS.

Considering data analysis specifically, in order to investigate differences between groups and by this describe groups in more detail, variance analyses were applied. Variance analyses in comparison to pairwise mean differences analyses consider more than two groups. Further, within multifactorial procedures, multivariate analysis of variance (MANOVA) specifically considers several independent variables and by this allows to detect possible interaction effects between independent variables (Field, 2009). The decision for appropriate variance analyses procedures depends on the number of analyzed variables. MANOVA includes more than one dependent var-

iable and further allows to examine differences across multiple dependent variables, whereas univariate analysis of variance (ANOVA) is the simplest form of data analysis considering only one dependent variable (Backhaus et al., 2018). Using MANOVA it was possible to investigate group differences across different student or teacher personal characteristics and thus detect if groups differed in the combination of dependent variables.

In data preparation for inferential analyses, missing values were excluded list wise. Applied MANOVAs therefore only included complete cases (Graham, 2009). Due to low percentage of missing completely at random values, list wise exclusion was considered sufficient for this sample as the procedure leads to a reasonably small loss of power in multivariate analyses (van Ginkel et al., 2020). Further, within MANOVA assumption testing, linearity, equality of covariance matrices and absence of multicollinearity were checked in the resulting sample in order to ensure the quality of the data (Pituch & Stevens, 2016). Multicollinearity testing further influenced the decision for the amount of applied MANOVA models in order to prevent distortions in MANOVA test statistics and obtain most valid results within the chosen aggregated examination of personal characteristics on the teacher and the student side.

MANOVA allows considering correlations between variables (Woisetschläger et al., 2007), which in this study represented a decisive advantage of this procedure over other variance analyses procedures, such as several ANOVAs. Correlations between dependent variables within one MANOVA model were checked to fall in the suggested range of .2 to .9. On the teacher side, this procedure resulted in three MANOVA models: *general personality traits*, *general interests*, and *motivational characteristics*. On the student side, this procedure resulted in four MANOVA models for each multivariate dependent variable: *general personality traits*, *physical self-concept*, *achievement motive*, and *motives to be physically active*.

To illustrate the practical relevance of significant MANOVA results, eta-squared was presented as it calculates error square in variance analyses with more than two mean values (Cohen, 1988). In order to detect if groups differed in all or several selected dependent variables, follow-up ANOVAs for personal characteristics individually were applied. Due to unbalanced data in the respective sample, sums of squares were calculated adaptively following Fox's (2016) recommendations for ANOVA modeling. Discriminant analyses as alternative multivariate approach in contrast to follow-up ANOVAs examine the dependence of one grouping variable on the feature variable and by this aim to detect linear combinations of the dependent variables

discriminating the groups (Field, 2009). Discriminant analyses are typically applied when predicting group affiliations (Backhaus et al., 2018) and were therefore not suitable in the underlying empirical study. Furthermore, in sport and exercise (Barton et al., 2016) as well as educational sciences (Smith et al., 2019), discriminant analyses have rarely been used whereas the chosen procedure of follow-up ANOVAs has been an approved method. In line with these arguments, Bray and Maxwell (1982) support univariate post hoc tests following MANOVA.

Subsequent pair-wise comparisons of significant results allow to determine the location of detected differences (Backhaus et al., 2018). Stepwise pairwise comparisons lead to alpha error accumulation, which can be avoided by the use of post hoc tests. Post hoc tests can be divided into a) pairwise multiple comparisons, which check mean differences of all possible pairs of groups for statistical significance and b) range tests, which try to form homogeneous subgroups that do not differ from each other. Test procedures differ according to the assumption of variance homogeneity, the equality of group sizes as well as the test's conservative nature in general (Werner, 1997). REGWQ or Tukey e.g., have good power but require equal sample sizes and similar population variances. Bonferroni however is generally more conservative but guarantees control over alpha mistake accumulation (Field, 2009). DTK Pairwise Multiple Comparison Test is designed to handle unequal variance and sample sizes (Dunnett, 1980) and therefore was chosen in this empirical study. Confidence intervals were used to display probable ranges of group differences and gave further insight into the strength and direction of reported effects (du Prel et al., 2009).

2.3 Project Design *SuM PLuS*

The project *SuM PLuS* was conducted in cooperation with Deutscher Sportlehrerverband/German PE teacher association (DSLVB). *SuM PLuS* analyzed PE's two key players by a set of determining variables relevant for PE teaching in general and PE's accompanied success measured via the outcome student motivation in particular. *SuM PLuS* encompassed a quantitative, cross-sectional study, including teacher and student self-report questionnaire surveys. Participants chose between online and paper-pencil participation. *SuM PLuS* examined PE teachers of all school types and secondary school students (class 7–10) Germany-wide from April 2018 to March 2019. Participant recruitment took place via DSLVB and its partners, educational institutions, social media, personal contacts, and local press. The responsible educational

ministries in each participating federal state 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. The following graphics and tables provide an overview of the study by showing the project plan (see Section 2.3.1), the applied scales within the questionnaires (see Section 2.3.2) as well as the samples' descriptive characteristics (see Section 2.3.3).

2.3.1 Project Plan

Figure 5 highlights *SuM PLuS*' project plan, from analyzing the state of research via the empirical investigation to further research possibilities.

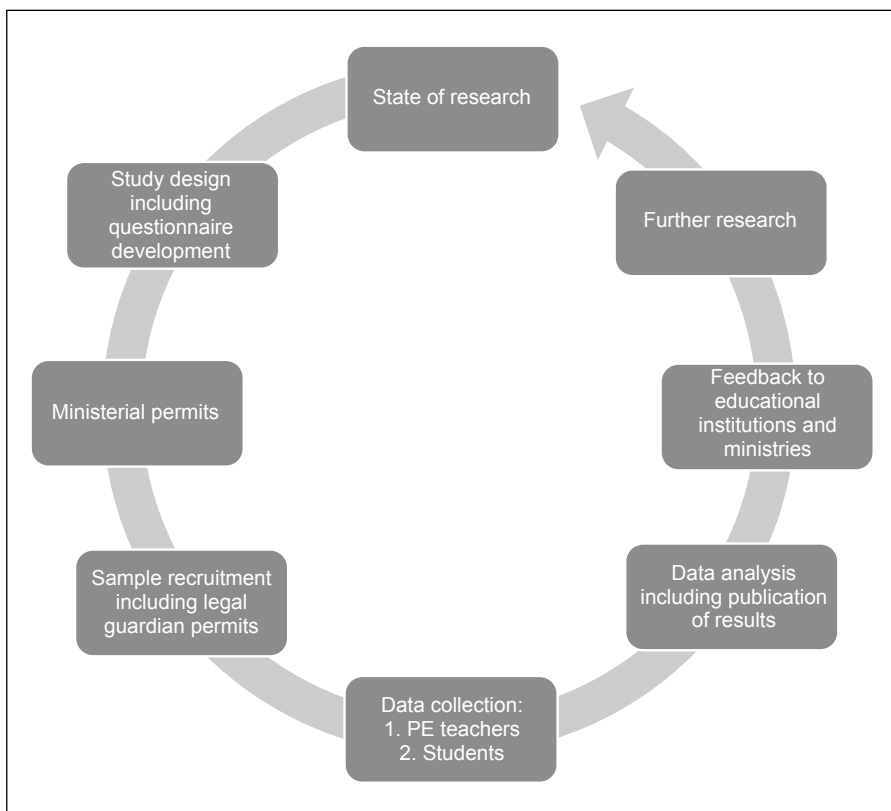


Figure 5: *SuM PLuS* Project Plan

2.3.2 Questionnaires

SuM PLuS' teacher questionnaire collected the following information (content) in five categories: sociodemographic data, personal characteristics, occupational well-being, physical activity, and teaching behavior (see Table 1).

Table 1: *SuM PLuS Teacher Questionnaire Variables*

Category	Content	Scale (Reference)	
Sociodemographic data	Gender*		
	Age*		
	Recruitment source		
	DSLVL membership		
	PE teaching qualification		
	Teaching status		
	Federal state		
	School type*		
	Taught subjects		
	PE teaching experience		
	PE teaching extent		
Height			
Weight			
Personal characteristics	General personality traits*	BFI-2S (Rammstedt et al., 2018)	
	General interests*	AIS (Bergmann et al., 2016)	
	Motivational characteristics	Teacher self-efficacy*	STSE (Pfitzner-Eden et al., 2014)
		Teacher enthusiasm*	ENTH (Kunter et al., 2011)
	Teacher interests*	LIS (Schiefele et al., 2013)	
Occupational well-being	Teaching satisfaction	ABZ (Merz, 1979)	
	Work engagement	UWES (Schaufeli & Bakker, 2004)	
	General health status	1 Item within SF-12 (Ware et al., 1996)	
	General well-being	WHO-5 (WHO, 1998)	
Physical activity	Physical activity	Adapted from MoMo-AFB (Jekauc et al., 2014)	
	Motives to be physically active	BMZI (Schmid et al., 2018)	
Teaching behavior	Provided basic needs support	Befriedigung der Psychologischen Grundbedürfnisse (Prenzel et al., 2001)	

Note. * Part of Dissertation Thesis

SuM PLuS' student questionnaire collected the following information (content) in five categories: sociodemographic data, personal characteristics, PE participation and perception, general information regarding PE, and sport club activity (see Table 2).

Table 2: SuM PLuS Student Questionnaire Variables

Category	Content	Scale (Reference)
Sociodemographic data	Gender* Age* Class level* School type Federal state Migration background Height Weight	(Schenk et al., 2006)
Personal characteristics	Personality traits*	BFI-KJ (Kupper et al., 2019)
	Physical self-concept*	PSDQ-S (Braun et al., 2018)
	Achievement motive*	Adapted from AMS-Sport (Herrmann et al., 2014)
	Motives to be physically active*	BMZI-JEFA (Gut et al., 2019)
	Sport interest*	Sportinteresse (Gogoll, 2010)
PE participation and perception	Motivational regulation in learning situations	SMR-L (Thomas & Müller, 2015)
	Perceived basic needs satisfaction	Wahrgenommene Befriedigung der Psychologischen Grundbedürfnisse (Prenzel et al., 2001)
General information regarding PE	PE days/week PE lessons/week Satisfaction with amount of PE PE grade	
Sport club activity	Membership Practiced sport Training sessions/week Training duration/week Seasonality	Adapted from MoMo-AFB (Jekauc et al., 2014)

Note. * Part of Dissertation Thesis

2.3.3 Sample

SuM PLuS examined 1,163 PE teachers (61.9% female, $M = 43.16 \pm 10.8$ years) Germany-wide. Figure 6 shows the teacher sample’s distribution by genders and age groups. Figure 7 shows the teacher sample’s distribution by school types. The examined PE teachers taught at one of the following school types: secondary schools (higher secondary, comprehensive, lower secondary), primary schools, vocational schools, or special schools.

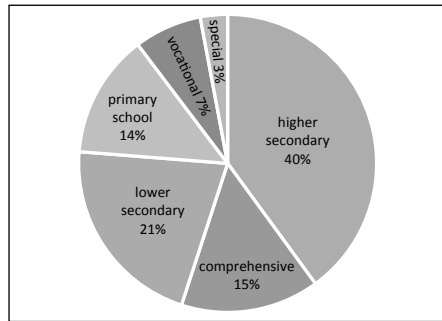
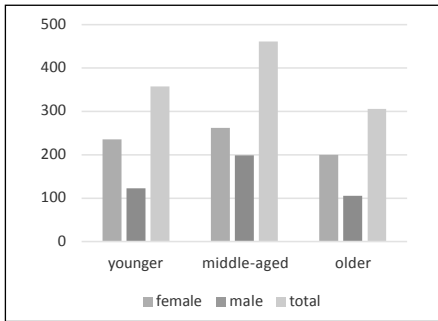


Figure 6: *SuM PLuS* Teacher Sample – Gender and Age Group Distribution

Figure 7: *SuM PLuS* Teacher Sample – School Type Distribution

SuM PLuS examined 1,740 students (58.1% female, $M = 14.39 \pm 1.44$ years) from class levels seven to ten in twelve German federal states. Figure 8 shows the student sample’s distribution by genders and class levels. Figure 9 shows the student sample’s distribution by school types. Students all attended secondary schools (higher secondary, comprehensive secondary, or lower secondary).

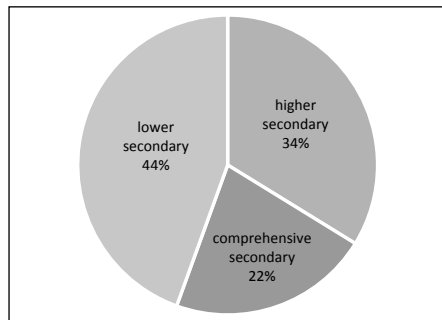
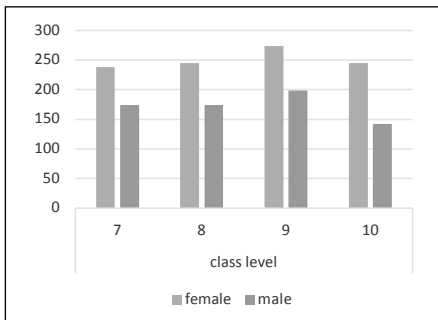


Figure 8: *SuM PLuS* Student Sample – Gender and Class Level Distribution

Figure 9: *SuM PLuS* Student Sample – School Type Distribution

3 Publications

Table of Contents

3.1 Article 1: Theoretical Part on the Teacher Side

3.2 Article 2: Empirical Part on the Teacher Side

3.3 Article 3: Theoretical Part on the Student Side

3.4 Article 4: Empirical Part on the Student Side

This section presents the four articles which constitute this cumulative dissertation thesis. The section contains the articles' general information (authors, title, journal, doi), abstracts, contributions as well as reprints of the complete articles. All articles have been published with open access under the Creative Commons attribution license (CC-BY).

3.1 Article 1: Theoretical Part on the Teacher Side

Authors: Schnitzius, M., Kirch, A., Mess, F., and Spengler, S.

Title: Inside out: A scoping review on the physical education teacher's personality

Journal: *Frontiers in Psychology*

Doi: 10.3389/fpsyg.2019.02510

Abstract

The teacher's personality in general plays an important role in the educational process. It is often examined in relation to outcome factors on the teacher or student side, e.g., teaching effectiveness or student motivation. PE with its peculiarities and allocated educational mandate particularly demands the personality of the PE teacher. Research considering this group of teachers is sparse, diverse, and hard to capture due to different personality understandings. Our review therefore aims at identifying and analyzing underlying personality understandings, research questions, and results of studies considering the personality of the PE teacher.

We conducted a scoping review. After the screening and additional analyses process, 23 studies were included. Included references had to be empirical, published in German or English, and explicitly examine the PE teacher's personality as variable or mention it as outcome factor in the school context. All studies are cross-sectional, 22 studies quantitative, one qualitative.

Regarding personality understandings, 12 studies follow a trait theoretical, six studies a vocational, and one study an interpersonal personality understanding. Four studies' personality understanding is not concretely determinable. Considering research questions, three studies aim at identifying the PE teacher's personality in general and do, e.g., not find considerable differences between the PE teacher's and other teacher's personality. Nine studies examine the relationship between the PE teacher's personality and different correlates such as burnout, highlighting, e.g., that female PE teachers' burnout process is less homogeneous than males. Eleven studies examine the PE teacher's personality from an external view and show, e.g.,

that students of different age groups perceive the PE teacher's personality differently.

Our review offers possible practical implications. By e.g., knowing their personality structure – their inside –, PE teachers can play to their own strengths and make use of their individual personality configuration in order to teach authentically and successfully, i.e., transferring the inside to the outside. Due to partly questionable and fragmentary methodologies of the included studies, results have to be interpreted with caution. More studies considering the PE teacher's personality following a broad personality understanding are needed to include potentially relevant factors for teaching and by this receive evident insights.

Contribution

Melina Schnitzius is the first and corresponding author of Article 1. Melina Schnitzius together with Alina Kirch, Sarah Spengler, and Filip Mess conceived and designed the study. Melina Schnitzius and Alina Kirch performed the literature search and study selection process. Melina Schnitzius analyzed the data and wrote the manuscript with contributions from Alina Kirch as well as Sarah Spengler and Filip Mess. All authors approved the final version of the manuscript.



Inside Out: A Scoping Review on the Physical Education Teacher's Personality

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The teacher's personality in general plays an important role in the educational process. It is often examined in relation to outcome factors on the teacher or student side, e.g., teaching effectiveness or student motivation. Physical education (PE) with its peculiarities and allocated educational mandate particularly demands the personality of the PE teacher. Research considering this group of teachers is sparse, diverse and hard to capture due to different personality understandings. Our review therefore aims at identifying and analyzing underlying personality understandings, research questions and results of studies considering the personality of the PE teacher. We conducted a scoping review. After the screening and additional analyses process, 23 studies were included. Included references had to be empirical, published in German or English and explicitly examine the PE teacher's personality as variable or mention it as outcome factor in school context. All studies are cross-sectional, 22 studies quantitative, one qualitative. Regarding personality understandings, 12 studies follow a trait psychological, six studies a vocational, one study an interpersonal personality understanding. Four studies' personality understanding is not concretely determinable. Considering research questions, three studies aim at identifying the PE teacher's personality in general and do, e.g., not find considerable differences between the PE teacher's and other teacher's personality. Nine studies examine the relationship between the PE teacher's personality and different correlates such as burnout, highlighting, e.g., that female PE teachers' burnout process is less homogeneous than males. Eleven studies examine the PE teacher's personality from an external view and show, e.g., that students of different age groups perceive the PE teacher's personality differently. Our review offers possible practical implications. By e.g., knowing their personality structure – their *inside* –, PE teachers can play to their own strengths and make use of their individual personality configuration in order to teach authentically and successfully, i.e., transferring the *inside* to the *outside*. Due to partly questionable and fragmentary methodologies of the included studies, results have to be interpreted with caution. More studies considering the PE teacher's personality following a broad personality understanding are needed to include potentially relevant factors for teaching and by this receive evident insights.

Keywords: personality, teacher, coach, physical education, school, sports, scoping review, teaching competence

INTRODUCTION

The teacher – one key player in the educational process in school – naturally attracts attention in didactic approaches. The teacher's role – e.g., as one axis in the well-recognized didactic triangle – and by this his general impact within the students' learning process is undisputed. General models of education such as Helmke's (2017) *Utilization of learning opportunities model*, which depict power factors of good lessons, also highlight the teacher's role and among this the teacher's personality and its influence on the quality of lessons. Traditional models of professional teaching competence also include the teacher's personality and make it a priority among other essential factors. Dunkin and Biddle's (1974) internationally well-recognized *Conceptual model of factors influencing teaching and learning*, e.g., attributes the teacher's properties (skills, intelligence, motivations and personality traits) a substantial role among variables predicting lesson and learning success. Considering German educational research, in Baumert and Kunter's (2013) *Model of professional teacher competence* four facets constitute the teacher's ability to perform: motivational orientations, self-regulation, beliefs/values/goals and professional knowledge. Professional teaching practice is seen as result of the coaction of these facets (Baumert and Kunter, 2013). Except for the latter one, personality characteristics play an important role in these facets. Baumert and Kunter's (2013) model allows for the development of professional competence over time, but explicitly highlights the role of relatively stable, implicit factors such as personality characteristics within the professional development process. Personality characteristics influence firstly the uptake of learning opportunities, thereby the teacher's professional competence and finally their professional practice (Kunter et al., 2013a). The teacher's individual personality characteristics therefore are essential for succeeding in teacher education and the teaching career.

Research on the relationship between the teacher's personality and their performance has a particularly long tradition. Succeeding as a teacher encompasses and is often measured by teacher-related factors such as academic success, satisfaction in teaching, teacher well-being or student-related factors such as student motivation or student achievement. General educational research often examines explicitly the relationship between the teacher's personality and the aforementioned *success factors*: On the teacher side, e.g., satisfaction in teaching, teacher burnout, teacher self-efficacy or teacher effectiveness (Mayr, 2011; Djigić et al., 2014; Cramer and Binder, 2015; Perera et al., 2018; Kell, 2019; Kim et al., 2019). On the student side, teacher personality is often analyzed in relation to student motivation or student achievement (Wayne and Youngs, 2003; Hattie, 2009; Jahangiri, 2016; Khalilzadeh and Khodi, 2018; Kim et al., 2018, 2019). Kim et al. (2018) attribute the identification of vital factors of the teacher's personality a promising role for their effectiveness – measured by teaching performance. Knowing about vital personality factors can be beneficial for teaching in general, e.g., for teacher's planning and reflection of lessons – as indicated in the teacher's role in models of lesson planning and evaluation (Döhning and Gissel, 2016). It might also be helpful

for the initial teacher selection or hiring process (Bastian et al., 2017; Kell, 2019).

In order to first understand the role and impact of the teacher's personality for the educational process, the term personality has to be defined and appropriate understandings have to be considered. Such a clear understanding serves as a basis for deriving possible practical implications for teaching or even structural and organizational implications. Following Pervin and Cervone (2008) the term personality refers to “psychological qualities that contribute to an individual's enduring and distinctive patterns of feeling, thinking and behaving.” In order to understand the construct of personality and ensure its comprehensibility, researchers have created models or frameworks. Even though personality psychology still lacks a comprehensive and universal framework for understanding the whole person, Costa and McCrae's *Five Factor Model (FFM)* (Costa and McCrae, 1999) has gained excessive attention (McAdams and Pals, 2006). This prevailing and widely accepted model follows a multidimensional understanding, clustering personality characteristics in the five facets: *Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism (OCEAN)* (John et al., 2008). These factors define a person's personality on a very global level (Rammstedt et al., 2018). The *FFM* is often used interchangeably with the term *Big Five*. The two frameworks are very similar but can be differentiated from each other regarding their origin: the *FFM* has been developed by empirically analyzing personality questionnaires whereas the *Big Five* are based on a lexical approach (Kim et al., 2019) believing that distinguishing characteristics have their origin in natural language use (Goldberg, 1981). Both frameworks share the understanding of personality by the use of five independent and bipolar categories (Rammstedt et al., 2018) and currently dominate personality research. Next to the aforementioned classical trait psychological personality understanding, personality research also borders upon other approaches such as the interactionist understanding. Here personality together with the situation determines an individual's behavior (Swann and Bosson, 2010). This understanding of personality can be considered less static. Moreover, considering personality research focusing on a specific professional group, Holland's (1997) theory and model of vocational personality can be seen as outlasting and prevalent in the occupational context. Holland characterizes people regarding their fit to six different personality types (*Realistic, Investigative, Artistic, Social, Enterprising, Conventional – RIASEC*) and highlights the influence of the environment and by this – similar to the interactionist understanding – developmental possibilities of the worker's personality. Even though originating from different understandings, all exemplary illustrated approaches claim to assess personality. In addition to following traditional and established approaches, further personal facets such as care and enthusiasm are often considered as closely associated or even equated with personality.

Examining the teacher's personality is common practice in general educational research. Göncz (2017) conducted a scoping review and aimed at giving an overview of research activities concerning the teacher's personality and by this

highlighting strategies for educational psychology. Göncz (2017) identified five types of studies classified according to their research questions: Studies of teacher typologies; Studies of teachers' desirable and undesirable features; Studies of teachers' professional behaviors and their influence on students; Studies of teachers' professional identity and Studies of teacher personality within the framework of personality theories (particularly within the *FFM*). In the conclusions Göncz (2017) takes position regarding the merits of the identified groups and proclaims the findings from studies following traditional personality theories "as the best starting point for a more comprehensive psychological theory of teacher personality in educational psychology."

Considering the personality of the physical education teacher (PET), Miethling and Gieß-Stüber (2007) also stated the PET's personality as pivotal point of their professional competence. This becomes especially important in conjunction with physical education (PE)'s allocated educational mandate. PE's mandate postulates (a) to educate the students' physical – e.g., by developing physical fitness and ideally a lifelong engagement in sports and (b) to educate through the physical – e.g., developing students' personality, fostering value imparting and moral education (Sallis and McKenzie, 1991). It is essential that PETs initially reflect their individual prerequisites and potentials (e.g., strengths and weaknesses, personality characteristics) in order to better understand and approach their students. PETs on the one hand have to reflect their own understanding of sports and teach this understanding their students to engage them in sports. On the other hand, PETs have to reflect their own values and then impart these values on their students to educate them beyond the physical. If they manage to fulfill both tasks, they are most likely able to successfully implement PE's aforementioned dual mandate. PETs serve as role models physically and by conveying their own reflected mission statement to their students. How PETs are perceived by their students in this process certainly depends on their personality. Beyond the challenging educational mandate, PETs are faced with further challenges that demand their personalities. The proximity between the PET and their students poses a challenge that requires the PET's personal characteristics. PETs need to address each child's needs, challenge each child at their personal level and create a positive, secure and supportive relationship in a climate where learning can succeed. This is among others achieved by PETs who know their personal qualities, reflect them and convert this process into empathetic, enthusiastic and ideally sustainable teaching. Considering the PET's personality – the *inside* – should therefore receive special attention among personality research in school context. Knowing the teacher's *inside* and transferring this to the *outside* – making it visible – can then support lesson planning and teaching.

Similar to research concerning teachers in general, in studies on the PET's personality the term personality though is construed differently and analyzed in various contexts with different correlates. Contrary to general educational research, a review article summarizing international publications concerning the PET's personality is missing. A review article is necessary though in order to organize the prevailing picture of the understanding of the PET's personality – its definition, characteristics or related

factors –, its correlates and by this its possible impact on educational outcomes. Therefore this review aims at answering the following research question: What are the underlying personality understandings, research questions and results of studies considering the personality of the PET in school?

METHODS

In order to answer the above stated research question, we conducted a scoping review. In 2005 Arksey and O'Malley outlined a first framework for this review approach. Arksey and O'Malley (2005) follow Mays et al.'s (2001) definition – assigning scoping studies the opportunity and task to easily depict a research area's fundamental specifics. They generally attribute scoping studies a comprehensive coverage. Our decision to conduct a scoping review was based on three reasons: First, as preliminary literature searches on the PET's personality revealed that research in this field is diverse and the understanding of personality vague, a scoping review that typically does not try to find an answer to a specific question but summarizes what questions have been asked, seemed to be appropriate (McEvoy et al., 2015; García-Moya et al., 2018). Second, we were interested in the identification of certain characteristics or concepts related to personality and in mapping, reporting or discussing these with finally suggesting practical implications – according to Munn et al. (2018) indications for a scoping review and therefore again supporting our decision. Third, conducting scoping reviews has become more popular in the educational context with a couple of recent perceptive scoping reviews published (e.g., McEvoy et al., 2015; Göncz, 2017; Richards et al., 2017; Sperka and Enright, 2017; Robinson, 2018; Killian et al., 2019).

Our research team consisted of two researchers. We independently passed through the individual phases of the review process following Arksey and O'Malley's (2005) six stages of their methodological framework: (1) Identifying the research question; (2) Identifying relevant studies; (3) Study selection; (4) Charting the data; (5) Collating, summarizing and reporting results; and (6) Consultation. Conflicts were cleared collaboratively after each step.

Stage 1: Identifying the Research Question

Considering Arksey and O'Malley's (2005) possible purposes of a scoping review, our review followed mostly two purposes: *Examine the extent, nature and range of research activity and identify research gaps in the existing research.* Due to the fact that preceding research on the PET's personality revealed inconsistency concerning the understanding and interpretation of personality, we decided to keep our research question relatively wide. We focused on ascertaining what type of empirical literature exists dealing with the personality of the PET in school, which understandings of personality are pursued and which questions are asked considering the personality of the PET in school. In order to capture most interpretations of the ambiguous term personality we did not specify it and decided to follow an open personality understanding. This

allowed for different understandings to be included in our review and by this receive an unaffected and true picture of the existing literature. We deliberately aimed at summarizing literature that either claims to assess personality as a variable or mentions personality as an outcome. Thus, the review's inclusion criteria were the following: content = personality, setting = PE, participants = PETS (personally or via external view), publication language = English or German.

Stage 2: Identifying Relevant Studies

In order to answer the research question we developed the search string, including three main categories: (1) Content: *Personality*; (2) Participants: *PETs*; (3) Setting: *PE*. Aiming at English and German publications, we included both languages in our search string:

(Persönlichkeit* OR personalit* OR Sportlehrerpersönlichkeit*
OR Lehrerpersönlichkeit*)
AND
(Lehrer* OR Sportlehrer* OR
Turnlehrer* OR Leibeserzieher* OR Bewegungserzieher*
OR teacher* OR coach* OR instructor*
OR educator* OR schoolteacher*)
AND
(Sportunterricht* OR Schulsport* OR Bewegungsunterricht*
OR Bewegungserziehung* OR Leibeserziehung*
OR Leibesübung* OR "school sport*" OR "physical education"
OR "gym" class*" OR "physical training")

Category 1 (Content) was searched on title/abstract level as personality had to be an essential part in the potentially included text. Category 2 (Participants) and category 3 (Setting) were searched on full-text level. Initially, no restriction regarding the publication date was undertaken. We chose a comprehensive selection of eleven approved databases in the field of school sport research covering English and German texts: Education Source, ERIC, PsychARTICLES, PsycINFO, PSYINDEX, PubMed, Scopus, SocINDEX, SPOLIT, SPORTDiscus, Web of Science. The initial database search was undertaken on February 6th 2017. On June 12th 2018 we fulfilled update search one and on April 11th 2019 update search two.

Stage 3: Study Selection

After removing duplicates, we independently screened the titles. References were excluded if they clearly did not examine PETS (personally or via external view), if the setting clearly was not PE or if the content clearly was not personality. After screening titles, the remaining abstracts were screened. First, we applied the same exclusion criteria as before. Screening abstracts allowed identifying non-empirical studies, which were excluded. As we aimed at providing a broad picture of the existing literature, we kept our search strategy rather wide and our exclusion criteria

quite soft. If references belonged to editorial works, these were provided and screened for chapters containing empirical studies. Finally, the full-texts of the remaining studies were provided and independently screened applying the same exclusion criteria as before (excluded if: not in English or German, not empirical, not examining PETS, not school setting, not personality). Ultimately, we searched the reference lists of all finally included texts and examined other work of the authors. We screened the authors' websites and publication lists for additional relevant texts and checked for conference presentations and projects. In this process, the same exclusion/inclusion criteria as in the initial search were applied. We created a flow chart which documents the search and reference selection process (see **Figure 1**).

Stage 4: Charting the Data

We independently extracted relevant data from the included texts and collaboratively agreed on a presentation format representing the studies' key information. This step was conducted according to the methodological guideline of the Joanna Briggs Institute (Peters et al., 2015). A table was created which served as the basis for comparing and contrasting the included texts (see **Table 1**).

Stage 5: Collating, Summarizing and Reporting Results

We followed Arksey and O'Malley's (2005) suggestion and divided this part into two different approaches of presenting the charted information: (1) Numerically analyzing the studies' framework conditions and design and (2) Organizing the literature thematically.

RESULTS

Figure 1 documents the search and reference selection process. The initial search yielded 2316 hits: Education Source ($N = 166$), ERIC ($N = 65$), PsychARTICLES ($N = 22$), PsycINFO ($N = 77$), PSYINDEX ($N = 24$), PubMed ($N = 18$), Scopus ($N = 462$), SocINDEX ($N = 70$), SPOLIT ($N = 1148$), SPORTDiscus ($N = 209$), Web of Science ($N = 55$). After removing 270 duplicates, 2046 titles were screened. Six hundred sixty-three references did not meet the inclusion criteria and were excluded. Consequently, 1383 abstracts were screened. Seventy-eight abstracts met all inclusion criteria. The corresponding full-texts were purchased and screened. In this process, 49 studies were excluded, concluding with 29 studies. Three additional studies resulted from update search one.

Fifteen out of these 32 studies were published between 1958 and 1990 (including). No study was published between 1991 and 2005. Seventeen studies were published between 2006 and 2016. Studies before 1991 differed from studies after 2005 regarding the underlying personality understanding (following various theories, e.g., human needs theory, interpersonal theory, situational theory, behavioral theory, trait theory) and consequently assessment methods [e.g., *Edwards Personal Preference Scale* (Edwards, 1959) or *California Psychological Inventory* (Gough, 1957)]. Studies from 2006 onward mostly relied on other, newer personality understandings, as recognized

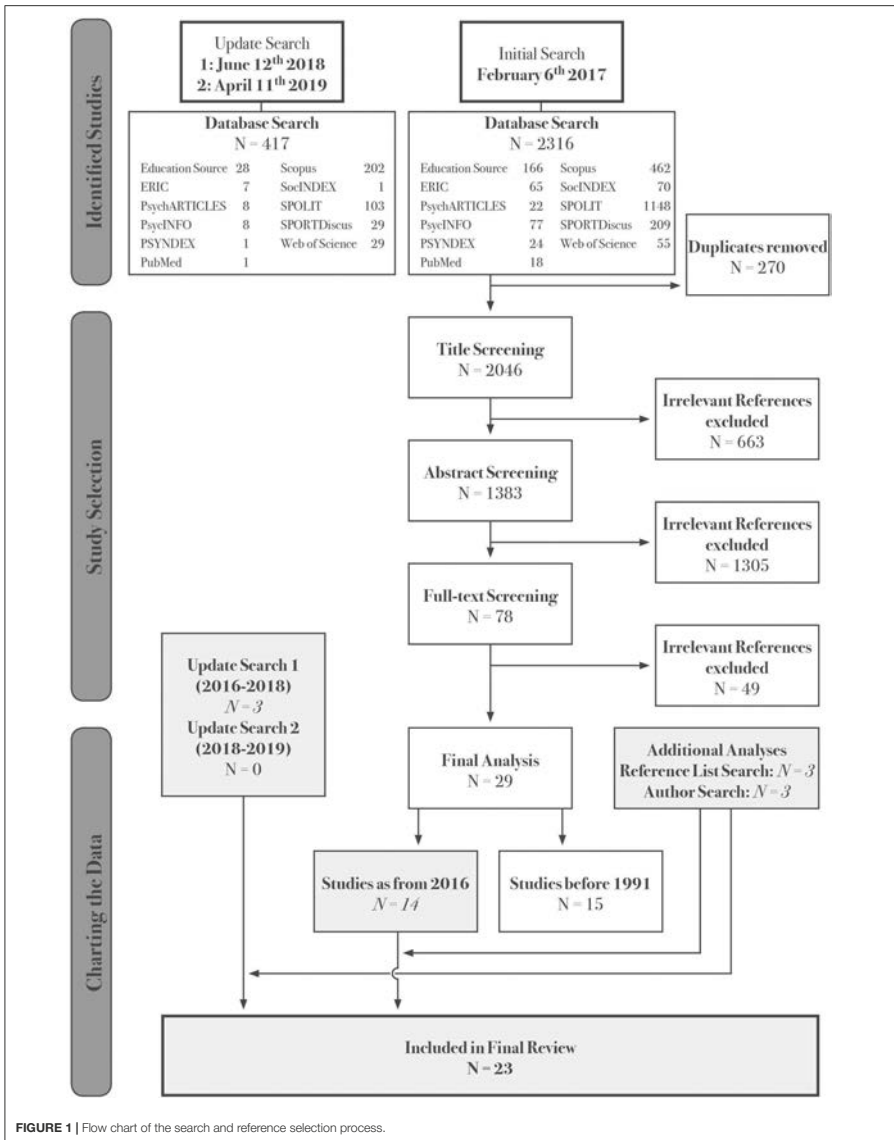


FIGURE 1 | Flow chart of the search and reference selection process.

TABLE 1 | Included studies as from 2006.

Author (year) origin	Study design/method sample	Aim	Personality inventory	Personality understanding (representative)	Main results
(I) The PET's personality (N = 3)					
García-Villanueva et al. (2017) Mexico	*cross-sec/quant. *53 PETs (65 m)	To analyze diff. among PETs in the 4 gender-related pers. scales of IMAFE and work variables sex, age and marital status	quest.: IMAFE (Lara Cantú, 1993) *4 factors: masculinity, femininity, machismo, submission = 60 items associated with pers.	Not determinable → gender-related pers. part of gender-related characteristics	*no diff. in the 4 scales proposed by IMAFE in regard to pers. char. and work variables sex, age and marital status in the group of PETs
Hassam et al. (2016) India	*cross-sec/quant. *20 m. PETs, 20 m. OSTs	To measure and compare the Big 5 pers. factors among m. PETs and OSTs	quest.: Big 5 Pers. Inventory (Buchheim et al., 2005) *5 factors (O, C, E, A, N) = 20 items	Trait psychological – Big 5	*no diff. betw. the Big 5 pers. factors among PETs and OSTs (valid for all 5 factors)
Manu and Montu (2014) India	*cross-sec/quant. *50 m. PETs, 50 m. OSTs	To compare the pers. traits of m. PETs and OSTs	quest.: Eysenck Pers. Quest. (EPQ-R-S) (Eysenck et al., 1985) *4 factors: N, E, psychoticism, lying = 48 items	Trait psychological (Eysenck)	*no diff. in the pers. factors (means of all factors) betw. PETs and OSTs *diff. in subc. E betw. PETs & OSTs PETs more extraverted
(II) The PET's personality and correlates (N = 9)					
Abolmorgab et al. (2016) Iran	*cross-sec/quant. *60 PETs – from boys high schools	To assess the relations. betw. PET's pers. and stud., individual and social beliefs and activities	quest.: NEO-FFI (McCrae and Costa, 2004) *5 factors: O, C, E, A, N = 60 items	Trait psychological – Big 5 (McCrae and Costa)	*relations. betw. pers. aspects of PETs and stud. beliefs and activities * corr. for E and O; no corr. for M, A, C * E and O together can predict 0.88% of changes of stud. beliefs and activities
Burdnik (2007) Poland	*cross-sec/quant. *160 PETs (77 m) – prim., sec., post-sec.	To define the vocational pers. profile of PETs and examine diff. reg. gender, work environment and school type (state or priv)	quest.: SOS (Polish version (Lacata et al., 2002) based on Holland (1994) *activities, skills, occupations; double self-evaluation I and II → 6 scales each = 288 items	Vocational (Holland)	*vocational pers. code differs betw. f. (Social/Investigative Artistic = SA) and m. (Social/Realistic/Enterprising = SRE) PETs *neither work environment nor type of school influences the obtained results
Burdnik (2010) Poland	*cross-sec/quant. *333 OSTs (65 m) + 62 PETs (29 m) – 22 sec. schools	To ascertain to what degree work-related stress, self-efficacy, prof. burnout burnout in OSTs and verify a hypothesis that PETs burn out in keeping with a prof. specific macro-path	quest.: SOS (Polish version (Lacata et al., 2002) – based on Holland (1994) *see Burdnik (2007)	Vocational (Holland)	*m. PETs exhibit typical burn out process for prof. group *I. PETs burn out less homogeneously → macro-paths of m. and I. PETs varied *burnout process OSTs diff. compared to PETs → disciplinary problems as causal, self-efficacy as preventive factor of burnout among OSTs *vocational pers. only slightly impacts burnout process
Demir (2014) Turkey	*cross-sec/quant. *296 PETs (187 m) – state and priv. sec. schools	To evaluate the relations. betw. pers. traits of PETs in relation to their sports branches and sports types and investigate diff. reg. gender, school type and years of service	quest.: PEPI (short form of Sevinç, 2005) *5 factors: O, responsibility, E, compatibility, emotional stability = 25 items	Trait psychological	*no diff. betw. PETs' pers. traits and sports branches, sports types, gender, school type and years of service
Demir (2015a) Turkey	*cross-sec/quant. *92 volunteer PETs (69 m) – state and priv. sec. or high schools	To examine the relations. betw. PPC of PETs and gender, school type, school level, years of service and sports traits/char. stimulating interaction; reflective interaction = 60 items	quest.: PET/PPC scale (adapted to PETs by Demir (2012) from Björkman et al. (2008) *4 subc., prof. enthusiasm/decisior, respect for human dignity/justice, stimulating interaction; reflective interaction = 60 items	Vocational	*PETs see their PPC "completely adequate" → mean scores of respect for human dignity/justice subc. lower than other subcomponents *gender, years of service, sports branches; no diff. *school type; diff. → priv. school PETs score higher on PPC *school level; diff. in stimulating interactions and reflective interactions (high school PETs score higher on PPC)

(Continued)

TABLE 1 | Continued

Author (year) origin	Study design/method sample	Aim	Personality inventory	Personality understanding (representative)	Main results
Demir (2015b) Turkey	*cross-sec./quant. *92 PE ts (69 m) – state and priv. sec. and high schools	To evaluate the relations, betw. pers. traits of PETS and their sports branches, sports types	quest.: <i>PEPI</i> (short form of Seung, 2005) *see Demir (2014)	Trait psychological	*sports branches: corr. only in terms of emotional stability and compatibility domains → e.g., racket sports and handball players emotionally more stable than gymnasts → e.g., basketball and defense sport players more compatible than swimmers *sports types: no diff. *neg. corr. betw. creative innovation, cooperation, tolerance of creative talents (parts of entrepreneurial organizational culture) and PETS' entrepreneurial pers. char. *pos. corr. betw. organizational risk-taking, open communication and PETS' entrepreneurial pers. char. *PETS higher on intellectual development less satisfied with work conditions → more likely to burnout *highly prof. teachers with highest practical experience = most prone to mental burnouts *qualified PETS exhibit higher rates in the subs. reasoning and emotional stability *neg. corr. betw. burnout subs. and mental health, E, O and A *pos. corr. betw. burnout subs. and N
Hosain Razavi et al. (2012) Iran	*cross-sec./quant. *162 PETS	To examine if entrepreneurial organizational culture is related to PETS' entrepreneurial pers. char.	No information	Vocational	
Melikhulova et al. (2017) Russia	*cross-sec./quant. *64 PE ts – general educational schools (37 high (=qualified) and 27 low-ranking)	To explore the specifics of mental burnouts in the context of pers. development of the PETS versus their prof. competency levels	quest.: <i>Cattell's 16 Pers. Factor</i> (Form C of 16PF) (Cattell et al., 1953) *105 items	Trait psychological (Cattell)	
Maryam et al. (2017) Iraq	*cross-sec./quant. *250 PETS (140 m)	To examine the relations, betw. (a) burnout and mental health, (b) burnout and pers. traits among PETS	quest.: <i>NEO-PIR</i> (Costa and McCrae, 1992) *5 factors: O, C, E, A, N = 240 items	Trait psychological – Big 5 (McCrae and Costa)	
(III) The PETS' personality from an external view (N = 11)					
Bianchi-Biedenbeck (2006) Germany	*cross-sec./quant. *8683 stud. – different school levels – <i>SPRINT</i> , (Bretschneider, 2006)	To examine stud., attitudes toward PETS	quest.: 2 inventories *semantic differential evaluating PETS = subject- and pers. related; 14 adj. pairs *PET care = 13 items	Not determinable → generally speaking behavioral + aspect of care	*stud. in general evaluate their PETS pos. → PE ts perceived as self-confident, caring, friendly *stud. age diff.: younger stud. evaluate more pos. *PET age diff.: younger PETS are evaluated better
Demir (2015c) Turkey	*cross-sec./quant. *1254 stud. - 9th, 10th, 11th grade – 17 schools (16 state, 1 priv.)	To examine how PPC of PETS is perceived by 9th, 10th, and 11th grade stud.	quest.: <i>PEPACS-Student</i> (adapted to PETS by Demir (2012) from Buyukmazar (2008)) *4 subs.: prof. enthusiasm/ dedication; respect for human dignity/justice; stimulating interaction and reflective interaction = 60 items	Vocational	*gender: diff. only in some subs. → prof. enthusiasm/dedication and motivational interaction: girls more satisfied than boys; reflective interaction: vice versa) *school type: diff. → priv. school more satisfied *class: diff. betw. 9th, 10th, 11th graders for all subs. → 8th graders evaluate PETS' PPC most pos.

(Continued)

TABLE 1 | Continued

Author (year) origin	Study design/method sample	Aim	Personality inventory	Personality understanding (representative)	Main results
Lauritsalo et al. (2015) Finland	*cross-sec/quant. *Finnish stud. communicating in internet forums (356 messages from 9 forums)	To examine what kinds of extrinsic factors underlie opinions expressed on experiences of PE: what is the role of the PEI, class environment, curriculum and assessment in these opinions?	messages taken from internet discussion forums analyzed by qualitative content analysis	Not determinable generally speaking behavioral	*6 extrinsic factors identified: PEI's pers./behavior = strongest factor containing most statements (40% = 103 messages); 2 _{nd} = class environment (24%), 3 _{rd} = curriculum (16%), 4 _{th} = assessment (9%), facilities & equipment (8%), out-of-school influence and other factors (3%) *mostly neg. statements and strong feelings of compulsion, humiliation in most opinions (PEIs seen as not supportive) 61% of messages in neg. category; 8% pos.; 31% both pos. and neg. *PEI's social-emotional pers. char. and competencies = imp. for stud. motivation *gender diff. → PEI's realizing stud. fear = more imp. for girls *partly diff. for sportiness → e.g., achievement orientation and strict grading more imp. for sporty/active kids
Serni et al. (2017) Austria	*cross-sec/quant. *122 stud. (87 m) – year 12, 13 and uni. stud.	To examine how pers. char. and competencies of PEI's influence stud. motivation in PE and indicate diff. reg. gender and sportiness	quest.; self-dev. (NN) *complex 1: imp. of social behavior (PET to stud.) *complex 2: PET achievement orientation	Not determinable → generally speaking behavioral	*PPC highest average points: "She/he cares that honesty and trust form the basis of our communication at school" = evaluated as "completely adequate" *PPC lowest average points: "She/he does not criticize a student who exhibits negative behavior in front of the class" = evaluated as "partly adequate" *gender: diff. only for motivational interaction → girls more satisfied than boys *school type: diff. in all subc. betw. state and priv. school stud. → priv. school stud. in general more satisfied with PPC *class: diff. in all subc. → 7 th graders more satisfied with PEI's; PPC than 8 th and 8 th graders
Demir (2016) Turkey	*cross-sec/quant. *1421 stud. (728 m) – 6 th -8 th grade – public and priv. schools	To examine the PPC of PEI's as evaluated by stud. and to investigate diff. based on stud., gender, school type and class	quest.; PET PPCS-Student; (adapted to PEI's by Demir (2012) from Elyukmaz (2008)) *see Demir (2015c)	Vocational	

(Continued)

TABLE 1 | Continued

Author (year) origin	Study design/method sample	Aim	Personality inventory	Personality understanding (representative)	Main results
Georgiev (2016) Bulgaria	*cross-sec/quant. 76 stud. (30 m.) – 5th, 6th, 7th grade – sec. school	To reveal stud.' attitudes toward the prof.-personal qualities and interpersonal char. of the PET pers. and examine if there are diff. reg. the stud.' age, gender or sports participation	quest.: <i>Test of T. Leary (Leary, 2004)</i> and self-dev. quest. (stud.' attitudes toward PETs' prof. personal qualities) *16 variables of interpersonal interaction (8 dimensions) *prof. personal qualities: 3 scales (knowledge, skills, personal qualities) = 26 items	Interpersonal	Preferences about PETs' char.: *hyper-affiliating pers. = highest degree of manifestation; 2nd = autocratic pers.; lowest two = nurtured and suspicious pers. → PETs should be benevolent, cooperative, helpful, showing empathy, strict and uncompromising enough in organization and control during PE classes *gender: no diff. *age: diff. → desire for communication, understanding, cooperation with PET increases with stud.' age Attitudes toward PETs' prof. personal qualities → PETs should be interested in stud.' problems, maintain a closer interpersonal distance, socialize, advise, support, help *age diff. → 5th class stud. place higher imp. on PETs' personal qualities than 7th class stud. *gender diff. → boys place less imp. on PETs' skills *sports participation diff. → active kids place higher imp. on PETs' personal qualities than kids not engaged in sports *PETs assess pos. image attributes (e.g., cheerful/likes), O. honesty, immediacy, pos. thinking) higher than OSTs *PETs proclaim organizational ability, dynamic actions and cheerful pers. distinguishing char./OSTs proclaim PETs' outfit, dynamic actions, cheerful/pers. Competence profile of stud. needs oriented PET; prof. expertise; great repository; sporty; empathy; methodical/didactical skills; pedagogical charm; autogenesis companion; sport ethos; creator; sensitivity for needs *several diff. mostly betw. grade 8 and 9, urban and rural schools, sec. and vocational schools only diff. reg. gender for responding to stud. → more imp. for m.
Szczepanski (2012) Poland	*cross-sec/quant. *312 PETs and 600 OSTs – prim. and sec. schools	To analyze differences reg. opinions on distinguishing char. of PETs perceived by PETs themselves and by OSTs	quest.: self-dev. (NN) *13 examined attributes – social distinguishing features (in PETs opinion) – self- and peer assessment	Trait psychological	
Voll (2006) Germany	*cross-sec/quant. *976 stud. – year 8–10 – sec. schools	To examine stud.' expectations toward their PET and to create a competence profile of an effective PET and examine diff. reg. stud.' grade, school environment, school level, gender	quest.: self-dev. (NN) concerning PETs' prof. competence/skills and char. (pers.: fairness, understanding, partner, role model, assertiveness)	Trait psychological	

(Continued)

TABLE 1 | Continued

Author (year) origin	Study design/method sample	Aim	Personality inventory	Personality understanding (representative)	Main results
Zalech (2011a) Poland	*cross-sec/quant. *763 stud. (279 m) – 2 senior high schools	To determine what features of PETs are most undesirable according to high school stud. and indicate if gender, grade or school affect selection of individual features	self-dev. (NN) diagnostic survey – quest. technique (semi open) *participants identify 3 char. a PET should not have *similar to Zalech (2011b)	Trait psychological	*most undesirable features: quick temper (65%); severity (50%); unreliability/moodiness (37/34%) *gender and grade: various 2nd and 3rd order interactions → e.g. girls in grade I chose strict more often than boys; boys were more displeased at the PET's inexcision (independent of grade) → boys e.g., indicate submissive and indulgent; girls e.g., being moody and quick-tempered as undesirable features *school: no diff.
Zalech (2011b) Poland	*cross-sec/quant. *744 stud. (273 m) – 1st, 2nd, 3rd year – comprehensive upper-sec. school	To define what pers. traits, according to upper-sec. stud. are most significant in a PET and indicate if school, gender, year differentiate the choices	Diagnostic survey – quest. technique (semi open); self-dev. (NN) *participants identify 3 distinguishing pos. traits a PET should have → selection from 12 diff. adj. plus option to add 1 feature	Trait psychological	*Top 4 no gender diff.: <i>understanding</i> (53.5%), <i>fairness</i> (47.3%), <i>patience</i> (39.3%), <i>sense of humor</i> (38.3%); only order differs *least indicated: <i>caring</i> (6.1%), <i>other traits</i> (6.5%) *variable interdependency (2nd and 3rd order interactions)
Zalech and Rutkowska (2014) Poland	*cross-sec/quant. *22 PETs, 22 OSTs, 22 final-year stud., – upper-sec. school	To get to know the image of PETs seen by themselves and compare it with school community's perception	quest., ACL-37 (Gough and Halburin, 2012) *300 adj. *participants choose fitting adj.	Trait psychological (Gough and Halburin)	*diff. betw. PETs & others' view → PETs perceive themselves in a more pos. manner (mark more favorable than non-favorable adj.) → 2. adj. most frequently associated with image of PETs by all groups: active and energetic → 6 most selected adj. (open-minded, willing to cooperate, active, healthy, hard-working, skillful) all pos. connoted

Study Design/Method Sample: cross-sec, cross-sectional; m, male; OST, Other Subject Teacher; PET, Physical Education Teacher; perm, primary; priv, private; sec, secondary; stud, students; uni, university; Aim: betw, between; char, characteristics; diff, difference(s); m, male; OST, Other Subject Teacher; pers, personality; PET, Physical Education Teacher; PPC, Professional Personality Competence; priv, private; prof, professional(s); reg, regarding; relations, relationship(s); sec, secondary; stud, student(s); self-dev, self-developed; self-dev, self-developed; quest, questionnaire; quest, questionnaire; self-dev, self-developed; stud, student(s); subc, subcomponent(s); O, Openness; C, Conscientiousness; E, Extraversion; A, Agreeableness; N, Neuroticism. Main Results: adj, adjectives; betw, between; char, characteristics; corr, correlation(s); diff, difference(s); f, female; imp, importance; m, male; OST, Other Subject Teacher; PE, physical education; reg, negative; pers, personality; PET, Physical Education Teacher; pos, positive(s); priv, private; prof, professional(s); PPC, Professional Personality Competence; relations, relationship(s); stud, student(s); subc, subcomponent(s); subs, subscale(s); O, Openness; C, Conscientiousness; E, Extraversion; A, Agreeableness; N, Neuroticism.

personality concepts as well as assessment instruments emerged in the late 1980s and subsequent years [e.g., emergence of Costa and McCrae's work and the publication of the first version of the *NEO-PI* (Costa and McCrae, 1985) or advancement of Holland's *Self Directed Search* assessing vocational interests (Holland, 1994)]. Due to this gap in the literature and the mentioned content-related considerations, a comprehensive thematic presentation was exclusively done for studies published after 2005. However, in order to also give an overview of the older studies, we included the data and results of the 15 studies published between 1958 and 1990 in the supplementary section of this paper (see **Supplementary Table 1**). In the additional analyses step of the 17 included studies we deliberately checked not only for publications as from 2006 but also for publications in the years between 1991 and 2005. This process resulted in further six studies – all published later than 2005. In total, 23 studies were included in our final review. **Table 1** provides a summary of the 23 finally included studies.

Framework Conditions and Study Design

Sixteen different first authors published the 23 included studies, 15 thereof in the last 5 years. Ten studies could be allocated to the Middle East (including India) (Hosein Razavi et al., 2012; Demir, 2014, 2015a,b,c, 2016; Mantu and Montu, 2014; Arbabisarjou et al., 2016; Hassan et al., 2016; Maryam et al., 2017), eight to Eastern Europe (Brudnik, 2007, 2010; Zalech, 2011a,b; Szczepanski, 2012; Zalech and Rutkowska, 2014; Georgiev, 2016; Makhmutova et al., 2017), four to Western/Northern Europe (Brandl-Bredenbeck, 2006; Voll, 2006; Lauritsalo et al., 2015; Senn et al., 2017) and one to North America (García-Villanueva et al., 2017). All studies followed a cross-sectional study design. Twenty-two studies chose a quantitative, one study (Lauritsalo et al., 2015) a qualitative approach. Test persons were either PETs themselves ($N = 14$), teachers of other subjects (in the following abbreviated as OST = other subject teacher) ($N = 5$) or students ($N = 10$) evaluating PETs' personality from an external view. Sample size varied between 20 and 312 for PETs, 20 and 600 for OSTs, 22 and 8863 for students. In order to assess personality the included studies used 19 different inventories – seven of which being well-recognized as personality inventories [*NEO-FFI* (McCrae and Costa, 2004); *NEO-PI-R* (Costa and McCrae, 1992); *SDS Polish Version* (Holland, 1997; Lacała et al., 2002); *EPQR-S* (Eysenck et al., 1985; Pourghaz et al., 2016); *ACL* (Gough and Heilbrun, 2012); *16PF Form C* of Russian version (Fetiskin et al., 2002) adapted from (Cattell et al., 1993); *Test of T Leary* (Leary, 2004) ($N = 8$)]. Six studies each either made use of less-recognized inventories or designed their own questionnaire according to the study's needs.

Personality Understanding, Research Questions and Results

As research questions of the analyzed studies are diverse, the presentation of the underlying personality understanding, research questions and results will be divided into three

thematically coherent categories: (I) *The PET's personality* – studies with their main focus explicitly on the identification of the PET's personality ($N = 3$); (II) *The PET's personality and correlates* – studies examining the PET's personality in relation to another variable ($N = 9$); (III) *The PET's personality from an external view* – studies interested in a non-PET view on the PET's personality ($N = 11$). Within the categories according to the formulated three foci of the review's research question, the studies' underlying personality understanding together with their research questions and the studies' results will be presented separately.

The PET's Personality

In this category researchers are explicitly interested in the PET's personality. In all three studies (Mantu and Montu, 2014; Hassan et al., 2016; García-Villanueva et al., 2017) personality is approached as universal and comprehensive. Mantu and Montu (2014) and Hassan et al. (2016) both intend to compare the personality characteristics of PETs with those of OSTs. They follow a trait psychological approach of personality. García-Villanueva et al.'s (2017) study follows a special understanding of the PET's personality in the subject area of gender studies. The study's primary aim is to analyze differences regarding sex, age and marital status among PETs in the four gender-related scales (*masculinity, femininity, machismo, submission*) considering personality characteristics.

Mantu and Montu (2014) conclude that there are no significant differences between the personality factors of PETs and OSTs considering the overall score. Solely when analyzing the individual factors, Mantu and Montu (2014) state that PETs are more *extraverted* than OSTs. Hassan et al. (2016) do not find any statistically significant differences in the individual *Big Five* factors of PETs and OSTs – *extraversion* and *conscientiousness* are most strongly pronounced in both teacher groups. García-Villanueva et al. (2017) do not find any statistically significant differences in the relationships of the four gender-related personality scales and the variables sex, age and marital status.

The PET's Personality and Correlates

The nine studies that are assigned to this category state the relationship between the PET's personality and one or more correlates as their main objective. Three of these studies examine the relationship between the PET's personality and burnout (Brudnik, 2010; Makhmutova et al., 2017; Maryam et al., 2017). Brudnik (2010) speaks of vocational personality, Makhmutova et al. (2017) of personality development within a trait psychological approach and Maryam et al. (2017) of personality traits in general. All three also assess additional aspects such as self-concept or mental health. Demir's three studies in this category (Demir, 2014, 2015a,b) aim at examining the relationship between PETs' personality traits and their sports branches (e.g., football, swimming, gymnastics) and sports type (team sports vs. individual sports). In two of the studies (Demir, 2014, 2015a) he also examines the PET's gender, school type (private vs. public schools) [in 2015a also school level (secondary vs. high schools)] and years of service in relation to the PET's personality. In two studies (Demir, 2014, 2015b) he follows a trait

psychological understanding of personality. In his third study (Demir, 2015a) he speaks of professional personality competence and by this identifies the PET's vocational personality. Brudnik (2007) follows Holland's tradition which understands vocational interests as personality characteristics and therefore also establishes a work-related peculiarity of personality. Similar to Demir's studies she examines the relationship between the PET's vocational personality and gender, type of school and work environment. Hosen Razavi et al. (2012) and Arbabisarjou et al. (2016) examine the relationship between PET's personality traits and students' individual and social behavior or the entrepreneurial organizational culture, respectively. Arbabisarjou et al. (2016) follow a trait psychological understanding of personality whereas Hosen Razavi et al. (2012) speak of entrepreneurial personality characteristics and therefore follow a vocational approach.

Studies examining the PET's personality in relation to burnout all focus on different analyses and therefore conclude with multifaceted results. Brudnik (2010) finds that PET's gender is related to the burnout path – male PETs burnout following a particular path whereas female PETs burnout less uniformly. Further, Brudnik (2010) finds out that self-efficacy – which is often seen as part of the personality – serves as preventive factor of burnout for OSTs. The degree of the PET's personality matching the profession (SDS; Holland, 1994) only slightly affects the burnout path. Makhmutova et al. (2017) highlight the fact that PETs scoring higher on the intellectual development level [Scale B of Cattell's 16PF (Cattell et al., 1993) – reasoning] are less satisfied with their work conditions and by this more likely to burnout. Qualified PETs – graduated in PE – exhibit significantly higher rates in the subscales *reasoning* and *emotional stability* compared to non-qualified PETs (Makhmutova et al., 2017). According to Maryam et al. (2017) when considering the *Big Five* personality factors only *neuroticism* shows a positive correlation with PETs' burnout development (via the burnout indicator *emotional exhaustion*).

Demir's results in his methodologically similar studies are contradictory. In his study from Demir (2015b) he does not detect a correlation between the PET's sports type (individual sports vs. team sports) but examines significant correlations between two personality sub dimensions (*emotional stability* and *compatibility*) and the PET's sports branches. Racket sports and handball players are *emotionally more stable* than gymnasts. Basketball and defense sport players are more *compatible* than swimmers. In his earlier study from 2014 he does not find any significant differences between PETs' personality and their sports branch, sports type or the other examined correlates (gender, years of service, school type). In his study from 2015a he detects differences in PET's vocational personality regarding the school type and school level the PETs teach in, but not regarding their gender. PETs in private schools and high schools are more competent regarding their professional personality than their colleagues in public schools or secondary schools. Brudnik (2007) finds a difference between male and female PETs' vocational personality code. *Social, Investigative, Artistic (SIA)* summarizes females' vocational personality whereas *Social, Realistic, Enterprising (SRE)* is the male equivalent. She cannot

show a relationship between the vocational personality and work environment or school type.

Hosein Razavi et al. (2012) and Arbabisarjou et al. (2016) both find significant correlations between at least some personality sub dimensions and their examined correlates. Arbabisarjou et al. (2016) only report correlations without mentioning directions of these. The sub dimensions *extraversion* and *openness* of the PET's personality have a significant relationship with the students' beliefs and activities (Arbabisarjou et al., 2016). Hosen Razavi et al. (2012) find that three of the six components of entrepreneurial organizational culture (*creative innovation, cooperation and tolerance of creative talents*) obtain a negative correlation and two components (*organizational risk-taking and open communication*) a positive correlation with the PET's entrepreneurial personality characteristics.

The PET's Personality From an External View

Category III consists of studies that aim at receiving an external view on the PET's personality. The eleven studies in this category examine OSTs and students as members of the school community. The category can be divided into three thematically coherent groups: (1) *Studies generally describing the PET's personality*; (2) *Studies obtaining attitudes of opinions toward PET's personality*; (3) *Studies describing "the ideal PET."* Three studies each can be assigned to group (1) (Zalech and Rutkowska, 2014; Lauritsalo et al., 2015; Senn et al., 2017) and (3) (Voll, 2006; Zalech, 2011a,b). Five studies belong to group (2) (Brandl-Bredenbeck, 2006; Szczepanski, 2012; Demir, 2015c, 2016; Georgiev, 2016).

In group (1), Zalech and Rutkowska (2014) compare the image of the PET from the PET's own perspective with students' and colleagues' descriptions. Senn et al. (2017) are interested in the relationship of PET's personality characteristics with students' motivation in PE, solely considering the students' view. Lauritsalo et al. (2015) aim at collecting an unbiased overview of students' attitudes toward school PE in Finland by collecting messages from chat protocols in internet discussion forums. Lauritsalo et al. (2015) do not mention the PET's personality in their aim but as an outcome factor – together with the PET's behavior. Lauritsalo et al. (2015) and Senn et al. (2017) closely associate PET's personality with behavior whereas Zalech and Rutkowska (2014) follow a trait psychological approach. In group (2) Brandl-Bredenbeck (2006), Demir (2015c, 2016), and Georgiev (2016) aim at obtaining the students' attitudes toward their PETs. Georgiev (2016) follows Leary's (Leary, 2004) theory of interpersonal interaction in order to assess personality. Demir (2015c, 2016) speaks of teachers' professional personality and therefore follows a vocational personality standpoint. Brandl-Bredenbeck (2006) speaks of personality in general closely related to behavior and supplements this general approach by examining the PET's care as additional personality aspect. Szczepanski (2012) also asks for opinions on the PET's personality but compares PETs' and OSTs' views, explicitly speaking of image or identity and therefore being in line with trait theory. The authors in group (3) – Voll (2006) and Zalech (2011a,b) – explicitly ask for the ideal (or not ideal, Zalech, 2011a) PET and all follow a trait psychological approach of personality.

In Zalech and Rutkowska's (2014) study PETs evaluate themselves more positively than their colleagues (OSTs) or students. OSTs and students describe the PETs as e.g., less patient, less hard-working and less intellectual compared to PETs' views. In total, PETs mark more favorable than non-favorable adjectives when describing their personality with a choice of given adjectives. The three groups are in agreement with each other regarding the most characteristic identity attributes of PETs – all mentioning active and energetic (Zalech and Rutkowska, 2014). Senn et al. (2017) detect differences regarding the students' gender and sportiness when assessing the role of the PET's personality for their motivation in PE. Girls put more emphasis on the skill that the PET realizes their fears and sporty kids choose different attributes as important for their motivation (e.g., achievement orientation and strict grading) compared to less sporty kids. Lauritsalo et al. (2015) detect more negative, not empathetic statements regarding the PET's personality than positive ones. Students describe PETs as not supportive, accompanied by strong feelings of compulsion and humiliation (Lauritsalo et al., 2015). In total, in this study 40 percent of the analyzed messages contain statements regarding the PET's personality or behavior – making this facet the dominant outcome variable.

Georgiev (2016) finds out that younger students put more emphasis on PETs' caring behavior and interest in their problems than older ones. The desire for communication, understanding and cooperation with the PET increases with the students' age. In Szczepanski's (2012) study, PETs rate positive image attributes (e.g., *cheerful lifestyle, openness, honesty, immediacy, and positive thinking*) of themselves higher than their colleagues (OSTs). The biggest difference occurs for the personality characteristic *organizational ability*. Considering the PETs' opinion, the top three characteristics, which distinguish them from their colleagues, are *organizational ability, dynamic actions and cheerful personality*. OSTs mention the PETs' *clothing style* as the strongest distinguishing feature followed by *dynamic actions and cheerful personality*. Demir (2015c, 2016) is again represented with two studies in this category, both obtaining students' attitudes toward their PET's professional personality competence. Demir (2016) finds significant gender differences for one subcomponent (*motivational interaction*) only – girls being more satisfied with their PET's *motivational interaction* than boys. In his earlier study (Demir, 2015c) he finds differences for three subcomponents – *motivational interaction, professional enthusiasm/dedication, and reflective interaction*, – girls being more satisfied with the first two and boys with the last subcomponent. Demir (2015c) also highlights the fact that younger students – grade nine and ten students – and students of private schools are more satisfied with their PET's professional personality competence compared to grade 11 students and counterparts in public schools (school type differences also in Demir, 2016). In Brandl-Bredenbeck's (2006) study PETs are perceived as *self-confident, caring and friendly* by their students. In total, he speaks of a positive evaluation. Younger PETs receive a better evaluation than older PETs.

Zalech (2011b) detects *understanding, fairness, patience, and sense of humor* as the four most desired attributes of a PET.

He does not find any differences regarding the students' gender. In his study asking for the most undesired features of a PET (2011a) though the choice differs significantly between girls and boys. Boys e.g., indicate *submissive and indulgence* as undesirable features, whereas girls, e.g., indicate *being moody* as well as *quick-tempered*. Zalech (2011b) also finds a second-order interaction between gender and grade of students with girls in grade one for example choosing *strict* significantly more often as most undesired feature than boys in the same grade. Schools though do not have a significant impact on the choice. Voll (2006) finds out that students in grade eight generally put more emphasis on all examined personality characteristics (*fairness, understanding, being a partner, being a role model, assertiveness*) than their counterparts in grade nine. Voll (2006) also detects differences regarding school type or level. Students in urban schools, e.g., put more emphasis on the PET's *fairness* than their counterparts in rural schools. Further, students in vocational schools put more emphasis on the PET's *assertiveness* than Realschule (German middle school) students.

DISCUSSION

Our review aimed at summarizing the status of research concerning the personality of the PET. After the screening process 23 studies were included. The chosen methodology of a scoping review – following a rather broad approach with soft exclusion criteria – tried to make sure that all studies coming within our aim (*Summarizing empirical studies – their underlying personality understanding, research questions and results – considering the personality of the PET*) were included in the final review. Other scoping studies in our field that can be considered as balanced, analyze a similar number of studies [e.g., Richards et al., 2017 (N = 20); Sperka and Enright, 2017 (N = 31); Robinson, 2018 (N = 30); Killian et al., 2019 (N = 24)] and conclude with promising results, partly providing practical implications and indications for future research. Due to the studies' heterogeneity, results are hard to synthesize and compare among each other or with our results. All 23 in our review analyzed studies were cross-sectional, all but one quantitative. The underlying personality understanding but also the research questions and results of the included studies varied enormously and by this supported the assumption that the research field is wide and construed differently.

Discussion of Framework Conditions and Study Design

Twenty of the 23 included studies were published in 2010 or later – fifteen thereof between 2014 and 2017. Therefore, we can speak of an increasing research interest with regard to the PET's personality in the last years. This might be caused by Hattie's (2009) world-renowned meta-analysis stating the teacher's personality as one essential factor of successful learning. Considering the origin of the included studies, it is surprising that 18 studies originate from the Middle East or Eastern Europe. This might be due to political changes at around this time or probably in consequence of the PISA study's results in 2000

and subsequent survey times. The studies' sample size varied distinctly. For eight studies it seems difficult to generalize findings due to small sample sizes (Mantu and Montu, 2014; Demir, 2015a,b; Arbabisarjou et al., 2016; Georgiev, 2016; Hassan et al., 2016; Garcia-Villanueva et al., 2017; Makhmutova et al., 2017).

Discussion of Personality Understanding, Research Questions and Results

The amount of different inventories used to assess personality ($N = 19$) emphasizes the assumption of a prevailing diversity among the different approaches to personality. Only five studies (Demir, 2014, 2015b; Arbabisarjou et al., 2016; Hassan et al., 2016; Maryam et al., 2017) used a *Five Factor* inventory and by this follow the *Five Factor* structure of personality (Costa and McCrae, 1999). Considering the fact that in general – not teaching context specific – personality research the *Five Factor* understanding of personality predominates the research area (John et al., 2008; Göncz, 2017), this number here can be considered rather small. Also only six studies followed a vocational approach of personality. This number was expected to be greater due to the chosen profession specific context.

In the following, the studies' research questions and results will be discussed separately, following the same three-part structure as before.

The PET's Personality

Interestingly, the personality between PETs and OSTs does not differ considerably according to the two studies approaching this question (Mantu and Montu, 2014; Hassan et al., 2016). Solely considering the factor *extraversion*, the PETs score significantly higher than OSTs, signifying that they are more extraverted. This becomes interesting and relevant when considering Kim et al.'s (2019) results that out of the *Big Five* domains, *extraversion* obtained the strongest association with the teacher's effectiveness and by this can be seen as favorable characteristic. Mantu and Montu's (2014) result that PETs are more *extraverted* than OSTs hinders that they particularly can positively influence their students' learning process. Due to the fact that only two of the included studies dealt with this topic, the implications have to be treated with caution though. Garcia-Villanueva et al.'s (2017) study clearly stands out when comparing personality understanding and research questions. The content of this study can be considered as stand-alone among the others. Also in general educational research we could not find an equivalent study (*inter alia* Göncz, 2017).

The PET's Personality and Correlates

PETs' burnout risk is clearly the dominant correlate among the included studies. Considering the publication dates of the included studies in our review, the fact that it is still only examined in three studies is in line with burnout research's development in the last decade. Teacher burnout research gained popularity at the turn of the millennium (Krause, 2003). In this time, as a result of empirical investigations, the widely known assumption that teachers obtain stress and strain levels higher than workers in other professions emerged (Maslach et al., 1996;

Schaufeli and Enzmann, 1998; Schaaarschmidt, 2004, 2005). Nowadays though after a decade of intensive research on this topic, work-related well-being is often approached from a positive perspective considering resources instead of demands and by this e.g., examining positive motivational processes and psychological states such as work engagement instead of burnout (Schaufeli et al., 2009). This is in line with psychology's orientation toward a *Positive Psychology* starting around the turn of the millennium (Schaufeli et al., 2009). Interestingly, the few included studies on this topic in our review, even though published later than 2006 follow the traditional understanding of burnout and conclude with a relationship between PETs' personality factors and their burnout level. As the results have shown, the amount and exact manifestation is unclear though. The orientation toward burnout might be explicable with our review's focus examining PET's personality. This orientation and therefore the relationship between teacher burnout and personality is also a common research topic in recent general educational research, especially when examining indicators for professional success. Cramer and Binder (2015) and Kim et al. (2019) examined the relationship between *Big Five* personality characteristics and burnout among teachers in general and conclude with similar results: high scores on *neuroticism* solidly indicate an increased burnout risk and low scores on *extraversion* and *conscientiousness* seem to indicate at least partly a reduced burnout risk. This is in line with Maryam et al.'s (2017) results – the only study in our review that analyses the relationship between PET burnout and *Big Five* personality characteristics. In comparison to studies considering teachers in general, the topic seems to be rather understudied for PETs. Research considering the PET's stress though – without linking it to personality and rather connecting it to their health – has gained popularity in recent years. Brandt (2019) highlights this fact in his dissertation summarizing quantitative and qualitative studies examining the PET's health. He concludes that PETs obtain rather high stress levels and are health wise more vulnerable than OSTs.

Demir (2014, 2015a,b) concentrates his research on the relationship between the PET's personality and the PETs' sporting practice – a focus area which does not receive a lot of attention in previous studies. It becomes interesting in the discussion on how much practical education PETs should receive at university, how comprehensive this should be and concomitant which sporting competencies should be condition for entering a teaching degree. In previous research it was only the overall picture of the PET's sportiness (Messing, 1979) that received attention whereas Demir (2015b) goes into detail and differentiates in terms of the particular practiced sport – sorted by branch and type. Due to the fact that his results are contradictory this approach does not raise hope for practical implications though.

Only one study (Arbabisarjou et al., 2016) examines the relationship of the PET's personality and students' actual behavior in the lesson and by this links the PET's personality to student participation and motivation in PE. This link is common in general educational research. Kunter et al. (2013b) for example revealed positive effects of the teacher's personality (in this particular case enthusiasm) on instructional quality and by this on student outcomes, such as motivation or achievement.

Wayne and Youngs (2003) pursued this relationship in a literature review also concluding with the fact that certain teacher characteristics foster student achievement. Arbabisarjou et al.'s (2016) results are especially interesting when following educational research's assumption that the teacher influences student motivation and learning success (Hattie, 2009; Eric, 2013; Kim et al., 2019). Considering Arbabisarjou et al.'s (2016) results, the personality factors *extraversion* and *openness* should therefore receive attention when considering student participation and motivation in PE, e.g., in teacher education or lesson planning. Arbabisarjou et al. (2016) raise the awareness for the right amount of interpersonal relations, creativity and flexibility when teaching. Even though the variability of the personality characteristics is rather small, knowing the individual manifestation, such as being overly *extraverted* and *open*, can help teachers in order to motivate students when deliberately playing to their own strengths. Conversely, less *extraverted* or less *open* teachers need to be presented with or find other strategies in order to ensure their students' motivation. Senn et al.'s (2017) study (category three) runs in a similar direction but only works with one variable (students' attitudes). Other than that, to the best of our knowledge, this explicit and interesting relationship has not been examined in PE context so far.

Brudnik (2007) and Demir (2015a) both following predominantly a vocational approach, conclude with contradictory results – no gender differences regarding PET's vocational personality in Demir's study but in Brudnik's; no differences regarding context factors in Brudnik's study but in Demir's. This might be explicable with their interpretation of vocational personality. Brudnik (2007) follows Holland's (1994) understanding asking for *preferred activities, possessed skills* and *professional preferences* whereas Demir's (2015a) scale includes the self-evaluation of *professional enthusiasm, respect for human dignity* and *interactional components (reflective and stimulating)* and by this partly follows an interactive approach within the vocational understanding. Demir's (2015a) decision to ascertain enthusiasm is again in line with modern general educational research's understanding of the teacher's professional competence (e.g., Baumert and Kunter, 2011) including a broad understanding of the term personality. Teacher enthusiasm in general educational research is often examined in relation to student outcomes such as motivation. Keller et al. (2013) suggested a *personal trait like enthusiasm understanding* within an integrated model of teacher enthusiasm and by this highlighted the relationship to and importance of personality characteristics.

The PET's Personality From an External View

With 11 studies in this category, examining an external view of the PET's personality can clearly be seen as a methodological peculiarity among the included studies. Connelly and Hulsheger (2012) were able to show that external observers have a clearer view on a person's personality and are therefore able to provide a certain depth of personality information. Further, Dinger et al. (2014) comparing self and observer reports of personality functioning conclude that the combination of both views was most efficient and should therefore be considered in future

research. Observer reports certainly add essential information and offer possibilities for incorporating bordering approaches upon personality.

Brandl-Bredenbeck (2006) incorporates the PET's care estimated by students as part of the PET's personality. This understanding borders upon Self-Determination-Theory (SDT) (Deci and Ryan, 2002) – considering the PET's care as part of SDT's factor relatedness. Interestingly, research focusing on the teacher's care – often in relation to student engagement (Nie and Lau, 2009) or student motivation (Thompson, 2010; Bieg et al., 2011) – is mostly located in general educational research. Especially in PE context though where PET's relationship closeness to students automatically receives importance, caring aspects seem to be influential. Brandl-Bredenbeck's (2006) approach of examining PET's care could be interesting, especially for researchers linking PET's personality with students' personality and further with their learning motivation.

Five studies aim at receiving attitudes/opinions toward the PET's (personality) which is also a common research aim in general educational research (Göncz, 2017). Interesting is also group three's focus – *the ideal PET*. Receiving attitudes/opinions toward the teacher and looking upon the ideal teacher are also visible strategies in the configuration of prevailing didactical concepts. Concretizations among these are e.g., obtaining students' attitudes toward their teacher as basis for further decisions when planning lessons or when teaching (e.g., making use of the methodology *student reflection* in order to influence students affectively, Cavilla, 2017). Additionally the focus area raises the predominant question if there is such a thing as the ideal teacher or the good and desired educator personality (Weinert and Helmke, 1996). Studies in category three in our review acknowledge the fact that students are valuable evaluators of their PE lessons (e.g., Brandl-Bredenbeck, 2006; Voll, 2006) and by this also their PET. They deliberately ask for desired or undesired character features (e.g., Zalech, 2011a,b) and believe that this information and empirical evidence can serve as a base for student-centered and adapted teaching. Amongst this content-related salience, category three comprises the only qualitative study (Lauritsalo et al., 2015) which follows a rather modern and in this research field unprecedented approach – screening internet chat forums. The approach itself certainly is exciting as it does not face typical problems that occur in questionnaire surveys, e.g., limited options to answer or drifting to the center when answering and therefore produces "relatively authentic natural data" (Holtz et al., 2012). It is necessary though to check if adolescents in chat forums really venture their personal opinions or the desired opinion of their friends.

The results regarding the PET's appearance – considered here as part of their personality (e.g., in Szczepanski, 2012; Zalech and Rutkowska, 2014) – resemble the common belief that PETs represent special personalities and can be distinguished from OSTs. It opens up questions and ideas for career advice for instance. Interestingly, the PETs evaluate themselves in a more positive light than their colleagues. This might be due to a generally higher evaluation of oneself by e.g., faking answers in order to appear socially better (Sjöberg, 2015) or because PETs in general possibly come off differently compared to OSTs such

as Mantu and Montu's (2014) results hint for the personality factor *extraversion*.

Overall, it is noticeable that when examining students, most studies also distinguish between the students' gender, the grade they are in and the school they attend. Senn et al. (2017), connecting the PET's personality to students' motivation, directly ask for motivation enhancing personality characteristics and detect gender and age differences between girls' and boys' perception. In addition, girls and boys in Voll's (2006), Zalech's (2011b), and Demir's (2015c) studies assess different PET personality characteristics as important and desirable. Consequently, when teaching single-sex groups of students it might be easier for the PET to satisfy the students' expectations and perform suitable for the taught group. In line with previous general educational research (e.g., Samdal et al., 1998) is the fact that younger students seem to be more satisfied with their teacher. Even though younger students compared to older students in general tend to be more satisfied with school and the teacher (Samdal et al., 1998), the studies' results could predict the need for raising the awareness of the topic *PET personality* especially in the area of secondary school teaching and concomitant teacher education as elder students seem to be more particular. Knowing their personality characteristics could therefore be beneficial for PETs in order to succeed when teaching this age group. It allows PETs again to play to their own strengths or deliberately focus on different motivational approaches detached from their personality. Another dominant result covers differences regarding the visited school (type and level) – both on the teacher and the student side. School type (private vs. public) but also school level (e.g., middle school, higher level secondary school, vocational school) affect the evaluation of the PET's personality (e.g., Voll, 2006; Demir, 2015c). This presages the possibility of a voluntary personality examination serving as assistance in the decision for a school-specific teaching degree program. Some states in Germany (Nordrhein-Westfalen, Baden-Württemberg and Rheinland-Pfalz) and the teachers colleges in Austria e.g., use CCT (Bergmann et al., n.d.) a web-based consulting tool, including the examination of personality characteristics. This tool serves as assistance in the decision process for students entering a teaching degree program.

Lauritsalo et al.'s (2015) study is the only one among the included studies that in general speaks of a rather negative image the students assign their PETs. Again, the chosen methodology can affect the results as e.g., group pressure could have led to the dominance of negative statements. This might be due to the users' tendency to make more extreme and more offensive statements on the internet (Williams et al., 2002). All other studies that examine the students' image of the PET's personality conclude with a positive picture.

IMPLICATIONS

In total, the results reflect the included studies' diverse methodological approaches and aims. This is also in line with general educational research's findings concerning the topic *teacher personality*. Göncz's (2017) five types of teacher

personality studies – (1) Teacher typologies; (2) Studies of teachers' desirable and undesirable features; (3) Studies of teachers' professional behaviors and their influence on students; (4) Studies of teachers' professional identities and (5) Studies of teacher personality within the framework of personality theories – can also be retrieved in our results. Type (1) *Teacher typologies* though is represented the least with only Brudnik (2007) speaking of teacher vocational personality codes and by this in the broadest sense also typologies. Even though not included in our review, Bräutigam (1999) can be seen as exemplary and popular study among PETs, examining students' opinions concerning the *bad PET* and concluding with PET's behavior typologies. He does not speak of personality, neither in his methodology nor in his outcomes and therefore was not included in our review, but the methodology of creating typologies and by this tangible results, seems promising and has obtained acceptance. Identifying typologies is a common and convenient approach especially when trying to derive practical implications and therefore should be considered in future research examining PETs' personality.

Göncz's (2017) type (2) *Studies of teachers' desirable and undesirable features* mostly implies other-reports, in his review as well as in our review. Kim et al. (2018) highlight possibilities and strengths of other-reports in this research field specifically as well and concluded with stronger associations between other-reports of teacher personality and outcomes (teacher effectiveness and burnout) than self-reports. Other-reports as mentioned before therefore seem to be a promising approach when examining the PET's personality and deriving practical implications.

Göncz (2017) addresses the partially low methodological quality in this field. We can support this assumption considering the included studies' methodological quality in our review. The number of participants, e.g., is often even adduced by the authors themselves as limiting factor, reducing their study to a case study (e.g., Brudnik, 2010). Demir's sample sizes vary enormously. He e.g., compares data from 1148 students from public schools with data from 273 students from private schools (Demir, 2016). In other studies the description of the undertaken methodological approach and the presentation of results are even unclear and partly contradictory and therefore have to be interpreted with caution (e.g., Hosein Razavi et al., 2012).

In total, we can speak of insufficient evidence in total and therefore suggest a cautious application of the aforementioned results and discussed issues, especially when considering the implication into teaching practice. We can align ourselves with Göncz (2017) when advising to follow the traditional personality models (e.g., *Five Factor* understanding) in order to ensure high methodological quality and a uniform foundation for educational research and valuable comparisons. Kim et al. (2018) focus specifically on the *Big Five* and conclude with valuable results for the evaluation of teaching. All *Big Five* domains except for *agreeableness* obtained a positive association with e.g., teacher effectiveness. They as well highlight the need for common, universal descriptors in teacher personality research and associated dissemination. This can especially be helpful for the abovementioned situations where PETs can play to their

own strengths and make use of their individual personality configuration in order to teach successfully.

LIMITATIONS

We decided to keep our understanding of personality as wide as possible in order to include all relevant studies and in order to answer the formulated research question. Therefore, the included studies had to actually measure personality as a variable or mention personality as an outcome. We acknowledge the fact that this procedure might have eliminated interesting studies that examine similar, related variables without mentioning personality explicitly. We also acknowledge the fact that by limiting our review to English and German publications – due to feasibility reasons – we might have lost relevant and interesting literature published in other languages.

CONCLUSION

In conclusion, results of the included studies differ significantly, are partly contradictory and partially exhibit major methodological shortcomings. Considering the underlying personality understanding, most studies ($N = 12$) follow a trait psychological understanding of personality. Six studies follow a vocational and one study an interpersonal personality understanding. The remaining four studies' underlying personality understanding is not concretely determinable but three out of the four studies are oriented toward an interactionist/behavioral view (see Table 1). The identification of these three prevailing orientations with the dominance of the *FFM* implies a rather consolidated orientation of the research field. Overall, this picture is congruent with general educational research's orientation toward a mostly trait psychological understanding. Due to the fact that the vocational as well as the interactionist/behavioral approach yields interesting results we suggest following a rather wide approach of personality. Within this wide approach it is advisable though to also follow generally accepted approaches of personality in order to compare results and to facilitate the creation of practical implications. Alongside the idea of including various facets of personality in promising research, the compilation of different viewpoints, especially when aiming at the impact of the PET's personality on student-related aspects, seems promising.

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Considering examined correlates in relation to the PET's personality, the two-part alignment prevalent in general education research mentioned in the introduction – personality in relation to student-related or teacher-related factors, mostly *success outcomes* – cannot be replicated in our review. Studies in our review mostly examine the relationship between the PET's personality and correlates of sociodemographic nature (e.g., gender, age). The promising results in general educational research and the significance which general educational research and teacher competence models attribute to the teacher's personality, leads to the conclusion that examining the PET's personality in relation to the aforementioned *success outcomes* should receive more attention and therefore be considered in future research.

AUTHOR CONTRIBUTIONS

MS, AK, SS, and FM conceived and designed the study. MS and AK performed the literature search and study selection process. MS, SS, and AK performed the final analysis process. MS wrote the manuscript with substantial contributions from AK, SS, and FM. All authors approved the final version of the manuscript.

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SUPPLEMENTARY MATERIAL

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

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3.2 Article 2: Empirical Part on the Teacher Side

Authors: Schnitzius, M., Kirch, A., Blaschke, S., Spengler, S., and Mess, F.

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

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Abstract

The 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 influences teacher effectiveness and student achievement. This requires a comprehensive analysis of PE teachers' personal characteristics. Consequently, this study aimed to describe PE teachers by applying an aggregated examination of PE teachers' synergistic personal characteristics and analyzing gender, age, and school type differences.

1,163 German PE teachers (61.9% female; $M = 43.16 \pm 10.8$ years) from six different school types participated in the study. Participants completed self-report questionnaires assessing PE teachers' *general personality traits*, *general interests*, and *motivational characteristics* (teacher *self-efficacy*, *enthusiasm*, *vocational interests*). Descriptive analyses, between subjects MANOVAs and univariate ANOVAs with pairwise multiple comparison tests were applied.

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.

The educational personnel can a) make use of the PE teachers' general stable factors by aligning teaching accordingly, e.g., considering teachers' gender and b) specifically foster PE teacher personal development regarding motivational characteristics by e.g., adapting teacher education or professional training to the particular school type.

Contribution

Melina Schnitzius is the first and corresponding author of Article 2. Melina Schnitzius together with Alina Kirch, Sarah Spengler, and Filip Mess conceived and designed the study. Melina Schnitzius together with Simon Blaschke and Alina Kirch analyzed the data. Melina Schnitzius with the support of Alina Kirch interpreted the study's findings. Melina Schnitzius wrote the manuscript. All authors contributed to the manuscript's revision, read, and approved the submitted version.



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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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2 Melina Schnitzius et al.

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 threads 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, Streblov, & 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

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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/ $M = 43.16 \pm 10.8$ years) and secondary school students from classes seven to ten ($N = 1,740/58.1\%$ female/ $M = 14.39 \pm 1.44$ 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 ($M = 14.42 \pm 10.41$ 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; $M = 31.01 \pm 0.78$ years; 27.8%/middle-aged: 35–49 years; $M = 43.19 \pm 4.51$ years; 42.3%/older: 50–65 years; $M = 57.25 \pm 4.15$ 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

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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)	.67	1 'Strongly disagree' – 5 'Strongly agree'	I am outgoing, sociable
		Conscientiousness (6)	.75		
		Extraversion (6)	.67		
		Agreeableness (6)	.63		
		Neuroticism (6)	.77		
General Interests General Interest Scale	Bergmann, Eder, and Mayr (2016)	Realistic (1)	.77	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 ...
		Investigative (1)			
		Artistic (1)			
		Social (1)			
		Enterprising (1)			
Conventional (1)					
Motivational Characteristics Scale for Teacher Self-Efficacy	Pfitzner-Eden et al. (2014)	Instructional Strategies (4)	.77	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 I enjoy teaching
		Classroom Management (4)	.86		
		Student Engagement (4)	.79		
		Teaching Enthusiasm (5)	.90		
		Subject Enthusiasm (5)	.82		
		Subject Interest (6)	.76		
		Didactic Interest (5)	.76		
Educational Interest (4)	.79				
Teacher Enthusiasm Scale	Kunter et al. (2011)	Subject Enthusiasm (5)	.82	'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

(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.

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

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	.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	<.001	.02	10.72				
Openness											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

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Table 3. (Continued)

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

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 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

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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, McCaughy, Kulinna, and Cothran's (2009) finding that *Teacher Self-Efficacy* is influenced by experience and therefore developable.

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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, Streblov, 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

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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

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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

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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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3.3 Article 3: Theoretical Part on the Student Side

Authors: Kirch, A., Schnitzius, M., Mess, F., and Spengler, S.

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Abstract

Students' personality is an essential component in order to plan and teach PE lessons according to students' individual needs. Additionally, personality formation in general is part of the educational mandate and student personality development specifically is considered as an elementary goal of PE. Although student personality is a central topic in the PE context, the state of research, especially regarding the underlying personality understandings, is diverse and hard to capture. Therefore, this scoping review aims to (I) describe the underlying personality understandings and (II) analyze research questions and results of studies examining students' personality in PE.

We conducted a scoping review. Eleven databases were chosen because of their specification within the field of education, sport, and health sciences. We included references if they empirically examined students' personality in PE and were published in German or English.

Twenty-four studies were included in the review. Fifteen of the included studies were cross-sectional, nine longitudinal. Regarding aim I), the underlying personality understandings were inconsistent across the studies but most of the studies followed trait theory. Considering aim II), the included studies investigated relationships between students' personality and either (a) students' achievement in PE, (b) students' psychological determinants of PE participation (e.g., motivation, anxiety), or (c) a school sport intervention.

Results indicated that e.g., extraverted students tend to enjoy PE more and obtain less anxiety in PE. The review showed that students' personality in PE is empirically examined but the studies' underlying personality understandings, research questions and results are diverse. Findings highlight that PE contributes to students' personality development. Additionally, the review showed that results of personality research in the PE context can be used in order to teach PE in a student-centered way (e.g., by deducing the detected relationships considering extraversion) and by this support students' lifelong physical activity. Further and targeted research in this field can help

PE teachers to tailor their teaching to their students' needs. This increases the chances to achieve PE's two main goals – *education to sport* (e.g., personality-aligned lessons addressing different motives) and *education through sport* (e.g., personality development) in the long term.

Contribution

Alina Kirch is the first and corresponding author of Article 3. Melina Schnitzius is second author and contributed to Article 3 as follows. Melina Schnitzius next to Alina Kirch, Sarah Spengler, and Filip Mess contributed to the conceptualization of the manuscript. Together with Alina Kirch, Melina Schnitzius performed the literature search and study selection process. Melina Schnitzius was also involved in the editing and revision process of the manuscript written by Alina Kirch. All authors approved the final version of the manuscript.



Who Are Our Students? Understanding Students' Personality for Refined and Targeted Physical Education. A Scoping Review

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Students' personality is an essential component in order to plan and teach physical education (PE) lessons according to students' individual needs. Additionally, personality formation in general is part of the educational mandate and student personality development specifically is considered as an elementary goal of PE. Although student personality is a central topic in the PE context, the state of research, especially regarding the underlying personality understandings, is diverse and hard to capture. Therefore, this scoping review aims to (I) describe the underlying personality understandings and (II) analyze research questions and results of studies examining students' personality in PE. We conducted a scoping review. Eleven databases were chosen because of their specification within the field of education, sports and health sciences. We included references if they empirically examined students' personality in PE and were published in German or English. Twenty-four studies were included in the review. Fifteen of the included studies were cross-sectional, nine longitudinal. Regarding aim I), the underlying personality understandings were inconsistent across the studies but most of the studies followed trait theory. Considering aim II), the included studies investigated relationships between students' personality and either (a) students' achievement in PE, (b) students' psychological determinants of PE participation (e.g., motivation, anxiety), or (c) a school sports intervention. Results indicated that e.g., extraverted students tend to enjoy PE more and obtain less anxiety in PE. The review showed that students' personality in PE is empirically examined but the studies' underlying personality understandings, research questions and results are diverse. Findings highlight that PE contributes to students' personality development. Additionally, the review showed that results of personality research in PE context can be used in order to teach PE in a student-centered way (e.g., by deducing the detected relationships considering *extraversion*) and by this support students' lifelong physical activity. Further and targeted research in this field can help PE teachers to tailor their teaching to their students' needs. This increases the chances to achieve PE's two main goals – “*educating to sports (e.g., personality-aligned lessons addressing different motives)*” and “*educating through sports (e.g., personality development)*” in the long term.

Keywords: personality, students, physical education, school sports, teaching, scoping review

INTRODUCTION

Physical education (PE) fulfills an outstanding role within the school curriculum. PE is the only subject in which children are physically active (Penney and Jess, 2004). Even more distinguishing is the fact that PE is the only context in which all school-aged children experience instructed physical activities in the course of their lives (Tammelin et al., 2016). PE is therefore the only sure opportunity to get everyone on the move and convey the importance and chances of physical activity for a healthy life (Kohl and Cook, 2013). This opportunity and the associated goal in its core is internationally prevalent in PE's central assignment (Sallis and McKenzie, 1991; Pühse and Gerber, 2005; Scheid and Prohl, 2012). In Germany, PE's central assignment is typically characterized by two main goals (Scheid and Prohl, 2012): (1) Prepare and motivate students for a physically active lifestyle. In this regard, children need to explore different kinds of sports, acquire an appropriate range of movement skills and by this find their individual motives to be physically active in and outside school. PE supports discovering the personal meaning of physical activity and at the same time promotes the understanding and knowledge of various aspects of movement. Students by this develop the capacity to act on one's own and apply these competencies to a purposeful use of their leisure time and ideally lifelong physical activeness. PE has evolved to become a content area with diverse aims that facilitate the holistic—physical, social, emotional, and intellectual—development of children (NASPE, 2004). Part (2) of PE's central assignment therefore includes the goal of empowering students' personal development. In this regard, curricula claim that PE contributes to children's development in different facets, such as formatting and developing positive personal, social or emotional qualities.

The Importance of Students' Personality in School

Students are in the focus of both abovementioned goals. PE's allocated educational mandate therefore implies the necessity to consider the learner in teaching processes such as lesson planning and implementation. In the general educational context, learners' individual needs are a central factor regarding their learning processes (Jurik et al., 2015). Knowing learners' individual needs in order to adapt teaching processes includes knowing the learners' personality. Personality formation is a central factor of the educational mandate which accounts for considering students' personality in teaching and research. Personality research in school showed a pervasive influence of personality traits on student outcomes such as students' well-being, emotional states or academic performance (O'Connor and Paunonen, 2007; Poropat, 2009; Richardson et al., 2012). According to O'Connor and Paunonen (2007) students' personality traits (Big Five) predict their academic performance in two different ways: (1) Via behavioral tendencies affecting habits (Rothstein et al., 1994) and (2) via students' willingness to perform (Furnham and Chamorro-Premuzic, 2004). O'Connor and Paunonen (2007) results further indicated the increasing importance of personality traits' influence compared to cognitive

abilities' influence on academic performance when students become older (Furnham et al., 2003). In summary, students' personality plays a significant role in shaping their educational experiences (Matthews et al., 2006).

Understanding Personality

In order to examine the importance and impact of students' personality in particular contexts, it is essential to conceive the underlying understandings of personality. Personality is a broad term describing a multifaceted construct (Johnson and Christensen, 2017). General personality research differentiates between seven major approaches of personality psychology: Psychoanalytic (i.e., Freud, 1940), neo-psychoanalytic (i.e., Adler, 1930; Jung, 1958), humanistic (i.e., Maslow, 1970; Rogers, 1972) emphasizing a self-actualizing tendency, behavioral (i.e., Watson, 1930; Skinner, 1972), biological (i.e., Sheldon, 1963; Cloninger, 1999), cognitive (i.e., Bandura and Walters, 1963; Ellis et al., 2009), and trait psychological (i.e., Cattell, 1946; Eysenck and Eysenck, 1969). In general personality research the trait approach became prevalent over time. Personality is therefore often defined as a person's unique structure of relatively stable traits (Guilford, 1971).

In order to interpret and compare the results of different studies following personality's trait theory, it is essential to know the different trait models' origin, their development and individual composition. In the course of time, some models have significantly influenced the development process of trait theory in general. Even if the models' origin varies, the chosen dimensions mostly display great relationships (Gerbing and Tuley, 1991; Goldberg and Rosolack, 1994). Initial trait psychological models are based on a lexical approach describing personality in multiple adjectives. Cattell (1946) derived 16 source traits inherent in every person. Cattell's 16 primary factors are categorized in 5 s stratum source traits (Cattell, 1956; Rossier et al., 2004). The dimensions warmth, liveliness, social boldness, privateness, and self-reliance are summarized in the factor extraversion. The dimensions emotional stability, vigilance, apprehension, and tension are subordinate to anxiety. Tough-mindedness is a combination of warmth, sensitivity, abstractedness and openness to change. Independence unites the dimensions dominance, social boldness, vigilance, and openness to change. Self-control includes the dimensions liveliness, rule-consciousness, abstractedness, and perfectionism (Cattell, 1956; Rossier et al., 2004). Cattell's (1946) model became a standard personality measure in about 1970. At about the same time, Eysenck and Eysenck's (1969) model which, contrary to Cattell's, describes personality in broad, abstract terms, was developed. Eysenck focused more on biological traits and revealed two major dimensions: Introversion vs. extraversion and emotional stability vs. emotional instability. Later he added the third dimension psychoticism (Eysenck, 1976). Eysenck (1984) stated that his and Cattell's (1946) model should not be seen as contradictory but rather as complementary and mutually supportive. An analysis estimating the two models' comparability confirmed the equivalence of the factors anxiety and neuroticism as well as the equivalence of the models' extraversion factors (McKenzie, 1988). At the end of the 20th century, McCrae and Costa (1987) as

well as Goldberg (1990) developed two similar models, which differed mainly in their mode of formation. While Goldberg (1990) pursued a lexical approach and developed the model of the Big 5, McCrae and Costa (1987) empirically analyzed personality questionnaires and by the means of factor analysis developed their five-factor model. Both models unite roughly the same five personality dimensions: Openness to experience, conscientiousness, extraversion, agreeableness and neuroticism. The five-factor model is currently the most prevalent model in personality research in general in order to describe personality holistically and superseded the aforementioned models (Cattell, 1946; Eysenck and Eysenck, 1969). The similarity between Cattell's global scales and the five-factor model was confirmed too. The two models share four of the five global dimensions. Only the dimension agreeableness is not represented in Cattell's 16 PF (Rossier et al., 2004). Due to the content-related similarity between different trait models, results of studies based on these models are to a certain extend comparable.

Considering Students' Personality in PE

This knowledge on personality research's development and its current orientation is essential for further investigating students' personality specifically in PE context. As previously mentioned, numerous relationships between students' personality and learning outcomes have been ascertained in the general educational context. It seems logical that the detected relationships—examined on this general level—also exist on a more specific level, e.g., considering PE particularly. Due to the fact that the PE context particularly creates incentives and opportunities contributing to students' personality development (Kohl and Cook, 2013), examining relationships between students' personality and learning outcomes in PE becomes important. Even though research has demonstrated that students' personality is related to various factors influencing academic performance (Komarraju et al., 2011) and PE's allocated mandate postulates students' personality development (Scheid and Prohl, 2012), research considering students' personality in PE has been very rare so far. Most studies investigate only single aspects related to personality, such as students' attitudes toward or perceptions of PE (e.g., Harwood et al., 2015; Kretschmann, 2015; Silverman, 2017). In order to capture the complex construct of personality and by this its impact on students' physical activity and their personality development, it is insufficient to only describe individual components of students' personality (Asendorpf and Teubel, 2009). Asendorpf and Teubel (2009) therefore claim to examine students' personality following an integrative perspective within the context of a holistic personality development. This fosters a better understanding of PE specific outcomes such as students' motor performance, achievement motivation and the development of personal, social, or emotional competencies. Holistically understanding students' personality allows to identify and address students' needs—part one of PE's main goals (“educating to sports”)—and provides links for students' personality development—part two of PE's main goals (“educating through sports”) (Sallis and McKenzie, 1991; Siedentop, 2009; Scheid and Prohl, 2012).

A review article of existing literature examining students' personality in PE would be beneficial to summarize findings and by this ideally highlight the potential of personality research in the PE context. Due to diverse personality understandings, different research questions and investigated correlates within studies, the identification of relevant literature is challenging. Hence, a broad approach is essential in order to capture all relevant texts. A review of this kind—considering students' personality in PE following a wide approach to provide an overview of the existing literature on a general level—does not yet exist. Review articles in PE context are mostly concerned with PE teachers—often focusing on their education (Scheuer, 2019) or teaching methods (Lander et al., 2017). Review articles, considering the students in PE, typically focus on specific questions concerning students' personal characteristics and within this individual aspects such as self-concept or achievement motivation, rather than the students' personality in a broad sense (Kretschmann, 2015; Ang and Yubing, 2017; Silverman, 2017). The latter approach is more common in general educational research. Here studies conclude with promising results, e.g., detecting a relationship between students' personality and academic performance (O'Connor and Pauonen, 2007).

In the specific field of PE, reviewing the literature considering students' personality following a broad approach has not been conducted so far. Therefore, the aim of our review was to provide an overview of studies proclaiming to assess students' personality in PE. More precisely, we intended to (I) describe the underlying personality understandings by analyzing the pursued personality approach and applied personality inventories and (II) depict the studies' research questions and associated results by analyzing investigated variables, relationships or outcomes.

METHODS

Scoping reviews are especially helpful in order to provide a broad picture of existing literature in a wide research field (Booth et al., 2016), such as personality research. Due to the fact that personality research is carried out in various contexts and due to the existence of diverse personality understandings, we decided to conduct a scoping review.

Selection Criteria

We were interested in investigating the students' (*sample*) needs, more specifically their general requirements regarding their personality (*content*). Further, we were specifically interested in studies examining these needs in PE (*context*). Therefore, we had to predefine our inclusion criteria, which also formed the basis of the search term in the three following categories: (1) Study focused on personality or rather proclaimed to assess personality; (2) sample under consideration comprised primary or secondary school students; (3) study was carried out during PE lessons or in school sports contexts. Category (1) was searched on title-abstract-keyword level in order to make sure that personality was the key issue in the text. The reference had to focus on personality or at least mention it as variable or outcome. Category (2) and (3) were searched on full-text level and included synonyms for students and various school sports contexts. Additionally,

the publication language had to be English or German. The publication period was not limited and all publication types were considered, which is in line with Arksey and O'Malley's (2005) methodological guidelines of scoping studies.

Search and Review Process

Based on Arksey and O'Malley's (2005) recommendations, the search strategy comprises four sequential steps: (1) Initial electronic database search; (2) key journal search of the included studies; (3) reference list search of the included studies; (4) manual author search of authors of the included studies. Considering the aforementioned principles the following search terms were used in the database search (in the following exemplary for the database Scopus): (TITLE-ABS-KEY ((persönlichkeit* OR personalit* OR schülerpersönlichkeit*)) AND ALL ((schüler* OR kinde* OR jugend* OR student* OR pupil* OR schoolchild* OR scholar* OR kid* OR child* OR youth* OR learner* OR adolescen* OR teen* OR youngster*)) AND ALL ((sportunterricht* OR schulsport* OR bewegungserziehung* OR bewegungsunterricht* OR leibeserziehung* OR leibesübung* OR "physical education" OR "gym" class* OR "school sport" OR "physical training")) AND (LIMIT-TO (LANGUAGE, "English") OR LIMIT-TO (LANGUAGE, "German")). In total, 11 databases were searched: Education Source, ERIC, PsychARTICLES, PsycINFO, PSYINDEX, PubMed, Scopus, SocINDEX, SPOLIT, SportDiscus and Web of Science. The databases were chosen because of their specification in the field of education, sports and health sciences. The first search was realized on February 6th 2017. An update search to ensure the review's topicality was implemented on June 27th 2018. The first and second author functioned as two independent reviewers and fulfilled the screening process—first on title and afterwards on abstract level, independently deciding whether the reference should be included or not. References were excluded if not published in English or German, not empirical, not examining students, not in school setting and not investigating personality. In case of uncertainty (e.g., missing information, unsure about sample) the references were reassessed in the next step. Conflicts were discussed and solved collaboratively. We did not exclude studies due to quality reasons in order to examine the whole body of literature and by this be in line with the scoping review's methodological standards (Arksey and O'Malley, 2005). Last, full-texts were screened considering the same criteria as mentioned above.

The journals *Research Quarterly* and *sportunterricht* frequently appeared as publication source of the included studies. The manual key journal search was therefore applied to these two journals. Furthermore, the reference lists of all included studies were screened and all therein potentially relevant references had to pass the aforementioned screening process. As a final step, the included studies authors' research activities were investigated by entering the authors' names in the abovementioned databases and additionally checking their profiles and publication lists. If relevant research on students' personality in school sports contexts was detected, the publications were considered for potential inclusion and

again had to run the screening process. **Figure 1** summarizes the search and review process.

Data Extraction and Analysis

In order to guide the data extraction stage, a data charting form in table format was created. The two reviewers first independently extracted the relevant information and filled in the table. Second, the two reviewers compared and discussed their tables, removed conflicts and joined the two tables to the final table. Subsequently, the variables under investigation in the included studies were extracted and grouped thematically. Further, results within these thematically similar groups were compared (within group comparison). For this purpose, the reviewers examined the possible comparability of the different applied inventories within a group. If a comparison was possible, e.g., due to a similar personality understanding pursued in the studies under investigation, the reviewers checked for replicability of the individually examined relationships among the studies.

Following Richards et al. (2017) as well as Arksey and O'Malley (2005) the results of the abovementioned data extraction and analysis step are presented in two formats. First, the results are summarized in table format (**Table 1**). **Table 1** presents the pertinent information of the included studies. In addition to each study's framework conditions, the table includes the study's aim, underlying personality understanding (approach and applied inventory) and main results. **Table 1** therefore provides a clear and compact presentation of answers to the review's research questions. Second, the results are provided in the running text, divided into framework conditions (author, year, origin, publication type, and sample) and a thematic analysis which explicitly addresses the review's research questions and provides an elaborated analysis.

RESULTS

Figure 1 summarizes the search and review process, differentiating between the initial and the update search. Both searches in total yielded 3,963 references. After removing duplicates, screening titles and abstracts 91 full-texts were examined. Twenty-three references fulfilled all inclusion criteria and were therefore considered for analysis. One additional reference was included via the reference list search. The author and key journal search did not yield any additional reference. In total, 24 references were included in the review.

Framework Conditions of the Included Studies

Most of the studies ($n = 18$) were implemented in Europe, eight thereof in Germany (Seitz and Bäuml, 1972; Dunkerbeck and Prenner, 1976; Gabler, 1976; Friedrich, 1978; Bachleitner-Hofmann, 1986; Willimczik, 1986; Westhoff, 1989; Klein, 2017) and three in the United Kingdom (Kerr, 1978; Williams and Eston, 1986; Hayes, 2017). Five studies originated from Canada or the United States of America (Blanchard, 1946; Tillman, 1965; Wilson, 1969; Lodewyk, 2018; Lodewyk and Gao, 2018). The remaining studies originated from Austria, Croatia, Czech Republic, Israel, Poland, Romania and Slovenia.

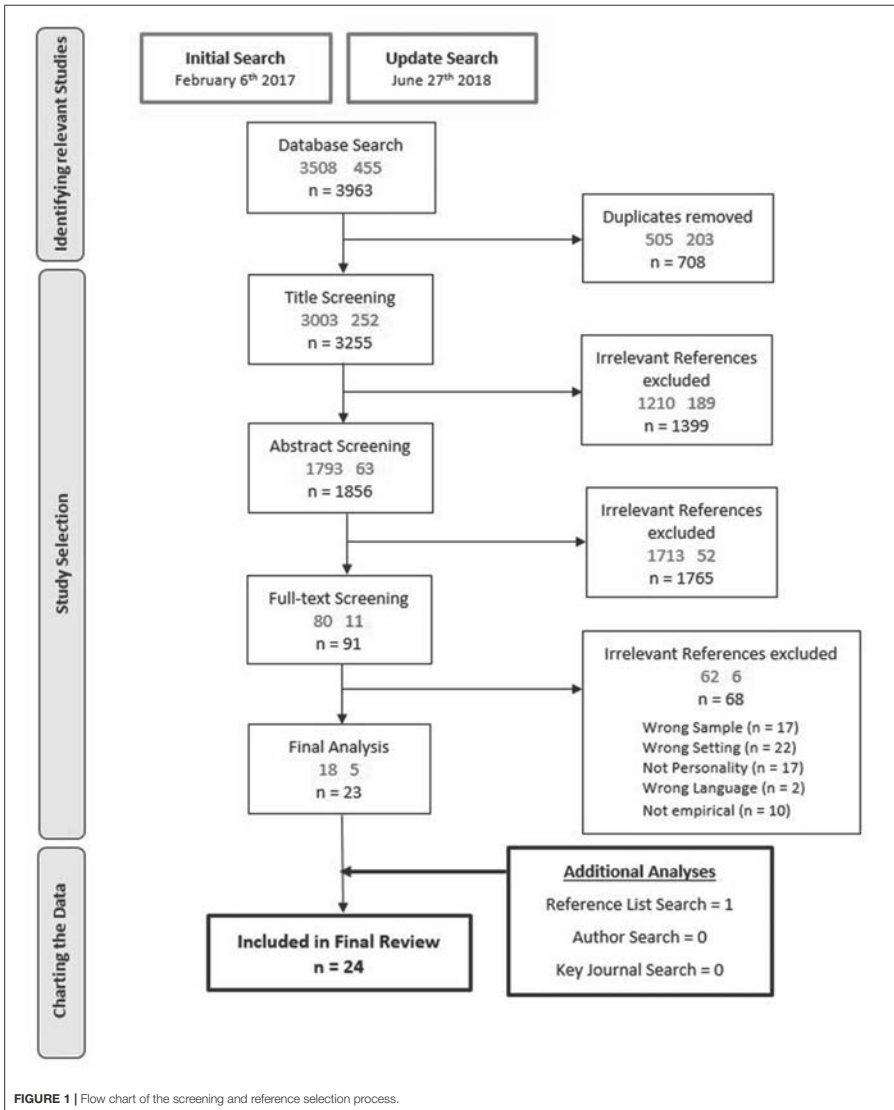


FIGURE 1 | Flow chart of the screening and reference selection process.

TABLE 1 | Included studies' framework conditions, aim, personality understanding, and main results.

Framework conditions		Aim	Personality understanding		Main results
Author (Year) Origin—Publication Type: Journal Name	Sample		Personality approach	Personality inventory	
CROSS-SECTIONAL STUDIES					
Culjak and Mlačić (2014) Croatia—Journal Article: <i>Croatian Journal of Education</i>	100 students (59 m; 41 f); grade 1 and 2 high school (age 16–17)	Relationships between personality and success (good grade) in PE	Big five model of personality (Goldberg, 1990)	Questionnaire: IPIP100 (Mlačic and Goldberg, 2007)	- Personality is related to success in PE - Students' success was positively related to conscientiousness and emotional stability (in girls) and negatively to extraversion (in boys)
Dunkerbeck and Prenner (1976) Germany—Book Section	50 PE teachers	Proof and analysis of implicit personality theories in PE context	Implicit personality theories; stereotypes	1) Free description of "the underperforming student" 2) Characterization within given dimensions	Implicit theories of PE teachers contain four dimensions to describe personality of students: physical abilities and conditions; PE expectations; sociability and interactive recognition; behavior
Erpic et al. (2005) Slovenia—Journal Article: <i>International Journal of Physical Education</i>	1,025 students; grade 5 and 7 primary school & 1 and 3 secondary school (age 11–18)	Relationships between students' personality traits and (a) attitudes toward PE and (b) motivation for PE	Big five model of personality (Goldberg, 1990), ATEAQ (Erpic et al., 2005)	Questionnaire: B5P-C (Little and Wanner, 1998)	a) Students scoring higher in conscientiousness show more positive attitudes toward PE b) Students scoring lower in agreeableness and higher in neuroticism are less motivated in PE
Friedrich (1978) Germany—Journal Article: <i>International journal of physical education</i>	523 students (257 m; 266 f); high school (age Ø 12.5)	Relationships between personality and achievement (good grade) in PE	Two-factor model (Eysenck and Eysenck, 1969)	Questionnaire: Hanes KJ (Buggle and Baumgärtel, 1975)	Students scoring higher in extraversion show better PE grades
Guszkowska and Rychta (2007) Poland—Journal Article: <i>Human Movement</i>	455 students (213 m; 242 f); high school (age 15–17)	Relationships between personality and students' (a) physical fitness and (b) gender-related diversification	Five-factor model (McCrae and Costa, 1987) 16 PF (Cattell, 1946)	Questionnaires: FCB-TI (Zawadzki and Strelau, 1997); polish version of NEO-FFI (Zawadzki, 1998); polish version of HSPQ (Rychta and Guszkowska, 2000)	a) Personality traits are poorly correlated with the adolescents' physical fitness b) Predictors of physical fitness are different in boys and girls. In boys: extraversion is positively correlated with the total fitness score, agreeableness is correlated with agility, trunk muscle strength and suppleness; trunk muscle strength and suppleness also with conscientiousness. None of these correlations are shown in girls
Hayes (2017) UK—Journal Article: <i>Research Papers in Education</i>	296 students (150 m; 146 f); primary school (age 5–11)	Analysis of factors responsible for negative attitudes toward PE	Personality part of "Personal factors" (variable + intrinsic)	Semi-structured interview	Identified factors: lack of self-efficacy, a lack of perceived autonomy, family and peer factors and individual physical and personality factors are decisive for negative attitudes toward PE
Kerr (1978) UK—Journal Article: <i>British Journal of Physical Education</i>	165 students (97 m; 68 f); grammar school (age 11–12)	Relationships between personality variables and physical ball skills	Personality = mind and body (physical, intellectual, social and emotional) 16 PF (Cattell, 1946) Two-factor model (Eysenck and Eysenck, 1969)	Questionnaires: JEPI (Eysenck, 1965); HSPQ (Hundleby and Cattell, 1968)	Students with good physical ball skills score higher in warmth, emotional stability, dominance, liveliness and extraversion and score lower in sensitivity, social boldness and apprehension or introversion
Klein (2017) Germany—Journal Article: <i>sports</i>	1,399 students (707 m; 692 f); grade 7 (age Ø 12.9) and 10 (age Ø 15.8)	Relationships between physical self-concept and general personality traits	Big five model of personality (Goldberg, 1990)	Questionnaire: NEO-FFI (McCrae and Costa, 1992)	Students scoring higher in neuroticism assess their own physical attractiveness and own athleticism lower

(Continued)

TABLE 1 | Continued

Framework conditions		Aim	Personality understanding		Main results
Author (Year) Origin—Publication Type: Journal Name	Sample		Personality approach	Personality inventory	
Lodewyk and Gao (2018) USA/Canada—Journal Article: <i>International Journal of Sport and Exercise Psychology</i>	319 students (162 m; 157 f); grade 9 and 10 high school	Relationships between personality traits and (a) enjoyment and (b) effort in PE as a function of gender	HEXACO model (Ashton and Lee, 2007)	Questionnaire: HEXACO-PI-R (Lee and Ashton, 2004)	a) Students with lower openness to experience and higher extraversion show higher enjoyment and with this effort in PE b) Boys: honesty-humility shows a stronger relationship to effort via enjoyment compared to girls Girls: agreeableness shows a stronger relationship to effort via enjoyment compared to boys
Lodewyk (2018) Canada—Journal Article: <i>Educational Psychology</i>	316 students (161 m; 155 f); grade 9 and 10	Relationships between personality and (a) anxiety (b) self-efficacy, and (c) intentions to exercise as a function of gender	HEXACO model (Ashton and Lee, 2007)	Questionnaire: HEXACO-PI-R (Lee and Ashton, 2004)	Students scoring higher in extraversion show (a) lower anxiety and (b) higher self-efficacy and (c) higher intentions to exercise (f/m); Students scoring higher in openness to experience show higher anxiety (f/m) and lower self-efficacy (f)
Seltz and Bäumler (1972) Germany—Book Section	70 students (m); grade 6 (age 11–13)	Relationships between personality traits and motor performance	16PF (Cattell, 1973)	Questionnaire: CPQ (Porter and Cattell, 1963)	Students scoring higher in personality dimensions (motor activity, optimistic concern and distance to authority) show better results in motor performance (flexibility or movement coordination)
Westhoff (1989) Germany—Journal Article: <i>Sportunterricht</i>	31 students (15 m; 16 f); grade 7 (age 12–13)	Relationships between personality and volleyball-specific abilities	3 non-motor variables: Students' interest on PE, concept of own abilities, anxiety of social consequences	Questionnaires: assessing non-motor variables	- Students with higher volleyball-specific abilities show higher content-specific interests and higher sports-specific concept of own abilities - Weak relationship between volleyball-specific abilities and anxiety
Williams and Eston (1986) UK—Journal Article: <i>Physical Education Review</i>	30 students (m) (age Ø 16)	Relationships between personality and (a) exercise intensity and (b) perception of exertion	Two-factor model (Eysenck and Eysenck, 1969)	Questionnaire: JEPI (Eysenck, 1965)	No relationship between personality (measured via extraversion) and (a) exercise intensity or (b) perception of exertion
Willimczik (1986) Germany—Journal Article: <i>Sportunterricht</i>	73 students (37 m; 36 f); grade 8 middle school (age Ø 16)	Relationships between different internal conditions and motor learning abilities	Personality traits = cognitive psychological construct (concept of own abilities, achievement motivation, attributions, anxiety)	Questionnaires: concept of own abilities (Meyer, 1984); achievement motivation (Schmalt, 1976); attributions (Weiner and Reizenzein, 1984); anxiety	Students scoring higher in the dimension concept of personal abilities show higher learning abilities
Wilson (1969) USA—Journal Article: <i>Research Quarterly</i>	154 students; high school	Relationships between selected personality factors and motor performance	16 PF (Cattell, 1946) Temperament (Guilford, 1971)	Questionnaires: 16 PFQ (Cattell and Eber, 1962); GZTS (Guilford et al., 1949)	Negative relationship between self-reliance and motor performance
LONGITUDINAL STUDIES					
Bachleitner-Hofmann (1986) Germany—Series	89 students (age 14–19)	Influence of more PE on personality	Lexical trait model (Fahrenberg et al., 1978) + self-concept (Sack, 1980) + attitudes (Kenyon, 1968)	Questionnaires: FPI (Fahrenberg et al., 1978); EWL (Sack, 1975, 1980); ATPA-D (Kenyon, 1968)	T0: Sports class students score higher in sports-specific achievement orientation (attitudes) T1: Sports class students are more inhibited and reserved (traits)

(Continued)

TABLE 1 | Continued

Framework conditions		Aim	Personality understanding		Main results
Author (Year) Origin—Publication Type: Journal Name	Sample		Personality approach	Personality inventory	
Blanchard (1946) USA—Journal Article: <i>Research Quarterly</i>	164 students; grade 8–11 high school	1) Whether or not personality traits are continuous in development 2) Whether boys or girls show greater development in personality traits over a 2 year period	Personality = integrated total of traits possessed by an individual	Questionnaire: BFRS (Blanchard, 1936)	1) Continuous growth in character and personality traits with each succeeding grade level 2) Development of wholesome character and personality traits in girls is overall greater than in boys
Gabler (1976) Germany—Edited Book	254 students (age 12–13 and 15–16)	Influence of sports class participation on the development of specific personality traits	16PF (Cattell, 1973), achievement motivation as independent part of personality + interests and attitudes	Questionnaires: HSPQ (Cattell, 1973); TAT (Heckhausen, 1974)	T0: Only one significant difference between sports class students and regular class students in the dimension perfectionism T1: Dominance increased significantly in sports class students compared to regular class students
Geron (1981) Israel—Conference Proceedings	395 professional junior student athletes; junior high school (age 11–12)	Influence of sports class participation on psychological characteristics	Personality characteristics: anxiety, locus of control and reactions to frustration	Questionnaires: Trait/State Anxiety Test (Spielberger et al., 1984); TALOC (Milgram and Milgram, 1975); Picture Frustration Test (Rosenzweig, 1944)	T0: Sports class students score higher in aggression, need persistence and obstacle dominance; regular class students are characterized more conformist and ego defensive T1: Sports class students change and score higher in locus of control and reaction to frustration
Krejci (1993) Czech- Republic—Journal Article: <i>Social Science International</i>	247 students (127 m; 120 f); grade 3, 5, and 7 elementary school (age 9–13)	Psychological development of students and the possibility of forming their personality in the process of PE	Two-factor model (Eysenck and Eysenck, 1969)	Questionnaire: EPI (Krallova, 1971)	T0: No differences among the initial measurement T1: Students in the intervention group score higher in extraversion, especially boys
Mijaica (2017) Romania—Conference Proceedings	2 classes; grade 9 and 10 college (age 15–17)	Influence of a specialized curriculum on the development of personality traits	Five personality directions: leadership; managing conflicting situations; preventing conflicting situations; fair-play; sports disciplines	Systematic observation method (Epuran, 2005)	Intervention group shows a significantly higher development in terms of target skill acquisition (solving conflict situations, fair-play, leadership) compared to control group
Tillman (1965) USA—Journal Article: <i>Research Quarterly</i>	386 students; junior and senior high school	Influence of a physical fitness program on selected personality traits	16 PF (Cattell, 1946) Social behavior (Allport and Allport, 1928) Preference Record (Kuder, 1950)	Questionnaires: A.S. reaction study (Allport and Allport, 1928); 16 PFQ (Cattell and Eber, 1962)	Experimental group only differs in one personality dimension (vocational interest: clerical) compared to control group
Schubert (1973) Austria —Dissertation	185 students (f); grade 5 and 6 sports school	Influence of more PE on students' personality traits	Parts of personality: self-criticism/- control,-/ confidence, initiative, contact, anxiety, satisfaction with parental home, and school	Questionnaire: SPQ (Zrzavy, 1960)	No differences between sports class students and regular class students in grade 6 Differences regarding satisfaction in school in grade 5: sports class students are more satisfied in general school than non-sports class students

(Continued)

TABLE 1 | Continued

Framework conditions		Aim	Personality understanding		Main results
Author (Year) Origin—Publication Type: Journal Name	Sample		Personality approach	Personality inventory	
Zupanic and Justin (1998) Slovenia—Journal Article: <i>Educational Research and Evaluation</i>	62 professional junior student athletes; grade 2 grammar school (age 16–17)	Impact of sports classes on personality development	16PF (Cattell, 1973)	Questionnaires: polish version of 16 PFQ (Lamovec, 1975); profile index of emotion (Plutchik and Kellerman, 1974)	T0: High performing sports class students are more achievement oriented, have a stronger ego, behave more spontaneously, are less demanding and less depressed than regular class students T1: High performing sports class students undergo more changes in personality traits compared to regular class students—increased dominance, ego strength, surgency, sophistication or decreased anxiety, and depressed moods in high performing sports class students

The included studies were published between 1946 and 2018, inclusive. Nine studies thereof were conducted before 1980, seven between 1980 and 2000 and eight after 2000. Seventeen studies were published in 14 different journals (10 thereof peer-reviewed). Four studies were published as books or chapters in an edited book, two studies were published within conference proceedings and one study was a dissertation. Dunkerbeck and Prenner (1976) asked 50 PE teachers to describe their students' personality. In the remaining 23 studies participants were students between 5 and 19 years. Most of the studies investigated teenaged students between 14 and 17 years. The number of participants in all studies ranged from 30 to 1,399. Eight studies observed <100 participants, 14 studies examined between 100 and 600 participants and two studies recruited more than 1,000 participating students. Fifteen of the included studies were cross-sectional studies, nine longitudinal. Longitudinal studies lasted from 6 months to 5 years.

Personality Understanding of the Included Studies

The studies followed different understandings of personality. Most of the studies ($n = 17$) followed trait theory and either applied the 16 PF model of Cattell (1946) ($n = 8$), the two- or three-factor model of Eysenck (1981) ($n = 4$), or the five-factor model of McCrae and Costa (1992) ($n = 5$). Four studies (Tillman, 1965; Wilson, 1969; Kerr, 1978; Guszowska and Rychta, 2007) united different personality approaches in their research. Others ($n = 8$) understood personality as an interaction of several factors, such as self-feelings, feelings toward others, anxiety, locus of control, or reactions to frustration (Blanchard, 1946; Schubert, 1973; Dunkerbeck and Prenner, 1976; Geron, 1981; Willimczik, 1986; Westhoff, 1989; Hayes, 2017; Mijaica, 2017).

The included studies used different methods to operationalize personality. The majority ($n = 21$) used questionnaires to assess

quantitative data and applied 19 different inventories. One study (Mijaica, 2017) used assessment sheets (Epuran, 2005) in order to systematically observe specific behavior indicating students' personality traits. Two studies (Dunkerbeck and Prenner, 1976; Hayes, 2017) applied a semi-structured interview or free descriptions to capture qualitative information.

Research Questions and Results of the Included Studies

The studies can be classified into three thematically coherent groups: Two groups depict cross-sectional studies and one group unites all longitudinal studies. One group of cross-sectional studies focused on the relationships between students' personality and their achievement in PE. The remaining cross-sectional studies examined relationships between students' personality and students' psychological determinants of PE participation e.g., motivation in PE or attitudes toward PE. All of the longitudinal studies investigated the influence of a school sports intervention on students' personality or rather their personality development.

Relationships Between Students' Personality Traits and Achievement in PE

Ten of the cross-sectional studies (Wilson, 1969; Seitz and Bäuml, 1972; Dunkerbeck and Prenner, 1976; Friedrich, 1978; Kerr, 1978; Williams and Eston, 1986; Willimczik, 1986; Westhoff, 1989; Guszowska and Rychta, 2007; Culjak and Mlačić, 2014) focused on the relationships between students' personality traits and their achievement in PE.

Two studies examined the relationship between students' personality traits and their PE grade (Friedrich, 1978; Culjak and Mlačić, 2014). Culjak and Mlačić (2014) showed relationships between Goldberg's conscientiousness, extraversion and emotional stability and better grades and therefore success in PE. These relationships were different for male and female students. Male students' (16–17 years) success was positively

related to conscientiousness and negatively to extraversion. Female students' (16–17 years) success was positively related to conscientiousness and emotional stability. In Friedrich's (1978) study, extraverted students (12 years) achieved better grades in PE.

Six studies (Wilson, 1969; Seitz and Bäumlner, 1972; Dunkerbeck and Prenner, 1976; Kerr, 1978; Williams and Eston, 1986; Guskowska and Rychta, 2007) analyzed the relationship between students' personality traits and their motor performance in PE. All studies except one (Williams and Eston, 1986) described a clear relationship between personality traits and different aspects of motor performance. Kerr (1978) showed that ball skills performance was positively related to Cattell's (1946) personality characteristics warmth, emotional stability, dominance, liveliness and Eysenck's dimension extraversion, but negatively related to Cattell's (1946) sensitivity, social boldness and apprehension as well as to Eysenck's (1981) introversion. Wilson (1969) found a negative correlation between Cattell's (1946) self-reliance and motor performance. Students (11–13 years) scoring higher in Seitz and Bäumlner's (1972) personality dimensions motor activity, optimistic unconcern and distance to authority showed better results in flexibility and movement coordination (Seitz and Bäumlner, 1972). Dunkerbeck and Prenner (1976) showed differences between high performing and low performing students regarding their personality and behavior assessed by the PE teacher. According to the interviewed PE teachers, low-performing students were shyer, more timid, and less social (Dunkerbeck and Prenner, 1976). Boys (15–17 years) in Guskowska and Rychta's (2007) study obtained a greater number of significant correlations between personality and motor performance than peer girls. Extraversion e.g., was positively correlated with boys' total fitness score. In addition, agreeableness was positively correlated with agility, trunk muscle strength and suppleness; trunk muscle strength and suppleness also with conscientiousness. None of these correlations were found for girls. Williams and Eston (1986) did not detect any relationship between personality—measured only via extraversion—and fitness or effort perception.

The remaining two studies (Willimczik, 1986; Westhoff, 1989) in this group focused on the relationship between students' personality traits and motor learning abilities. Both studies described the concept of personal abilities within their personality understanding and showed a positive relationship to higher learning abilities (12–13 years; 16 years, respectively). Apart from that, the studies revealed only few significant results. The relationship between interest in PE and student performance in PE e.g., was significant for boys and girls. Anxiety about social consequences was more prominent in girls and negatively related to their motor learning abilities (Westhoff, 1989). Boys scoring higher in hope for success performed better. Girls performed better when scoring lower in fear of failure (Willimczik, 1986).

Relationships Between Students' Personality and Their Psychological Determinants of PE Participation

All five cross-sectional studies in this group (Ercic et al., 2005; Hayes, 2017; Klein, 2017; Lodewyk, 2018; Lodewyk and Gao, 2018) investigated and detected relationships between students'

personality traits and several psychological determinants of PE participation. Ercic et al. (2005) examined the relationships between students' personality traits and their motivation in and attitudes toward PE. Students (11–18 years) scoring higher in conscientiousness show more positive attitudes toward PE. Students achieving higher scores in neuroticism and lower scores in agreeableness are less motivated in PE. Ercic et al. (2005) concluded that personality traits are related to students' motivation to learn and to perform in PE classes. Klein (2017) analyzed the relationship between general personality traits and physical self-concept. A high score in neuroticism was related to a lower assessment of physical attractiveness and athleticism. A weaker but positive correlation was shown between extraversion and athleticism. Hayes (2017) investigated the development of negative attitudes toward PE with the aid of a semi-structured interview and identified personality as one developmental factor. Due to the fact that the impact of students' personality traits on their enjoyment and engagement in PE is difficult to assess, Hayes (2017) suggested to consider personality-related predictors of PE enjoyment and engagement instead e.g., resilience, intrinsic motivation, and confidence. Lodewyk and Gao (2018) focused on the relationships between students' (14–15 years) personality traits and various outcomes such as enjoyment and effort in PE. By means of a proposed model, they showed that lower openness to experience and higher extraversion are related to a higher level of enjoyment. Further a higher level of enjoyment is related to a higher level of effort. In a second study, Lodewyk (2018) investigated the relationships between personality traits and anxiety, self-efficacy and intentions to exercise. This study showed that higher extraversion is associated with lower anxiety, higher self-efficacy, and a higher level of intentions to exercise in both males and females (14–15 years). Furthermore, higher openness to experience is associated with raised anxiety and lowered self-efficacy in females.

Influence of a School Sports Intervention on Personality

Five of the longitudinal studies analyzed personality differences between students participating in sports classes (receiving a higher amount of PE per week) and students participating in regular classes. Sports class students in Schubert's study (Schubert, 1973) received four additional PE lessons per week. The remaining four studies did not specify the amount of additional PE. In two of the studies, students of sports classes were professional junior athletes (Geron, 1981; Zupancic and Justin, 1998). These studies aimed at identifying potential personality differences between high performing student athletes and regular class students (t0 and t1) as well as at examining their personality development (t1). Zupancic and Justin (1998) showed that sports class students (16–17 years) were more natural, spontaneous and undemanding whereas regular class students were more propulsive and intellectual with a self-interested attitude in the initial measurement. In addition, sports class students were more practically oriented, conformist and more worried about everyday necessities, but able to stay calmer in crucial situations (autia-praxernia). Furthermore, sports class students were more controlled over emotions, showed more

discipline and a higher self-esteem (integration) (Zupancic and Justin, 1998). Geron (1981) showed initial personality differences in the dimension of reaction to frustration. Sports class students (11–12 years) scored higher in aggression, need persistence and obstacle dominance whereas regular class students were characterized as more conformist and ego defensive (Geron, 1981). Furthermore, Geron (1981) highlighted initial differences between sports class students and regular class students regarding their personality structure. Compared to regular class students, sports class students' motor skills and behavioral characteristics depended less on their socio-economic status. Comparing data of the first and second measurement point within the groups, both studies emphasized that sports class students' personality traits changed more or rather developed into contradictory directions compared to regular class students. In Zupancic and Justin's study (Zupancic and Justin, 1998), sports class students dropped on the deprivation and on the anxiety scale, whereas in the regular class group the mean score for deprivation increased over the 2 years. The initial differences between the two groups regarding the dimensions autia-praxernia and integration were no longer significant. In addition, sports class students increased their score in their ego strength, dominance, surgency as well as their score in sophistication. Regular class students obtained an insignificant increase in the same dimensions (Zupancic and Justin, 1998). Geron (1981) concluded that sports class students had changed in the dimensions locus of control and reaction to frustration after 1 year. A positive development was highlighted for sticking to rules, working within a framework, self-control, and perseverance. The authors did not report a change among the regular class students.

Three studies investigated sports class students who signed up for sports classes but were not professional athletes (Schubert, 1973; Gabler, 1976; Bacheitner-Hofmann, 1986). Sports class students (14–19 years) in Bacheitner-Hofmann's (1986) study scored higher in sports-specific achievement orientation which he declared as part of their personality. In two studies, the first data assessment took place after a 1 year participation in the sports class (Schubert, 1973; Gabler, 1976). Schubert (1973) did not detect personality differences between the intervention and the control group enrolled in regular classes. Gabler (1976) only found one significant difference in the dimension perfectionism. Thus, students in sports classes are less concerned and show less self-discipline regarding social norms than students in regular classes. Comparing the two groups at the second measurement point, in Gabler's study (Gabler, 1976) differences in perfectionism were still present. Changes between the first and second assessment were similar for both groups, except for dominance, which increased significantly in sports class students but not in regular class students. The other two studies also detected only few significant differences with e.g., sports class students being more inhibited and reserved (Bacheitner-Hofmann, 1986) and more satisfied in school (Schubert, 1973) than regular class students.

The nine longitudinal studies investigated the influence of a school sports intervention on students' personality, either through specific sports programs (different didactical alignment and structuring of PE lessons) or by participation in sports

classes (receiving a higher amount of PE per week). Four studies (Blanchard, 1946; Tillman, 1965; Krejci, 1993; Mijaica, 2017) focused on the influence of specific PE programs on students' personality or personality development. One study (Blanchard, 1946) did not consider a control group. Blanchard (1946) investigated boys and girls (grade 8–11) from PE classes and analyzed differences between the sexes. During the intervention, students experienced various sports (boys: football, basketball, gym classes; girls: basketball, volleyball, shuffleboard, soft ball, gym classes). This study detected the greatest gain over time in the dimensions ethical social qualities (truthful, fair) and qualities of efficiency (dependable, trustworthy). Overall, gains in girls were greater than in boys. Tillman (1965), Krejci (1993), and Mijaica (2017) examined the impact of a specific PE program (intervention group) on students' personality traits compared to regular PE (control group). Krejci (1993) and Mijaica (2017) detected changes in personality traits within the intervention group and in comparison to the control group. Students (9–13 years) in Krejci's (1993) intervention group experienced PE lessons that emphasized social learning by implementing special games or adapting PE teacher behavior. After the intervention, students in the intervention group scored higher in extraversion, especially boys and depicted more positive attitudes toward PE (Krejci, 1993). Students (15–17 years) in the intervention group—experiencing personality development supportive units characterized by an array of games, targeting at educational objectives, values and attitudes—showed a significantly greater development of targeted skills (e.g., leadership, problem-solving, fair-play), typifying personality development (Mijaica, 2017). Tillman (1965) followed a special study design with a first study phase in which male junior and senior high school students were classified into two groups based on their results in a physical fitness test (lower 15% vs. upper 15%). Between these groups he found significant personality differences (upper 15% more dominant, extraverted and socially oriented). In a second study phase he divided the lower 15 percent in an intervention and a control group, with the intervention group receiving 9 months strenuous physical fitness training instead of regular PE. After the intervention, the intervention group scored significantly higher in physical fitness but only in one (clerical interest) out of 28 personality dimensions.

DISCUSSION

The aim of the review was to give an overview of the literature dealing with students' personality in PE. The underlying personality understandings of the included studies are inconsistent in general. More recent studies though exhibit greater consistency. The research field investigates relationships between students' personality and (a) students' achievement in PE or between students' personality and (b) their psychological determinants of PE participation or (c) the influence of a school sports intervention on students' personality. Relationships regarding personality were found in all three groups—(a), (b), and (c). The following discussion is divided into two

parts: (1) Discussion of personality understandings and (2) Discussion of research questions and results—separately for (a), (b), and (c).

Discussion of Personality Understandings of the Included Studies

Among the included studies, three models are predominant to approximate the understanding of personality: The models of Cattell (1946), Eysenck (1981), McCrae and Costa (1987). The fact that all three models follow personality's trait approach (John et al., 2008), signalizes this approach as the leading paradigm in students' personality research in PE. Following the trait approach is very common in general personality research (Novikova, 2013) as well. Using trait psychological models in the educational context is less common—because of the focus on learning theories—but nonetheless existent in educational studies. O'Connor and Paunonen (2007) and Poropat (2009) in their studies for example made use of the trait approach in order to analyze relationships between students' personality traits and their academic performance.

Most of the elder studies (1946–1986) (Tillman, 1965; Wilson, 1969; Seitz and Bäumlner, 1972; Gabler, 1976; Kerr, 1978; Bachleitner-Hofmann, 1986) follow the 16PF model of Cattell (1946). Studies between 1978 and 1993 (Friedrich, 1978; Kerr, 1978; Williams and Eston, 1986; Krejci, 1993) primarily use Eysenck's (1981) model of personality. Using the five-factor model (McCrae and Costa, 1987) or its further development, e.g., the HEXACO-model (Honesty-humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, Openness to experience) (Lee and Ashton, 2004), is more frequent in recent studies (2005–2018) (Erpic et al., 2005; Guskowska and Rychta, 2007; Culjak and Mlačić, 2014; Klein, 2017; Lodewyk, 2018; Lodewyk and Gao, 2018). This is in line with the five-factor model's dominance in contemporary psychology in the last two decades (McCrae, 2001; Rammstedt et al., 2012). The abovementioned trajectory can also be retrieved in general personality research, beginning with Cattell's model, followed by Eysenck's model to McCrae and Costa's five-factor model of personality. Considering the included studies in our review, all three models—Cattell (1946), Eysenck (1981), McCrae and Costa (1987)—are deployed in each of the three groups with the five-factor model being primarily used in studies investigating students' personality in relation to their psychological determinants of PE participation. Although the three models are predominant in the reviewed studies, some of the researchers created or assorted and by this examined their own understanding of personality (Blanchard, 1946; Schubert, 1973; Dunkerbeck and Prenner, 1976; Geron, 1981; Willimczik, 1986; Westhoff, 1989; Hayes, 2017; Mijaica, 2017). This holds true even in recent studies where the trait approach had become dominant and widely accepted. Even if the trait approach is generally accepted, the results of our review signify that in addition to following the trait approach, other facets of personality are implied in PE research. Several researchers expand their underlying understanding of personality by examining other person-related facets such as self, interests

or achievement motivation (Gabler, 1976; Bachleitner-Hofmann, 1986; Willimczik, 1986; Erpic et al., 2005).

In our review, all studies following the trait approach use questionnaires to measure personality. Questionnaires therefore can be seen as methodology of choice when operationalizing personality within a clear underlying personality understanding. It is remarkable that even if the majority of the included studies follow the trait approach, 19 different inventories are used to measure personality. A possible reason might be that during the trait approach's development many different inventories were created and used in personality research relative to the respective research aim or sample under investigation. Comparing results of studies that apply similar inventories, is—due to the similar development and background of the models—possible, but requires a careful and often time-consuming comparative analysis. Three of the included studies (Dunkerbeck and Prenner, 1976; Hayes, 2017; Mijaica, 2017) collected qualitative data and applied their own understandings of personality instead of following an established personality approach. Therefore, these results are only content-wise comparable among themselves or to other studies in the review.

Discussion of Research Questions and Results of the Included Studies Studies Investigating the Relationships Between Students' Personality Traits and Achievement

Nine out of ten studies found relationships between students' personality and their achievement in PE. Similar findings could also be retrieved in other settings, e.g., in competitive sports. In their review Allen and Laborde (2014) e.g., analyzed contemporary studies to find evidences for personality traits as precursors to athletic success in terms of sports performance. They concluded that athletic success in competition and participation in physical activity could be predicted by personality traits (Allen and Laborde, 2014). Studies investigating the relationships between students' personality traits and achievement in PE operationalized achievement differently. This fact had to be considered while discussing the studies' results.

Studies in our review revealed that extraversion is notably related to students' PE grade. The direction of the relationship is diverse though among the studies: Friedrich (1978) detects a positive relationship whereas Culjak and Mlačić (2014) indicate a negative relationship. This might be caused by the long period of time between the studies and the concomitant change in the education system as well as by the different cultures in which the two studies were conducted. Furthermore, there is no uniform picture regarding grading practice, which might explain why each study consults different criteria to compose students' PE grade. In order to find out whether extraversion has a positive or negative influence on students' PE grade, the grade's composition needs to be determined and other influencing factors (such as the teacher or the students' performance) must be monitored. Similar to Culjak and Mlačić's (2014) detected positive relationships between girls' emotional stability and their PE grade, Steca et al. (2018) showed that successful athletes obtain higher emotional stability than less successful athletes.

Additionally, conscientiousness is in the included studies of our review positively related to students' PE grade, which is in line with general educational research where conscientiousness is considered a crucial non-cognitive determinant of school grades (Dumfart and Neubauer, 2016).

Students' performance measured by fitness or ability tests is also positively related to extraversion - independent of the chosen methodology: Either when measured by Cattell's warmth and liveliness (Kerr, 1978), Cattell's self-reliance (Wilson, 1969), Eysenck's extraversion (Kerr, 1978) or as highlighted in Seitz and Bäuml's (1972) and Dunkerbeck and Prenner's (1976) findings. Similar findings are known from research considering leisure time physical activity or competitive sports (Shariati and Bakhtiari, 2011). Shariati and Bakhtiari (2011) indicate that athletes scored higher in extraversion than non-athletes. This is in line with research showing that more extraverted individuals are also more energetic (Terracciano et al., 2013) which is also supported by findings that extraverted individuals tend to exercise more in their free time and therefore probably perform better (Rhodes and Smith, 2006). These explanations emphasize selection processes in sports whereas the assumption that sports promote extraversion supports the impact of socialization processes. According to Gerlach (2008), it can be assumed that selection processes first pave the way for sports or physical activity, in which adolescents then experience a corresponding socialization.

Besides extraversion, Dunkerbeck and Prenner (1976) as well as Guszowska and Rychta (2007) report relationships between performance and conscientiousness by measuring conscientiousness directly or describing high performing students as hard-working and ambitious—characteristics that accompany conscientiousness (McCrae and Costa, 1987). In general educational research, out of all five personality dimensions conscientiousness is most strongly and consistently associated with academic performance. This dominant relationship cannot be found when considering PE specifically. A possible explanation might be that other subjects are more closely linked to academic performance than PE: The PE grade consists of e.g., motoric, social, cognitive components, whereas other subjects' grades depict usually a purely cognitive achievement (Roth et al., 2015). Kerr (1978) with his results on Cattell's dimensions emotional stability and apprehension shows that neuroticism is negatively associated with students' performance in PE. Guszowska and Rychta's (2007) results support this relationship for boys. Same is known for successful athletes showing higher emotional stability than less successful athletes or non-athletes (Steca et al., 2018). Accordingly, emotional stability benefits good performance in various contexts, not only in school PE.

In summary, relationships between students' achievement in PE and their personality are partly comparable to results of studies in leisure sports or general educational research. Considering extraversion and conscientiousness however, contradictory relationships became apparent. This fact underlines PE's above-mentioned specific demands regarding students' performance in comparison to other school subjects.

Studies Investigating the Relationships Between Students' Personality and Their Psychological Determinants of PE Participation

Due to the fact that the students' psychological determinants of PE participation differ among the analyzed studies, the highlighted relationships are barely comparable. Considering the different determinants—motivation (Erpic et al., 2005), self-concept (Klein, 2017), attitudes to PE (Hayes, 2017), enjoyment (Lodewyk and Gao, 2018), anxiety, self-efficacy, and intentions to exercise (Lodewyk, 2018)—findings from general educational research are similar: Students' personality—commonly measured by inventories based on personality's trait approach, similar to the studies in our review—is related to students' academic (intrinsic) motivation (Komarraju et al., 2009), self-concept (Pilarska, 2018), attitudes toward school (Heaven et al., 2002), enjoyment in life (Cheng and Furnham, 2003) as well as test-anxiety (Chamorro-Premuzic et al., 2008), self-efficacy (Caprara et al., 2011), and exercise intentions (Rhodes et al., 2003). The fact that the relationships detected in PE context coincide with relationships detected in general educational context underlines personality's important role in education.

In the analyzed studies extraversion is positively related to a positive physical self-concept (Klein, 2017), a high score in PE enjoyment (Lodewyk, 2018), high self-efficacy, positive intentions to exercise and low anxiety (Lodewyk, 2018). Similar relationships were found in the general educational context for extraversion and general self-esteem (Pilarska, 2018), life enjoyment (Cheng and Furnham, 2003), and high intentions to exercise (Rhodes et al., 2003). One explanation for the strong relationships in PE context shown in our review might be that PE demands social interaction and cooperation more than other subjects. Extraverted students feel more comfortable because they are more sociable and seek the company of others. This is in line with the aforementioned assumption that extraverted people are more physically active (Rhodes and Smith, 2006), perform better and therefore possibly feel more comfortable when exercising. However, the question that remains unanswered is whether these findings are actually PE specific or whether they are attributable to and domain-specific for sporting activities in general.

Regarding conscientiousness, the analyzed studies in our review only report relationships with positive attitudes toward PE whereas studies in other subjects emphasize conscientiousness as strong predictor of further inner factors such as motivation, self-efficacy, self-control and self-esteem (e.g., Heaven et al., 2002; Komarraju et al., 2009; Caprara et al., 2011; Pilarska, 2018). A possible explanation for the diminished relationship with conscientiousness might be the weak link between PE and academic performance. In other subjects, variables such as motivation or self-efficacy act as mediators within the strong relationship between conscientiousness and academic performance. Compared to other school subjects, academic performance's role is less significant in PE (Roth et al., 2015). This might be reason for the weaker relationship between conscientiousness and e.g., motivation, self-concept and enjoyment in PE.

In addition, our review shows interesting relationships between students' psychological determinants of PE participation and openness to experience which is negatively related to enjoyment (Lodewyk and Gao, 2018) and self-efficacy and positively related to anxiety (Lodewyk, 2018). Contradictory to the studies' results of our review (Ercic et al., 2005; Lodewyk, 2018; Lodewyk and Gao, 2018), openness to experience is in other contexts positively related to learning motivation (Hazrati-Viari et al., 2012; Wahyu Ariani, 2013), positively associated with enjoyment (Lindenberg, 2001), positively related to academic self-efficacy (Sánchez-Cardona et al., 2012), and unrelated to anxiety (Kotov et al., 2010).

These contrary results again underline the fact that PE compared to other subjects demands different student abilities. In PE the demanded abilities are less associated with intellectual performance e.g., PE teachers still often use teacher-centered instructional styles (Byra, 2006; Pfitzner, 2014), which go along with a clear and predetermined lesson structure. Further, PE often focusses on student performance (Rink, 2013) and therefore does not necessarily address openness to experience. People scoring high in openness to experience are described as aesthetic appreciating, inquisitive, creative and unconventional (Lee and Ashton, 2004). They enjoy to educate themselves in the intellectual, artistic and historical fields—closely associated with learning environments (Moshagen et al., 2014). This could explain why openness shows different relationships in other school contexts, e.g., students who are intellectually curious are more likely to enjoy learning (Tempelaar et al., 2007; Komaraju et al., 2009). PE in contradiction might be rather unpopular for students who score high in openness and are therefore more inclined toward learning situations. A new teaching style and alternative forms of teaching—e.g., experiential learning, genetic learning or generally student-centered, inductive and participatory teaching—might produce different results.

To summarize, the analyzed studies in our review describe several relationships between students' general personality traits and psychological determinants of PE participation. The findings in our review compared to findings in general educational research emphasize PE's unique role in the curriculum—being the only subject demanding and developing cognitive, social as well as physical competencies. PE challenges different needs whereby determinants such as physical self-worth or anxiety become important.

Studies Investigating the Influence of a School Sports Intervention on Students' Personality

Interesting and discussable are the differences between high performing student athletes in sports classes and regular class students e.g., regarding Cattell's dimensions *autia-praxernia* and *integration* (Geron, 1981; Zupancic and Justin, 1998), which are mainly associated with conscientiousness: High performing student athletes score higher in conscientiousness (Zupancic and Justin, 1998). Studies in other contexts detect similar relationships. Athletes or physically active people score higher in the dimension conscientiousness (Rhodes and Smith, 2006; Malinauskas et al., 2014). Results differ regarding the level of professionalism: Athletes competing at a higher level score

higher in conscientiousness than athletes competing at a lower level (Allen et al., 2011). Self-discipline and organization are prerequisites of a physically active lifestyle (Rhodes and Smith, 2006; Gallagher et al., 2013) encouraging conscientiousness, which possibly explains the abovementioned finding. However, the reviewed studies do not answer the question whether high performing athletes differ because of the sports they practice or due to the fact that they are generally different. The effect of selection processes as well as socialization processes seems to occur, as was shown in studies considering students' self-concept (Brettschneider, 2002; Stiller and Alfermann, 2005; Gerlach, 2008). The development process of high performing student athletes and regular class students also differs, which in turn may indicate that sports influences personality development. It remains unclear though, whether different processes of personality development are caused by sports class enrollment merely or probably more likely by performing competitive sports. The assumption that competitive sports may have a significant influence is supported by studies investigating the influence of competitive sports on adolescents' personality development (Conzelmann, 2001) as well as by the fact that studies in our review which examine sports classes but not high performing athletes reveal only minor differences in terms of personality development. Students interested in sports or practicing more sports do not seem to be different *per se* or differ considerably in their personality development. However, the personality of students in sports classes considering high performing student athletes develops differently.

This result is also detectable in studies examining special PE programs. It has to be mentioned though that observed changes are rare and only detected by individual studies. Regarding extraversion, Krejci (1993) found an increase of extraversion in the intervention group similar to the results in high performing student athletes (Zupancic and Justin, 1998). Similar results were also found for general physical activity, where extraversion was identified as determinant of physical activity (Rhodes and Smith, 2006). Reasons for the higher scores can be the necessity to cooperate with others or to assert oneself in competition—both typical situations in PE. Zupancic and Justin (1998) assumed that sports class students undergo more extensive life experiences through training and competing in various environments and thus extraversion is promoted. In addition, Costa et al. (2005) and Pocnet et al. (2013) declared biological and cognitive processes responsible for increased extraversion in physically active people. Physical activity can reduce e.g., disease burden, cognitive decline, and risk of depression associated with low scores in extraversion (Costa et al., 2005; Pocnet et al., 2013). Contrary to increased conscientiousness in high performing athletes (Zupancic and Justin, 1998), the other reviewed studies do not show an increase in conscientiousness. Gabler (1976) even highlighted a decrease in Cattell's (1956) dimensions *perfectionism* and *rule-consciousness* associated with the second-order factor *self-control* which complies with conscientiousness (Rossier et al., 2004). According to this, sports class students are less conscientious than regular class students. This insight again supports the assumption that competitive sports may be decisive for personality development, possibly

due to the concomitant participation in competitions and athletes' high motivation and willingness to perform. The missing relationship regarding non-high performing sports class students might be caused by PE's contextual peculiarity, as physical activity is part of the school curriculum and thus compulsory for students. Unlike professional athletes, students do not need to motivate themselves to be physically active and discipline themselves to be successful. This might be a reason why the analyzed intervention studies do not reveal an increased score for conscientiousness.

The results show that PE can only to a certain extent influence students' personality. This result is legitimate, as PE rather aims at supporting students' personality development than changing personalities. The assumption is supported by Tillman (1965) study in our review, where a 9-month fitness training program led to almost no changes in personality traits. In addition, the association seems to depend on many factors, including e.g., PE's curriculum or structuring. According to the studies in our review, which report hardly any changes (Tillman, 1965; Schubert, 1973), it can be assumed that PE's pedagogical alignment has a greater impact on personality development than physical activity itself. In order to test whether and to what extent PE can support personality development, it is necessary to implement a specifically designed intervention.

Relevance of Personality Research in PE

The findings of our review indicate that personality research can be used to teach PE in a student-centered way and by this support students' uptake of leisure time physical activity and the development of an active lifestyle—one of PE's two main goals ("educating to sports"). In order to achieve *education to sports*, PE teachers need to know students' motives to be physically active and teach PE in a varied, multi-perspective way. In view of the fact that certain general personality traits are also related to various psychological determinants of PE participation, knowing students' personality can help teachers to align PE lessons to students' needs. Our review e.g., reveals a negative relationship between neuroticism and motivation in PE (Ercic et al., 2005) and between neuroticism and PE grade (Culjak and Mlačić, 2014). Girls scoring low in neuroticism e.g., receive better grades in PE than girls scoring high in neuroticism. People scoring high in neuroticism generally are more fraught, anxious, worried, concerned, nervous, plaintive, and with self-doubt (Ostendorf and Angleitner, 2004). All these characteristics are rather unfavorable for enjoying a great number of typical PE situations where a determined task has to be fulfilled, often in new and insecurely experienced settings. Therefore, in order to engage emotionally instable students in PE e.g., the teacher has to provide tasks that satisfy the students' personality traits. The PE teacher e.g., can apply open forms of learning where students can participate in lesson decisions and freely choose from a variety of learning materials and activities. By this, the students try themselves out in activities they feel comfortable with doing and/or control their own working pace even in less secure situations avoiding the emergence of anxiety and insecurity. Further, reflecting on what has been learned, taking into account one's own emotional state, can contribute to making an initially

uncomfortable task profitable and fearless in the future. The assessment of one's own level of proficiency and the subsequent personal objectives allow for an individual orientation and encourage the learner to achieve realistic and satisfactory goals. This orientation promotes the students' autonomy and competence experience and by this contributes to the satisfaction of their basic needs, which can increase their motivation (Ryan and Deci, 2017). Furthermore, attention to individual learning progress can reduce students' experience of stress and thus anxiety. This is in line with the recommendation to apply self-referenced grading in addition to criterion-referenced grading when assessing students' performance in PE (Jaitner, 2013). Considering students' personality already in lesson preparation is in line with widespread planning models for PE. Döhring and Gissel (2016) e.g., attribute students' prerequisites a crucial role in the teacher's planning of PE lessons. Students' needs and personalities have to be considered in order to carry out PE lessons as smooth and individual as possible and by this ideally reach all students.

With regard to PE's second main goal ("educating through sports"), findings of our review indicate that PE contributes to students' personality development. Several of the analyzed studies (Blanchard, 1946; Geron, 1981; Mijaica, 2017) concluded that personality traits are affected and primarily desirable traits are stimulated by participating in PE classes. However, the interventions' effects are rather small, which seems to be evident considering that PE represents only a fraction of children's everyday lives and considering that non-cognitive personality traits—examined in the analyzed studies—are relatively stable. Even in the studies with younger participants, where a less stable personality is assumed (Neyer and Asendorpf, 2018), only limited changes can be observed. Considering students' age in general, no discussable trends can be depicted in the included studies. This might be due to the studies' diverse methodologies and research aims though. Examining personality facets with a higher variability, e.g., facets of the self (Shavelson et al., 1976; Gore and Cross, 2011), is probably more suitable in intervention studies. These studies though were not included in our review, as they did not explicitly claim to assess personality. Variable personality facets, e.g., hierarchical lower-order self-concept facets should be considered in didactic concepts specifically addressing students' personality development. As a result, PE must follow targeted and pedagogically oriented concepts in order to develop students' personality and by this achieve its main goals.

CONCLUSION

Our scoping review showed that research on the students' personality in PE exists, but the studies' underlying personality understandings, research questions and results are diverse. Due to the fact that the term personality was approached very broadly and we explicitly searched for this term, only studies that actually contain the term were included. Studies investigating single facets of personality without claiming to assess personality were therefore excluded. Literature reviews including several terms

related to personality could provide information about further interesting relationships. Moreover, it has to be mentioned that due to feasibility reasons only German and English studies were included. Including studies published in further languages, could possibly increase the final number of included studies and provide insights into further international findings.

In addition to the aforementioned short section on ideas for further research resulting from our review's limitations, the following section will make use of the review's results and associated strengths to provide concrete practical ideas and further research opportunities. In order to explicitly highlight teaching opportunities and support PE teachers, ideas to make use of the students' personality, explicitly address students' personality or determine the specific influence of PE on students' personality development, further studies are needed:

- 1) Even though only studies proclaiming to assess personality were included, promising relationships between individual personality facets (e.g., interests) and learning outcomes (e.g., performance in PE) became visible when the examined facets were part of the studies' personality understanding. Therefore, a closer look at the relationships between further personality facets (e.g., self-concept, motives) and other desirable outcomes of PE (e.g., motivation, enjoyment, and achievement) would be desirable. Due to the fact, that 16 of the included 24 studies are more than 20 years old and therefore older than the existence of the nowadays widely accepted five-factor model, they display a rather inconsistent understanding of personality. For future research, high-quality studies following a clearly defined understanding of personality and applying reliable inventories should be carried out. This allows to compare results and by this receive empirical evidence.
- 2) It would also be interesting, to further examine the relationships between students' personality and their motives to be physically active. This knowledge allows to provide specific recommendations for PE in general and PE teaching specifically. Knowing e.g., if extraverted students are more competition- or fitness-oriented can help PE teachers to plan and structure their lessons but also to adapt their behavior when teaching in order to reach the students' diverse motives to be physically active and by this motivate them for PE in the short term and ideally for a physically active lifestyle in the long term.
- 3) However, it is not realistic that a PE teacher knows and considers the personality or the motives of each individual student. Further research is therefore needed to

identify compositions of personality traits that are particularly important for PE enjoyment and achievement. A suitable way to further reduce complexity could be to identify typical personality patterns. Considering specific groups or types of students in PE rather than considering each individual may therefore facilitate PE planning and teaching. Müller et al. (2013) and Burrmann (2015) have already implemented similar approaches. The authors identified typical sub-groups that differ in their self-concept or in their perception of PE, respectively. Burrmann (2015) concluded that further research regarding students' personality types could be beneficial in order to realize student-centered teaching and by this promote PE's two main goals—"educating to sports" and "educating through sports."

- 4) Besides intensifying research that addresses students' personality by explicit and adapted teaching, interventions aiming at students' personality development raise hope for future research. It seems to be promising to target interventions at specific and individual personality facets (e.g., anxiety, self-confidence). The more the interventions' content corresponds to the examined facets, the more likely the intervention influences the facets under examination and by this the students' personality (Conzelmann et al., 2011). Teaching methods explicitly promoting students' personal development such as problem-based learning or experiential learning already exist and might be worth considering and utilizing in such targeted interventions.

By providing the abovementioned practical opportunities but also further research ideas for PE, we aimed at deepening and specifying the results of our review in order to increase the chances of achieving PE's main goals in the long term.

AUTHOR CONTRIBUTIONS

AK, MS, FM, and SS conceived and designed the study. AK and MS performed the literature search and study selection process. AK, MS, and SS performed the final analysis process. AK wrote the paper with substantial contributions from MS as well as SS and FM. All authors approved the final version of the manuscript.

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

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3.4 Article 4: Empirical Part on the Student Side

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Abstract

PE aims to convey the joy of exercise and by this educate students to lifelong physical activeness. Student motivation in PE decreases during the school career. This study therefore comprehensively analyzes student characteristics determining motivation in PE: *general personality traits, physical self-concept, achievement motive, motives to be physically active, and sport interest*. This contribution aims to describe students' prerequisites in the PE context by using an aggregated assessment of the abovementioned general plus sport specific characteristics and to detect gender, class, and school type differences.

In total, 1,740 German secondary school students (58.1% female, $M = 14.39$ years) participate in a cross-sectional questionnaire survey. Descriptive analyses and between subjects MANOVAs followed by univariate ANOVAs with pairwise multiple comparison tests are applied.

Gender explains the largest proportion of variance across all characteristics. Regarding individual dimensions, genders differed on 12, grades on four and school types on 11 out of 19 dimensions.

PE teachers must adapt teaching to different gender dispositions. In general, group differences ascribe special meaning to student perception and teaching behavior. Findings are discussed in terms of their contribution to the research area and their implementation in teaching practice as well as in PE teacher education or professional training, e.g., aligned teaching methods, arranged learning atmospheres or adjusted content design of PE lessons.

Contribution

Alina Kirch is the first and corresponding author of Article 4. Melina Schnitzius is second author and contributed to Article 4 as follows. Melina Schnitzius next to Alina Kirch, Sarah Spengler, and Filip Mess contributed to the conceptualization of the manuscript. Together with Alina Kirch and Simon Blaschke, Melina Schnitzius con-

tributed to data analyses. Melina Schnitzius contributed to the interpretation of the study's findings. Melina Schnitzius was also involved in the editing and revision process of the manuscript written by Alina Kirch. All authors approved the final version of the manuscript.



Knowing Students' Characteristics: Opportunities to Adapt Physical Education Teaching

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Physical Education (PE) aims to convey the joy of exercise and by this educate students to lifelong physical activeness. Student motivation in PE decreases during the school career. This study therefore comprehensively analyzes student characteristics determining motivation in PE: *General Personality Traits*, *Physical Self-Concept*, *Achievement Motive*, *Motives to be physically active*, and *Sports Interest*. This contribution aims to describe students' prerequisites in the PE context by using an aggregated assessment of the abovementioned general plus sport specific characteristics and to detect gender, class, and school type differences. In total, 1,740 German secondary school students (58.1% female, $M = 14.39$ years) participate in a cross-sectional questionnaire survey. Descriptive analyses and between subjects MANOVAs followed by univariate ANOVAs with pairwise multiple comparison tests are applied. Gender explains the largest proportion of variance across all characteristics. Regarding individual dimensions, genders differed on 12, grades on two and school types on 11 out of 19 dimensions. PE teachers must adapt teaching to different gender dispositions. In general, group differences ascribe special meaning to student perception and teaching behavior. Findings are discussed in terms of their contribution to the research area and their implementation in teaching practice as well as in PE teacher education or professional training, e.g., aligned teaching methods, arranged learning atmospheres, or adjusted content design of PE lessons.

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INTRODUCTION

Physical Education (PE) aims to educate students to lifelong engagement in physical activities and to live a healthy lifestyle. Compulsory school PE reaches all school-aged children and promotes physical activity by offering possibilities to exploit the *movement, games and sports* culture, and at the same time personally develop into a competent, literate, and enthusiastic sports person through experiencing *movement, games, and sports* (Siedentop, 2002, 2009; Kurz, 2008; Farias and Hastie, 2016). PE's aim in general and PE's lesson content in particular therefore entail lifelong personal as well as societal relevance.

PE teachers strive to develop and maintain students' enthusiasm for the subject PE but also for physical activity in general, ideally resulting in a state of intrinsic motivation (Rheinberg and Vollmeyer, 2019). This is important as research has shown that physical activity in general (Dumith et al., 2011; Dishman et al., 2018) and motivation for sports (Knisel et al., 2009) decrease from childhood to adolescence—being especially low in teenage years. Reasons provided relate to sexual

maturity (Dumith et al., 2011) or to a change and shift of interests away from physical activity in the course of adolescence (Marques and Gaspar de Matos, 2014). Consequently, only 26% of German adolescents (Finger et al., 2018) fulfill the World Health Organization's (2018) recommendations of 60 min daily moderate- to vigorous-intensity physical activity. Further, the World Health Organization (2020) reported an increasing amount of overweight and obese children. Considering these facts, PE's role of transferring knowledge about and enthusiasm for an active and healthy lifestyle becomes more and more important. The Sport Education Model (Siedentop et al., 2020) is a commonly followed approach aiming to provide students with authentic experiences and by this, gain motivation within PE. By taking on roles within learning experiences, students develop personally and internalize the idea of sport.

PE has to highlight different physical activity capabilities and allow students to experience a multifaceted *movement, games, and sports* culture in order to find their individually preferred activity. Students make use of and experience PE's movement offers differently though. PE lessons therefore require an adequate design, which addresses each student appropriately (Powell and Kusuma-Powell, 2011). It is therefore essential to investigate student characteristics in the PE context.

Scientifically examining student characteristics for targeted and sustainable learning processes in school has been prevalent in general educational research (e.g., Drachler and Kirschner, 2011; Powell and Kusuma-Powell, 2011). Researchers have typically focused on single characteristics (e.g., Personality Traits or Self-Concept) and examined their relationship to, e.g., students' motivation to learn. Also in the PE context, researchers have examined the relationship between single characteristics and student motivation. In order to meet PE's specific peculiarities and requirements with its accompanied inherent experiences, an examination needs to consider not only general but also sport specific characteristics (Beni et al., 2017). Our study therefore addresses the following five characteristics:

- (I) General *Personality Traits* as stable individual differences over time and situation, which explain thoughts, behavior, and emotions (Hogan et al., 1996). The five-factor model describes personality in five dimensions (*Conscientiousness, Openness, Extraversion, Agreeableness, Neuroticism*) and has proven its empirical validity in personality research (Rammstedt et al., 2018). Komaraju and Karau (2005) as well as Ljubin-Golub et al. (2019), e.g., have highlighted the relationship between students' non-cognitive personality traits and their motivation to learn. Relationships between students' personality traits and their motivation to learn, and perform in the lesson have also been shown for PE specifically.
- (II) *Physical Self-Concept* as sport specific characteristic is an important mediator for physical activity (Jackson-Kersey and Spray, 2013) and motor abilities (Jekauc et al., 2017). Additionally, students' *Physical Self-Concept* is positively related to motivation in PE (Murcia, 2012). The overarching facets of the *Physical Self-Concept* (Braun et al., 2018) can be categorized as *Sports Competence, Physical Self-Esteem, and Global Self-Worth*.

- (III) *Achievement Motive*, classified into *Hope for Success* and *Fear of Failure*, has intensively been researched in motivational psychology (Rheinberg, 2006) but also offers links for school-based learning (Urhahne, 2008). Students' *Achievement Motive*, e.g., correlates with their learning performance (Tanaka and Yamauchi, 2000) and learning behavior (Schmalt, 2003). With regard to PE, success-oriented students are more willing to exert themselves and reveal greater subject interest than students with a tendency to avoid failure (Streso, 2015).
- (IV) *Motives to be physically active* are considered as triggers for physical activity in general (Lehnert et al., 2011). This knowledge influences the design of sport offerings by e.g., tailoring them to the target group (Lehnert et al., 2011), and thus increases the offerings' fit to individual preferences, outside school but also in school PE. Following Gut et al.'s (2019), Kueh et al.'s (2017), or Lehnert et al.'s (2011) understanding, *Motives to be physically active* represent a central benchmark for specifically designing and conducting PE's lesson content. Gut et al. (2019) ascertain the following *Motives to be physically active: Contact, Competition/Performance, Distraction/Catharsis, Body/Appearance, Health, Fitness, Aesthetics, and Risk/Challenge*. In German PE, *Motives to be physically active* have found their way into the curriculum as pedagogical perspectives (Neumann and Balz, 2004) and by this, decisively influence teaching behavior.
- (V) Interest is also considered decisive for the development of intrinsic motivation in learning situations (Krapp, 2010), as well as in PE in particular aiming to motivate students sustainably. Adolescence is an important period of life's personal interest development (Hofer, 2010; Hoff et al., 2018). Otundo and Garn (2019) highlighted that situational interest as well as need support provided by the PE teacher predicted students' personal interest. If students' learning and performance in PE is driven by their personal *Sports Interest*, learning processes are considered to be more self-determined, voluntarily more frequent, and thorough as well as more sustainable (Gogoll, 2010).

As highlighted, the abovementioned five characteristics—general *Personality Traits* and sport-specific *Physical Self-Concept, Achievement Motive, Motives to be physically active* as well as *Sports Interest*—have already been individually examined. A collective examination is missing but necessary in order to describe students' holistically and derive targeted teaching strategies, which trigger student's motivation in PE. Furthermore, relationships between individual characteristics can be examined.

Further, most of the abovementioned studies only examine small samples restricted to a certain study group, e.g., one age group or school type. A large-scale study covering different grades, school types, and geographical regions is missing in Germany as well as in international research. Such a study will provide (a) a detailed picture by describing students profoundly, and (b) a basis for classing the results with existing research.

Due to different student dispositions, it is essential to compare groups of students, e.g., different genders, grades, and school types. This allows identifying differences, which can become

significant in practice and help PE teachers to address students appropriately. Differences in students' characteristics in the PE context between genders, grades, or school types have not been analyzed so far. This knowledge though would affect PE teachers in schools and offer possibilities for PE teacher education at university, e.g., target group-oriented teaching from the outset.

In order to draw reliable and valid conclusions regarding a profound knowledge of students in PE, student characteristics—general *Personality Traits* and sport specific *Physical Self-Concept*, *Achievement Motive*, *Motives to be physically active* as well as *Sports Interest*—have to be examined collectively, region-wide across different grades and school types. It is hypothesized that different student groups can be distinctly described by their manifestations in the characteristics. Therefore, this paper aims to comprehensively, in a large Germany-wide sample (a) describe students in the PE context by general and sport specific characteristics triggering motivation, and (b) find out whether characteristics differ with regard to gender, grade, or school type.

MATERIALS AND METHODS

Study Design

The student survey on which this article bases was part of the study *SuM PLuS*. *SuM PLuS* was a Germany-wide study carried out in cooperation with DSLV. It comprised a cross-sectional quantitative questionnaire survey of PE teachers and their students. Participating PE teachers were recruited via DSLV and partners, personal contacts, social media, local press, and educational institutions. After participation, PE teachers could additionally register for the student survey of the study. PE teachers received the student survey material including a standardized instruction. Students took 15 to 20 min to complete the questionnaire in class—online (17.3%) or via paper-pencil (82.7%). Data collection took place from April to December 2018. In total, 40.8% of the questionnaires sent out in paper form were returned. The responsible ministries or school authorities of each participating federal state examined ethical and data protection regulations and approved the study. In addition, schools' administration and a respective legal guardian provided their written consent. Furthermore, the study followed the Declaration of Helsinki. Participation was voluntary and participants could withdraw their consent at any time during the examination.

Sample

In total, 1,740 secondary school students (58.1% female, $M = 14.39 \pm 1.44$ years) from 12 German federal states took part in the study. School types were categorized as follows: (1) lower secondary school ($n = 830$), where students finish with an intermediate school-leaving certificate; (2) higher secondary school ($n = 753$), where students finish with a higher education entrance qualification; (3) comprehensive secondary school (n

$= 500$), combining different educational paths, where students finish with either of the two aforementioned qualifications (Maaz et al., 2008).

Measurements

Students' characteristics were measured via the following five instruments: *Personality Traits* via BFI-K KJ (Kupper et al., 2019), *Physical Self-Concept* via (Braun et al., 2018), *Achievement Motive* via AMS-Sport (Herrmann et al., 2014) derived from Elbe et al. (2005), *Motives to be physically active* via BMZI-JFEA (Gut et al., 2019), and *Sports Interest* via *Sports Interest* (Gogoll, 2010) derived from Kunter et al. (2002). All instruments were validated in samples similar to *SuM PLuS* sample and obtained satisfactory test quality criteria (Table 1). Besides student characteristics, the questionnaire included sociodemographic data such as gender, grade, and school type.

Statistical Analyses

In the data screening process, accuracy, missing values, and outliers were checked. In descriptive analyses, missing values were excluded case wise. In inferential analyses, 337 participants were excluded list wise due to missing values (Graham, 2009). A total of 1,376 participants remained in the final sample meeting the assumptions for linearity, equality of covariance matrices and absence of multicollinearity (Pituch and Stevens, 2016). Between subjects multivariate analysis of variances (MANOVA) was conducted with independent variables gender (female, male), grade (7, 8, 9, 10), and school type (lower secondary school, higher secondary school, comprehensive secondary school) predicting dependent variables *Personality Traits* (I), *Physical Self Concept* (II), *Achievement Motive* (III), and *Motives to be physically active* (IV). One-dimensional *Sports Interest* (V) was considered in univariate analyses of variance (ANOVA). If MANOVA showed significant results, univariate ANOVAs and, in case of significance, follow-up post hoc tests (Huberty and Morris, 1989) were conducted.

Univariate ANOVAs were used to examine individual dependent variable contributions of the scales' dimensions: (I) *Conscientiousness*, *Openness*, *Extraversion*, *Agreeableness*, *Neuroticism*, (II) *Sports Competence*, *Physical Self-Esteem*, *Global Physical Self-Concept*, (III) *Hope for Success*, *Fear of Failure*, (IV) *Contact*, *Competition/Performance*, *Distraction/Catharsis*, *Body/Appearance*, *Health*, *Fitness*, *Aesthetics*, *Risk/Challenge*, and (V) *Sports Interest*. Due to unbalanced data, sums of squares were calculated adaptively following Fox's (2016) recommendations for ANOVA modeling. Last, p -adjusted Dunnett–Tukey–Kramer (DTK) (Li, 2012). Pairwise Multiple Comparison Tests were applied in order to show differences between independent variables. RStudio was used (Version 1.2.5033, RStudio Inc., Boston, USA) for data analysis.

RESULTS

Overview of Student Characteristics

The following section describes students by their manifestations in the five chosen characteristics. Table 2 shows the sample's score

Abbreviations: SuM PLuS, Sportunterricht und Motivation; Personbezogene Faktoren von LehrerInnen und SchülerInnen als Determinanten der Schülermotivation/Physical Education and Motivation; Teachers' and Students' Person-Related Factors as Determinants of Student Motivation; DSLV, Deutscher Sportlehrerverband/German PE teacher association.

TABLE 1 | Applied scales to measure students' characteristics in physical education (PE).

Construct	Inventory	References	Subscales (items per scale/subscale)	Cronbachs α	Introductory question "Sample Item" rating level
(I) Personality traits	BFI-K KJ (Short version of the big five inventory for children and adolescents)	Kupper et al., 2019	Conscientiousness (6)	0.69	How do you assess yourself and your behavior in everyday life? "I get nervous easily" 5 point scale from 1 = strongly disagree to 5 = strongly agree
			Openness (6)	0.76	
			Extraversion (3)	0.90	
			Agreeableness (6)	0.63	
			Neuroticism (5)	0.71	
(II) Physical Self-Concept	PSDC-S (Short version of the physical self-description questionnaire)	Braun et al., 2018	Sports competence (3)	0.87	How do you rate yourself and your abilities in general as well as in sports? "Most things I do, I do well" 6 point scale from 1 = strongly disagree to 6 = strongly agree
			Physical self-esteem (3)	0.94	
			Global physical self-concept (5)	0.80	
(III) Achievement Motive	AMS-Sport (achievement motive scale-sport)	Hermann et al. (2014) derived from Elbe et al. (2005)	Hope for success (5)	0.91	How do you feel when you are faced with a task in sports? "I enjoy athletic tasks in Physical Education that are slightly difficult for me" 4 point scale from 1 = not right to 4 = totally right
			Fear of failure (4)	0.87	
(IV) Motives to be physically active	BMZI-JFEA (the bernese motive and goal inventory for adolescence and young adulthood)	Gut et al., 2019	Contact (5)	0.87	Why do you engage in sports in your free time or why would you engage in sports? "To do something in a group" 5 point scale from 1 = strongly disagree to 5 = strongly agree
			Competition/performance (3)	0.68	
			Distraction/catharsis (4)	0.84	
			Body/appearance (3)	0.85	
			Health (3)	0.77	
			Fitness (3)	0.81	
			Aesthetics (2)	0.67	
Risk/challenge (3)	0.71				
(V) Sports interest	Sports interest	Gogoll (2010) derived from Kunter et al. (2002)	Sports Interest (3)	0.81	What do you think about sports? "Sport is important to me" 4 point scale from 1 = strongly disagree to 4 = strongly agree

(M, SD) in total and differentiated by gender, grade as well as school type.

Hope for Success, Competition/Performance, Risk/Challenge, and Sports Interest.

Gender, Grade, and School Type Differences

This section reports differences between students' gender, grade, and school type. Table 3 shows significant differences ($p < 0.05$) in the respective variables, with effect sizes (η^2) and *post hoc* results between different groups (CI). MANOVA analyses revealed small to large effects (Cohen, 1988) whereas ANOVAs only showed significant differences with small effects.

Gender Differences

According to Table 3, statistically significant main effects of gender occurred in *Personality Traits* [$F_{(5, 1,348)} = 25.05, p < 0.001, \eta^2 = 0.09$], *Physical Self-Concept* [$F_{(3, 1,350)} = 22.69, p < 0.001, \eta^2 = 0.05$], *Achievement Motive* [$F_{(2, 1,351)} = 21.66, p < 0.001, \eta^2 = 0.03$], and *Motives to be physically active* [$F_{(8, 1,345)} = 28.17, p < 0.001, \eta^2 = 0.14$]. The multivariate η^2 implied that 3–14% of multivariate variance of the dependent variables was associated with gender. Univariate analyses yielded significant differences between boys and girls in 12 dimensions. Girls scored significantly higher on *Conscientiousness*, *Openness*, *Neuroticism*, and *Fear of Failure* whereas boys scored higher on *Extraversion*, *Sports Competence*, *Physical Self-Esteem*, *Global Self-Worth*,

Grade Differences

Statistically significant main effects of grade were found on *Physical Self-Concept* [$F_{(9, 4,056)} = 2.98, p = 0.002, \eta^2 = 0.02$] and *Motives to be physically active* [$F_{(24, 4,041)} = 4.04, p < 0.001, \eta^2 = 0.07$]. The multivariate η^2 implied that two to seven percent of multivariate variance of the dependent variables was associated with grade. Univariate analyses yielded significant differences between grades in *Global Self-Worth* and *Distraction/Catharsis*. Only the DTK-Test for *Distraction/Catharsis* revealed significant grade differences and showed that older students (grades 9 and 10) scored higher than younger students (grades 7 and 8).

School Type Differences

Statistically significant main effects of school type were found in *Personality Traits* [$F_{(10, 2,698)} = 5.23, p = 0.001, \eta^2 = 0.04$], *Physical Self-Concept* [$F_{(6, 2,702)} = 4.57, p < 0.001, \eta^2 = 0.02$], *Achievement Motive* [$F_{(4, 2,704)} = 3.72, p = 0.005, \eta^2 = 0.01$], and *Motives to be physically active* [$F_{(16, 2,692)} = 5.28, p < 0.001, \eta^2 = 0.06$]. The multivariate η^2 implied that one to six percent of multivariate variance of the dependent variables was associated with school type. Univariate analyses yielded significant differences between school types on *Openness*, where higher secondary school students scored higher than lower

TABLE 2 | Overview of student characteristics—total, gender, grade, and school type.

Variable	Total		Gender		Grade				School Type		
			Female	Male	7	8	9	10	Lower	Higher	Comprehensive
	<i>N</i> = 1,740	<i>n</i> = 1,011	<i>n</i> = 701	<i>n</i> = 424	<i>n</i> = 430	<i>n</i> = 486	<i>n</i> = 400	<i>n</i> = 747	<i>n</i> = 581	<i>n</i> = 375	
<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	<i>M</i> ± <i>SD</i>	
(I) Personality Traits											
Conscientiousness	3.52 ± 0.77	3.57 ± 0.75	3.45 ± 0.81	3.54 ± 0.79	3.47 ± 0.82	3.53 ± 0.76	3.53 ± 0.73	3.48 ± 0.79	3.58 ± 0.74	3.50 ± 0.78	
Openness	3.46 ± 0.63	3.49 ± 0.62	3.41 ± 0.65	3.36 ± 0.65	3.42 ± 0.66	3.49 ± 0.63	3.57 ± 0.57	3.38 ± 0.66	3.57 ± 0.59	3.44 ± 0.63	
Extraversion	3.40 ± 1.33	3.31 ± 1.36	3.53 ± 1.29	3.37 ± 1.36	3.50 ± 1.30	3.41 ± 1.33	3.29 ± 1.35	3.36 ± 1.37	3.52 ± 1.27	3.30 ± 1.36	
Agreeableness	3.73 ± 0.67	3.72 ± 0.70	3.73 ± 0.64	3.75 ± 0.72	3.73 ± 0.68	3.74 ± 0.63	3.69 ± 0.67	3.62 ± 0.72	3.85 ± 0.61	3.75 ± 0.63	
Neuroticism	2.71 ± 0.82	2.89 ± 0.81	2.46 ± 0.77	2.66 ± 0.82	2.71 ± 0.80	2.70 ± 0.82	2.80 ± 0.84	2.80 ± 0.83	2.58 ± 0.80	2.75 ± 0.81	
(II) Physical Self-Concept											
Sports competence	4.50 ± 1.08	4.32 ± 1.06	4.75 ± 1.06	4.46 ± 1.15	4.55 ± 1.07	4.53 ± 1.04	4.43 ± 1.10	4.35 ± 1.10	4.66 ± 1.02	4.54 ± 1.11	
Physical self-esteem	4.28 ± 1.38	4.06 ± 1.45	4.61 ± 1.20	4.38 ± 1.41	4.24 ± 1.44	4.32 ± 1.31	4.20 ± 1.36	4.09 ± 1.44	4.53 ± 1.27	4.29 ± 1.35	
Global self-worth	4.59 ± 0.89	4.50 ± 0.92	4.74 ± 0.82	4.51 ± 0.96	4.53 ± 0.92	4.65 ± 0.83	4.66 ± 0.84	4.45 ± 0.90	4.75 ± 0.86	4.65 ± 0.85	
(III) Achievement Motive											
Hope for success	2.75 ± 0.80	2.63 ± 0.81	2.91 ± 0.75	2.77 ± 0.83	2.74 ± 0.79	2.74 ± 0.78	2.73 ± 0.79	2.63 ± 0.84	2.87 ± 0.74	2.79 ± 0.75	
Fear of failure	1.89 ± 0.78	1.99 ± 0.80	1.75 ± 0.73	1.87 ± 0.81	1.94 ± 0.79	1.86 ± 0.75	1.91 ± 0.78	1.95 ± 0.81	1.81 ± 0.76	1.90 ± 0.75	
(IV) Motives to be physically active											
Contact	2.87 ± 1.24	2.71 ± 1.24	3.10 ± 1.21	3.10 ± 1.32	2.83 ± 1.17	2.81 ± 1.27	2.79 ± 1.19	2.61 ± 1.26	3.14 ± 1.15	2.97 ± 1.25	
Competition/performance	2.83 ± 1.14	2.54 ± 1.04	3.25 ± 1.15	2.80 ± 1.16	2.83 ± 1.08	2.79 ± 1.15	2.91 ± 1.18	2.67 ± 1.16	3.03 ± 1.10	2.85 ± 1.12	
Distraction/catharsis	2.99 ± 1.23	3.02 ± 1.25	2.95 ± 1.21	2.72 ± 1.23	2.84 ± 1.20	3.09 ± 1.27	3.27 ± 1.13	2.84 ± 1.27	3.10 ± 1.16	3.11 ± 1.23	
Body/appearance	2.99 ± 1.36	3.16 ± 1.38	2.75 ± 1.28	2.92 ± 1.39	2.95 ± 1.40	3.00 ± 1.34	3.10 ± 1.29	3.17 ± 1.39	2.80 ± 1.29	2.94 ± 1.34	
Health	3.12 ± 1.18	3.10 ± 1.19	3.14 ± 1.18	3.00 ± 1.26	3.06 ± 1.19	3.13 ± 1.20	3.27 ± 1.06	3.14 ± 1.23	3.04 ± 1.14	3.19 ± 1.16	
Fitness	3.96 ± 1.01	3.94 ± 1.02	4.00 ± 1.00	3.80 ± 1.12	4.02 ± 0.97	3.97 ± 1.05	4.05 ± 0.87	3.89 ± 1.08	3.98 ± 0.95	4.07 ± 0.96	
Aesthetics	2.84 ± 1.23	2.80 ± 1.23	2.89 ± 1.24	2.95 ± 1.27	2.84 ± 1.24	2.77 ± 1.26	2.82 ± 1.16	2.73 ± 1.26	2.98 ± 1.18	2.84 ± 1.24	
Risk/challenge	2.73 ± 1.13	2.53 ± 1.09	3.01 ± 1.12	2.79 ± 1.20	2.68 ± 1.06	2.76 ± 1.18	2.68 ± 1.05	2.66 ± 1.20	2.74 ± 1.04	2.84 ± 1.09	
(V) Sports Interest											
Sports interest	3.10 ± 0.76	3.01 ± 0.77	3.23 ± 0.72	3.04 ± 0.79	3.11 ± 0.72	3.11 ± 0.74	3.12 ± 0.78	2.93 ± 0.78	3.27 ± 0.69	3.16 ± 0.73	

Number of participants (in total (*N*); in different groups (*n*)); means (*M*) and standard deviations (*SD*).

secondary school and comprehensive school students. Further, differences occurred for *Agreeableness*, *Sports Competence*, *Global Self-Worth*, *Hope for Success*, *Contact*, and *Sports Interest* where higher secondary school and comprehensive school students scored higher than lower secondary school students. Further, higher secondary school students scored higher on *Openness* and *Physical Self-Esteem*, and lower on *Neuroticism* than comprehensive school and lower secondary school students.

Interaction Effects

Interaction effects were calculated to check if groups influenced each other. An interaction effect of gender and school type [$F_{(16, 2,692)} = 2.49, p = 0.001, \eta^2 = 0.03$] as well as of grade and school type [$F_{(48, 8,100)} = 1.49, p = 0.016, \eta^2 = 0.05$] was found on *Motives to be physically active*. Univariate analyses showed no further interaction of individual *Motives to be physically active*. Therefore, the interaction effect can be ignored and subsequently no further post hoc tests exploring the interaction were undertaken.

DISCUSSION

The study's first aim was to describe students in the PE context by an aggregated examination of general plus sport specific characteristics triggering motivation in PE. Results are compared with existing research considering individual characteristics, in order to classify and interpret the findings. The study's second aim was to find out whether students characteristics differ with regard to gender, grade, or school type. In order to make use of the abovementioned classification as well as detected group differences, possible implications for PE teaching practice as well as professional training and teacher education are highlighted.

Descriptive Comparisons

The study's results—values as well as order of individual dimensions—considering *Personality Traits* are comparable with national studies using the same scale (Rammstedt and John, 2005; Kupper et al., 2019). *Agreeableness* and *Conscientiousness* values are higher in our sample in comparison to students

TABLE 3 | Significant differences in student characteristics between students' gender, grade, and school type.

Variable	Gender				Grade						School Type ^a								
	P	F	η^2	m/f	P	F	η^2	7/8	7/9	7/10	8/9	8/10	9/10	P	F	η^2	HSS/LSS	CSS/LSS	CSS/HSS
(I) Personality traits	<0.001	25.05	0.09											0.001	5.23	0.04			
Conscientiousness	0.005	7.90	0.01	0.20/0.03										0.047	3.06				
Openness	0.006	7.47	0.01	0.15/0.01										<0.001	14.90	0.02	0.1/0.28		0.24/0.03
Extraversion	0.005	7.96	0.01	0.08/0.36										0.042	3.19				
Agreeableness														<0.001	14.79	0.02	0.13/0.32	0.02/0.24	
Neuroticism	<0.001	85.74	.06	0.51/0.34										0.003	5.96	0.01	0.33/0.10		0.03/0.30
(II) Physical self-concept	<0.001	22.69	0.05		0.002	2.98	0.02							<0.001	4.57	0.02			
Sports competence	<0.001	46.34	0.03	0.31/0.54										0.001	7.24	0.01	0.16/0.47	0.02/0.38	
Physical self-esteem	<0.001	45.95	0.03	0.41/0.69										<0.001	9.27	0.01	0.24/0.63		0.47/0.02
Global self-worth	<0.001	19.46	0.01	0.15/0.33	0.027	3.08	0.01							<0.001	11.43	0.02	0.16/0.42	0.05/0.33	
(III) Achievement motive	<0.001	21.66	0.03											0.005	3.72	0.01			
Hope for Success	<0.001	35.72	0.03	0.20/0.37										<0.001	8.17	0.01	0.12/0.35	0.04/0.29	
Fear of Failure	<0.001	27.52	0.02	0.32/0.16										<0.001	5.28	0.06			
(IV) Motives to be physically active	<0.001	28.17	0.14		<0.001	4.04	0.07							<0.001	7.76	0.01	0.35/0.70	0.15/0.56	
Contact																			
Competition/performance	0.020	5.44	.00	0.59/0.83															
Distraction/catharsis					0.026	3.11	0.01			0.13/0.62	0.30/0.80	0.02/0.49	0.20/0.66						
Body/appearance																			
Health																			
Fitness																			
Aesthetics																			
Risk/challenge	<0.001	9.84	0.01	0.36/0.60															
(V) Sports interest	<0.001	17.90	0.01	0.14/0.30															
Sports interest	<0.001	17.90	0.01	0.14/0.30										<0.001	24.59	0.03	0.24/0.45	0.11/0.35	

Significant differences ($p < 0.05$); F: ratios of variances; η^2 : effect sizes; CI: confidence interval.
^aHSS: Higher Secondary School; LSS: Lower Secondary School; CSS: Comprehensive Secondary School.

in the international context (Culjak and Mlačić, 2014; Iimura and Taku, 2018; Lodewyk, 2018; Lau and Jin, 2019). This is in line with Schmitt et al.'s (2007) study comparing adults' Big Five personality traits across different countries and cultures. Therefore, detected findings in this study could result from educational or cultural differences.

Physical Self-Concept values are comparable to previous studies, which have used the same scale in a sample consisting of teenagers or young adults (Braun et al., 2018). Similar to Braun et al.'s (2018) as well as Stiller and Alfermann's (2007) sample, students obtain the highest score on *Global Self-Worth*. *Global Self-Worth's* score in this study is lower than in Stiller and Alfermann's (2007) older sample. Students' *Sports Competence* values are higher in comparison to students in the international context (Marsh et al., 2002; Guérin et al., 2004; Garn et al., 2019). However, fifth grade students from the USA (Garn et al., 2019) show higher scores than our study's sample. Cultural differences in relation to, e.g., one's self-perception might have influenced this result. It has to be taken into account that younger students often over-estimate themselves (Lan, 2005; Kolovelonis et al., 2013). Further, USA's organization of youth sports culture where all physical activities are typically offered in schools, possibly allows more opportunities to experience various sports easier of access than in Germany where after school sports are commonly outsourced to sports clubs, and where children's experiences often depend on the regional offering and parental support.

The values of *Achievement Motive's* dimensions are comparable to national and international studies (Herrmann et al., 2014; Streso, 2015).

The strongest expression of the *Fitness* motive is in line with the validation sample (Gut et al., 2019) and another study from Germany (Diehl et al., 2018) as well as with studies from Greece (Zervou et al., 2017), Lithuania (Sukys et al., 2019), and Malaysia (Molanorouzi et al., 2015)—all investigating older samples. Only Kilpatrick et al.'s (2003) American sample attributed less importance to the *Fitness* motive than to *Contact*, *Competition/Performance*, *Aesthetics*, or *Risk/Challenge*. This could be due to USA's different design of PE's curriculum emphasizing other motives, e.g., competitive sports games (Shape America, 2014). Another reason might be the fact that the importance of fitness has greatly increased in recent years (Wiklund et al., 2019) while Kilpatrick et al.'s (2003) study dates back several years. Fitness' increasing societal relevance points not only to the meaning of the *Fitness* but also the *Health* motive, which in our study obtained the second highest score. Triggering students' meaning assignment to the *Health* motive paves the way to an active and therefore healthy lifestyle.

Regarding *Sports Interest*, Herrmann et al.'s (2014) Swiss student sample (12–15 years) reveals similar *Sports Interest* values as this study's sample. Gogoll's (2010) sample of older students (17–19 years) reveals lower scores than this study's sample indicating that with increasing age not only motivation but also *Sports Interest* decreases. Further, international comparisons are difficult due to the differences in the operationalization of *Sports Interest*.

Investigated Group Differences

The fact that girls score higher on *Neuroticism* than boys coincides with the assumption that girls are less confident and more timid than boys are (Danthony et al., 2019). The tendency of girls' higher *Neuroticism* is in line with earlier studies examining *Personality Traits* (Kupper et al., 2019). Further, girls' lower *Physical Self-Concept* matches previous research (Klömsten et al., 2004; Klein, 2017). Klein (2017) additionally highlighted a relationship between *Personality Traits* and *Physical Self-Concept*. The fact that boys' *Achievement Motive* values lie above girls' is compatible to boys' higher self-evaluated *Physical Self-Concept* and lower *Neuroticism*. This again underlines the fact that boys are more confident and venturesome than girls are (Cárdenas et al., 2012). Gender differences might be traceable to the puberty phase, which is a major life event for adolescents. It is associated with many rapid biological, social, and psychological changes (Patton and Viner, 2007). While girls tend to gain body fat during puberty, boys tend to gain muscle mass favoring their sports activities (Waylen and Wolke, 2004). Accompanied physical self-perception is one key correlate of physical activities, especially for girls (Stuart et al., 2005). This explains why girls' characteristics are less advantageous for participation in PE than boys' characteristics. Due to socialization effects, boys are physically tougher, more autonomous, and emotionally stoic (Amin et al., 2018), which may explain gender differences. Socialization effects may also be the reason for boys' higher *Sports Interest*, as males generally are more active than females (Finger et al., 2017). This further implies that a parent of the same sex has a greater role model function than a parent of a different sex (Brouwer et al., 2018). Boys' higher *Sports Interest* could also be traced back to PE's and extracurricular sports' performance as well as goal orientation which matches boys' pronounced *Risk/Challenge* and *Competition/Performance* motive orientation. This further corresponds to boys' higher *Physical Self-Concept* and more distinct *Hope for Success*.

Main effects of grade on *Physical Self-Concept* cannot be used for practical considerations as univariate and post hoc tests did not reveal significant differences (Chen et al., 2018). Whether *Physical Self-Concept* develops over the school career, cannot be answered in this study, due to the cross-sectional design and sample restriction to grade seven to ten. Additionally, further characteristics influencing student development must be considered.

Higher-grade students' stronger orientation toward *Distraction/Catharsis* can possibly be explained by *Distraction/Catharsis's* stress-compensating alignment. Academic-related stress is a major concern of secondary and tertiary students (Pascoe et al., 2020). Therefore, older students facing ongoing normative stressors may appreciate the stress-compensating function of physical activities and therefore enjoy *Distraction/Catharsis*-oriented lessons.

Differences between lower and higher secondary school students emphasize the fact that teachers in higher secondary schools face different student characteristics than lower secondary school teachers. Whether the reason for the difference lies in school-based, family-related, or societal parameters, e.g.,

cannot be answered in this study. One possible explanation for the detected differences could be the fact that lower secondary school students are less often active in sports clubs (Albert, 2017), and therefore have fewer opportunities to strengthen their *Physical Self-Concept*, train their *Achievement Motive*, or awaken their *Sports Interest*.

Motives to be physically active are among all characteristics the most easily addressable in PE teaching practice. Regarding the investigated independent variables, gender explains the most whereas grade explains the least variance. This suggests that the examined characteristics, especially *Personality Traits*, differ between genders but are quite stable within secondary schooling, representing a shorter life period (Neyer and Asendorpf, 2018).

Implications

Aligned Teaching Methods

PE teachers can make use of the detected differences in student characteristics in order to design and conduct PE lessons, which address students appropriately. The fact that girls are more conscientious than boys could imply that they, e.g., need more time to practice. They are more interested in mastering things with confidence and therefore, e.g., benefit from process-oriented rather than product-oriented performance evaluation. Girls' higher *Openness* implies a higher interest and willingness to engage in new contents and teaching methods. PE teachers could thus find it easier to teach girls when trying to follow a broad and multi-perspective curriculum. Further, PE teachers should pay heed to this result when offering new contents or new perspectives to boys, e.g., by proceeding in small steps or by granting co-determination and including students' ideas and desires in the lessons. Here, the Sport Education Model represents a valuable approach by bringing students to take up different perspectives via different roles. Considering the abovementioned stable traits therefore facilitates teaching and allows appropriately addressing students. This in turn ideally arises their intrinsic motivation in PE and by this contributes to PE's overarching aim to establish motivation for lifelong physical activities.

Boys' higher *Extraversion* facilitates teaching competition-oriented tasks and contents. Comparatively low scores on *Agreeableness* and *Openness* in lower secondary school students can be considered when, e.g., applying cooperation tasks, creative teaching concepts or offering unknown lesson content.

Safe Learning Environments

Lower secondary school students' as well as girls' higher level of *Neuroticism* implies that they particularly require safety in PE lessons. Girls' higher *Neuroticism* plays a crucial role in PE. It has been shown that feeling safe in PE is important for students in general (Albert, 2017). Particularly girls in PE require security against risk, injury, or embarrassment (Brown, 2014; Casey et al., 2014). Considering individual learning progress and process, rather than product-oriented teaching approaches, especially during assessment, can take away fear or uncertainty, and promote security as well as a sense of achievement. Additionally, girls' lower *Physical Self-Concept* should be considered when planning and conducting PE lessons. PE teachers need to create

and guarantee a learning setting in which all students feel secure and encounter achievement. Such learning settings allow for valuable experiences, which in turn strengthen students' *Physical Self-Concept* (Schmidt et al., 2013). This can further be promoted by, e.g., considering individual learning progress or applying an optimized feedback culture—e.g., recurring self-, peer-, and teacher evaluation (Conzelmann et al., 2011).

According to PE's educational mandate, students' *Physical Self-Concept* should be maintained or increased in the course of the school career. In order to achieve this aim, PE teachers should be aware that particularly girls and lower secondary school students require *Physical Self-Concept* promotion within safe learning environments.

Lesson Design and Tasks

Considering this study's results, tasks with a medium degree of difficulty suit most students best. This consequently triggers their motivation in PE (Engeser and Rheinberg, 2008). Because of a predominant success orientation, PE teachers should make sure that students receive enough time, even when fulfilling easy tasks, before moving on to more difficult tasks.

Another starting point is *Motives to be physically active*, which give direction to the lesson's content and design. The *Fitness* motive appeals the most to students, regardless of gender, grade, or school type. The topic fitness is less centrally presented in Germany's PE curriculum than, e.g., sports games, and therefore plays a subordinate role when planning and designing PE lessons. Addressing this motive in different PE strands, e.g., in gymnastics as well as in athletics or games, empowers students to take part in extracurricular physical activities. Boys are more likely addressed by performance-, competition-, or risk-oriented situations. Girls might not feel adequately addressed in strongly performance- and competition-oriented PE lessons where they have to assert themselves – which is common in PE though (Erdmann, 2008; Lund and Kirk, 2020). Therefore, PE teachers should focus on the values and the order of different *Motives to be physically active* in order to address both genders and pupils who do not correspond to the predominant motivational orientation. It is e.g., as important for girls as for boys to cope with risk experiences and to feel pleasure in doing so. Boys are perhaps more willing to take risks and exceed their individual level of requirements whereas girls may need a more gradual approach. *Distraction/Catharsis's* stress-compensative function can be used in higher and mixed-gender grades in order to find meaning in sport. As the *Health* motive is stronger pronounced in higher grades, aligning PE lessons toward *Health* might support students' lifelong engagement in physical activities.

Sports Interest also offers potential for PE teaching, especially because of their close link to intrinsic motivation. Considering this study's results, PE teachers should particularly promote *Sports Interest* among girls and lower secondary school students in order to establish the basis for lifelong engagement in physical activities already in adolescence. In line with girls' desire for safe learning environments, PE teachers' need support becomes especially important also to trigger *Sports Interest* among girls.

The fact that numerous gender differences occurred would initially speak for mono-educational PE, as it might be easier to

address students adequately (Hannon and Williams, 2008). Only two *Motives to be physically active—Competition/Performance and Risk/Challenge*—but all other characteristics except for *Agreeableness* differed between boys and girls. This indicates that in co-educational PE, teaching behavior or teacher-student interactions might be more important than the lessons' content, which is influenced by the choice of pedagogical perspectives, and therefore by its motive orientation. Considering students' personality development within PE's dual function of education to and through sports, co-educational PE offers developmental potentialities (Hill et al., 2012), e.g., raising students' awareness of thoughtfulness and gender equality. Both, a mono-educational and co-educational organization of PE lessons, offers chances but also problems, which have to be taken into account.

CONCLUSION

The presented findings contribute to research as well as PE practice. Students' individual characteristics offer different approaches to influence motivation in PE. The aggregated examination leads to a comprehensive picture of students' in the PE context offering various anchors for targeted teaching.

The study highlights the dimensions' varying manifestation within the examined characteristics. Regarding general characteristics, students show low *Neuroticism* and high *Agreeableness*. Considering sport-specific characteristics, students are rather success-oriented and most attracted by the *Fitness* motive. Further, students obtain high values on *Physical Self-Concept* dimensions as well as on *Sports Interest*. Student groups differ, which allows describing them by the manifestation of the examined characteristics. Gender explains the largest proportion of variance across all characteristics with 12 differing dimensions. School types differ in 11 whereas grades only differ in two dimensions. This indicates the characteristics' relative stability. Predominant differences in *General Personality Traits*, *Physical Self-Concept*, *Achievement Motive*, and *Sports Interest* ascribe special meaning to student perception and teaching behavior in comparison to lesson content, which is reflected by fewer differences in *Motives to be physically active*.

Results can raise PE teachers' awareness of the fact that certain groups of students may experience PE differently and require appropriate addressing. Findings are transferred into recommendations for PE teachers in schools and can further affect PE teachers participating in professional courses or prospective PE teachers in teacher education.

STRENGTHS, LIMITATIONS, AND OUTLOOK

The study's strengths are its nationwide character and its sample size. This was achieved by the support of DSLV and ministerial approvals in the different federal states. Considering several grades and school types makes the study even more meaningful.

The comprehensive understanding of student characteristics provides a wide range of discussable results and implications.

PE teachers registered for and instructed the student survey. This might have influenced students' response behavior trying to please the teacher. Further, no information regarding the exact setting and conditions under which the examination took place can be provided. Students' voluntary participation might have biased the sample. Socio-economic stratification was not considered in order to receive a sample resembling the population. An exact response rate cannot be provided as participants were partly recruited via public advertisement and online participation was possible.

Differences regarding grades and school types are mostly comparable to previous results from studies in Germany investigating characteristics individually. As the examined sample differs from students in other countries, a survey in different countries applying the same survey instrument as in PISA (e.g., OECD, 2019) or HBSC (e.g., Inchley et al., 2016) seems interesting. In addition to analyzing and comparing students' characteristics, one could observe PE teaching and see if applied strategies differ considering cultural specific manifestations of characteristics. This knowledge can contribute to teaching recommendations and possibly have an effect on teaching outcomes, e.g., student motivation or achievement.

In order to decide whether student characteristics develop over the school career, a longitudinal survey—also including primary schools in order to cover students' school career comprehensively, is essential.

As the presented results showed potential patterns and previous studies highlighted relationships between at least some of the investigated characteristics, future work should aim to holistically conceive and describe these relationships by means of students' socio-demographic characteristics. Further, the replication crisis in personality research in combination with occurring small effect sizes, emphasize the need for future studies adopting an accordingly comprehensive approach. Clustering students with similar patterns across the individual characteristics, would reduce the complexity, and by this facilitate additional implications without expecting too much of the individual PE teacher. Easily identifiable and distinguishable student types can help PE teachers to plan and conduct targeted PE lessons, which successfully accomplish PE's educational mandate.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because of educational ministries' permits underlying privacy policies. Requests to access the datasets should be directed to filip.mess@tum.de.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation

and institutional requirements. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

AK, MS, SS, and FM contributed to conception and design of the study. SB, AK, and MS performed the statistical analysis. FM and SS managed and coordinated the responsibility for the research

activity planning and execution. AK wrote the first draft of the manuscript. All authors contributed to the article and approved the submitted version.

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

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4 Discussion

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The aim of this dissertation thesis was to describe PE's key players: PE teachers and students in the PE context. The primary focus hereby was on the PE teachers' personal characteristics. The results' impact can be discussed in regard to three dimensions. First, the thesis contributes to educational research in general by filling content- as well as methods-related research gaps or tying in with demands as well as orientations in educational research. Second, the thesis contributes to PE research in particular and the subject's accompanied development by its impact on and formulated implications for PE teaching, PE teacher education as well as professional training. Subsequently and third, the thesis has an impact on societal level by its overarching objective and accompanied effects considering health-related aspects.

4.1 Contribution to Educational Research

Overarching Contribution

Germany's Federal Ministry of Education and Research's (2018) *Framework Programme for Empirical Educational Research* intends to guide researchers aiming to favor educational processes by taking into account current challenges and related needs. The framework program highlights national research policy objectives and targeted fields of action within educational research for the time period 2017 to 2022. The dissertation thesis ties in with the framework program's demands. On a very general level, the thesis' work contributes to intensifying the communication and cooperation between researchers, educational politicians, and practitioners. By its practical orientation and close cooperation with DSLV as well as the ministerial support of the federal states, the research automatically connects all three groups of stakeholders. It further involves differing needs and interests. Addressing teachers as well as students provides a solid base and multiple connection possibilities for the abovementioned stakeholder groups and therefore underlines the thesis' impact within educational research. The Federal Ministry of Education and Research (2018) highlights the need to understand education as multilevel system. This thesis combines multiple levels: It operates on education's micro level by focusing on prerequisites of the individual learner's development. This development in turn is subject to the teacher's expertise and accompanied pedagogical-didactical decisions on the educational process' macro level. By investigating multiple levels, essential determinants or relationships can be considered.

One objective within the framework program states to extend the structure of outstanding educational research by reaching out to adjacent disciplines, e.g., psychology or general as well as subject-specific didactics. The dissertation thesis takes on this interdisciplinary task. It connects general educational research with psychology's background knowledge as well as provides approaches to concretize PE's subject didactics. More precisely, the thesis enhances two fields of action within the *Framework Programme for Empirical Educational Research*: 1) *improving educational equity: recognizing and developing individual potential* and 2) *ensuring quality in education*. Essential basis for individualized teaching which encourages learners' potential is knowledge about learners' requirements. Ensuring quality in teaching is closely linked to the expertise of the teaching staff as well as interdependencies between students and teachers. Both require comprehensive study and concretization. The framework program particularly highlights the need to study non-cognitive skills in teaching and learning processes. The thesis enhances this field by analyzing PE teachers' and students' non-cognitive personal characteristics in an aggregated manner. The abovementioned contribution can be specified for the thesis' theoretical (see Article 1 and Article 3) as well as empirical part (see Article 2 and Article 4).

Theoretical Part: Scoping Reviews

In its first aim to identify, summarize and analyze research on PE teachers' and students' personality in the PE context by two scoping reviews, this thesis has followed an innovative methodological approach as well as taken up the prevailing contentual opening and differing interpretation of the term personality in the educational context. By this, the thesis further ties in with empirical educational research's demand to adapt to challenges of teaching in the 21st century, which profit from a clear and comprehensive picture of the educational process' key players. By its choice for a scoping review, which opens the scope of coverage and therefore facilitates practical transfer, the thesis fills methodological gaps and follows interdisciplinary demands. Scoping reviews have generally gained importance in order to easily depict a research area's fundamental specifics. Further, their function has been recognized in educational research specifically (Göncz, 2017). Arksey and O'Malley (2005) attribute scoping studies a comprehensive coverage. This comprehensive coverage was necessary in order to receive a picture of how the context-overarching and independent terms teacher and student personality have been understood in the PE context including different perspectives as well as applied procedures. Further, the comprehensive coverage was necessary to identify existing relationships with e.g., teaching and

learning outcomes or correlates that are typically analyzed and considered in accompanied models. The applied approach allowed to assess whether the theoretically acknowledged context-specificity is also evident in empirical studies. This in turn implies different approaches or understandings in research considering the PE teacher. It further highlights whether the methodological approach or content orientation in studies on the PE teacher's personality matches with applied approaches in general educational research. Since the latter was true and the review did not reveal differences in this regard, Mayr's (2014) model e.g., could be applied to the PE context and therefore to the design of the thesis' empirical part.

By this, the thesis has provided a summary of strategies approaching the diffuse term personality as well as relationships to teaching and learning outcomes in the PE context. Studies analyzing correlates underline the subject-specificity within the fields of interest by e.g., examining relationships to PE teachers' physical activity, sport orientation (e.g., via *motives to be physically active*) or burnout. Analyzed studies focusing on PE teachers' burnout tie in with general education research's focus and popularity in this regard since the turn of the millennium (Krause, 2003). Researchers e.g., often analyze attrition rates within the teaching profession (Scott, 2019).

Considering the interpretation of the term personality, the review methodologically ties in with general educational research's wider and less definite understanding of teacher personality. On content level, it underlines a PE-specific research orientation within educational research. Studies e.g., ask for ideal or desired teacher characteristics and often consider students' view. This orientation is interesting in two ways: 1) It underlines the importance of the teacher-student interaction considering planning of teaching as well as teaching situations and within this the consideration of students' needs. 2) It ties in with the abovementioned orientation towards teacher professional competence (Baumert & Kunter, 2013), which in its widest sense identifies competencies and underlying characteristics that are beneficial to be effective as teacher in order to reach learners. Tying in with this, the review further underlines the consideration of general but also vocation-specific motivational characteristics when analyzing and deducing implications regarding PE teacher personalities. Studies so far have only examined characteristics individually. The accompanied promising implications therefore speak for examining relevant personal characteristics in an aggregated and comprehensive manner. Article 1 provides detailed results and information on these interpretations.

The importance of considering the teacher-student interaction as well as including students' views and needs is pursued in the thesis' multilevel approach. Regarding its subordinate aim in the theoretical part – to identify, summarize, and analyze

research on students' personality in the PE context by means of a scoping review – results also contribute to educational research by delivering a context-specific summarizing picture of learners' personality, which, similar to the teacher side, can be compared to other contexts and content foci. It further, similar to the teacher side, has highlighted the necessity of an aggregated comprehensive examination providing various anchors for adapting PE teaching to learners' needs. Article 3 provides detailed results in this regard.

The review's results on the teacher side – 1) prevalence of trait theoretical personality understanding complemented by vocation- and context-specific motivational aspects, and 2) lack of studies examining the PE teachers' personality in relation to teaching outcomes or in an aggregated manner; but also on the student side – 1) prevalence of trait theoretical personality understanding, 2) performance as most typical outcome measure as well as 3) detected possibilities to support students' personality development within PE – have influenced this dissertation thesis' study design in its empirical part leading to Article 2 on the teacher and Article 4 on the student side. This multilevel approach contributes to educational research by providing descriptions of the educational process' key players. The thesis by this, on the one hand, provides anchors for teaching practice and demands for practitioners in teacher education. On the other hand, it highlights the need for future studies.

Empirical Part: Physical Education Teacher and Student Examination

In its empirical part, the thesis has seized on the context-specificity of teachers' professional competence – especially considering non-cognitive characteristics – by the aggregated analysis of PE teachers' personal characteristics. Following results gained in the theoretical part as well as educational research's general orientation, the empirical part included a wide understanding of teacher personality by analyzing general characteristics – *general personality traits and general interests* – as well as vocation-specific *motivational characteristics – teacher self-efficacy, teacher enthusiasm, and teacher interests*. By this, it has left personality psychology's traditional but often critically approached (Bergner, 2020) narrow and typically implicit consideration, which allows little direct implications for e.g., teachers' behavior. The thesis thereby has combined the insights and backgrounds of personality psychology with the demands of research on teaching and learning contributing to empirical educational research's interdisciplinary orientation.

The context-specific consideration has partly been prevalent in educational research, e.g., within Kunter, Baumert, et al.'s (2013) study COACTIV and the accompanied

teacher examination focusing on mathematics teachers specifically. This thesis therefore aligns itself with other studies in educational research by providing data for comparison possibilities to other teacher groups considering specific characteristics, e.g., *teacher self-efficacy* and *teacher enthusiasm* with COACTIV's sample. This contribution is closely linked to the thesis' recommendations for future research (see Section 5). Article 2 includes already conducted comparisons and provides detailed results in this regard.

Additionally, the thesis delivers a more precise picture of PE teachers' personal characteristics by its aggregated nature offering diverse anchors for teaching. By this, the thesis meets the need of research on teaching's practical relevance. The thesis innovatively provides a picture of PE teachers' professional competence by applying general subject-overarching models to the PE context and assigning manifestations to the mostly theoretical interpretation of professional competence components. By this, the thesis offers a description of PE teachers, representing one specific teacher group within the educational system.

Highlighted interpretations also account for the thesis' student focus in the empirical part. Models of teaching and learning (see Section 1.2.2.1) ascribe students an important role in the teaching and learning process, especially considering their personal requirements in the initial process of planning teaching. This apparent meaning often remains theoretical and by this lacks empirical as well as practical concretization. Studies describing students' requirements e.g., do exist but lack conscious planning towards required characteristics within specific contexts and by this comprehensive implementation possibilities. The thesis provides anchors to tie in this gap and concretize the models' components. It enriches the existing overarching picture of students in the educational context, which e.g., has found its way into the abovementioned theoretical considerations of teaching and learning, such as Helmke's (2017) or Kollar and Fischer's (2019) model.

Further, similar to its contribution on the teacher side, it delivers a comprehensive picture of students' requirements by an aggregated examination of personal characteristics and by this adds to previous mostly specified research concerning individual characteristics. Results can be compared to previous as well as future research e.g., considering students in different contexts. This allows to identify subject specialties and apply these in teaching implications. Aiming to describe students comprehensively ties in well with research on individualized teaching within heterogeneous groups of learners, which aims to encourage students' potential and positively influence their development as highlighted in the framework program's objective (Fed-

eral Ministry of Education and Research, 2018). Article 4 provides detailed results in this regard.

In summary, the thesis exceptionally contributes to educational research by its 1) context-specificity, 2) multilevel approach analyzing teachers and students, and 3) impact on different stages of a teacher's career and involved stakeholders. The thesis therefore provides profound summaries within a wide research field following an innovative and comprehensive method in its theoretical part, its empirical part as well as in the combination of the two parts. The aggregated as well as combined examination of both key players in the PE context, together with the study's large sample, which allows distinguishing between groups, underline the thesis' overall impact on educational research. This impact will be concretized in the following contributions to PE research as well as subsequent implications and by this the subject's development specifically.

4.2 Contribution to Physical Education Research

Educational researchers have highlighted the relevance of considering teachers and students in order to initiate recommendations for successful teaching in the PE context (e.g., Bräutigam, 2008; Döhring & Gissel, 2016; Lange & Sinning, 2009; Scherler, 2008). The thesis' descriptive and comprehensive alignment including both key players clearly provide innovative knowledge, which impacts not only empirical educational research in general but also PE research specifically. It acknowledges the subject's peculiarities and accompanied demands, which affect teachers but also students in the PE context (Gerber, 2015). After all, the curriculum implies that it is the students that are to be educated to and through sport by their PE teachers. The results therefore can enrich PE research by the gained knowledge of PE teacher as well as student characteristics. The aggregated and multilevel context-specific consideration has been missing so far. It ties in with PE research's goal to comprehensively examine PE's reality (Bräutigam, 2008). In order to achieve this goal, PE research follows an interdisciplinary approach considering not only sport pedagogical and sport didactical knowledge but also findings from e.g., sport medicine, exercise science, or sport psychology (Bräutigam, 2008). PE teachers and students as acting agents of PE lessons are among others typically analyzed within sport psychological research in the PE context (Bräutigam, 2008). The applied approach therefore ties in with sport pedagogical, sport didactical as well as sport psychological considerations and by its empirical character fosters the demand for linking PE research to educational research. Further,

its pedagogical-psychological orientation can be classed within PE research's advisory character for didactical decisions (Aschebrock & Stibbe, 2017).

PE teachers knowing their own as well as their students' personal dispositions can align their lesson planning, teaching, and reflection accordingly. The thesis offers a differentiated picture on the teacher as well as on the student side. Similar to its concretizing nature within empirical educational research in general, it provides anchors to concretize theoretical considerations within PE research and accompanied subject didactics specifically, e.g., Scherler's (2008) didactic star but also e.g., Döhring and Gissel's (2016) model and within this *Level A (Requirements and Conditions)* as well as *Level C (Evaluation)* of lesson and sequence planning. Here the thesis provides data in regard to PE teachers' and their students' requirements, which guide PE lesson planning, teaching and reflection but also influence future research in this regard. PE teachers e.g., can explicitly reflect on their personal characteristics in relation to their teaching behavior or interaction with their students. Detailed planning allows targeted teaching and by this increases the chance to address and motivate students. This implies intrinsic motivation to take part in PE lessons as well as to engage in physical activities outside school – ideally lifelong – and thereby contributes to PE's mandate. By this, the thesis offers starting points for the empirical as well as practical consideration of student motivation and the accompanied promotion of student motivation within PE lessons. The thesis thereby ties in with motivational research in PE, which is guided by sport psychological but also general educational research orientations.

Considering Lange and Sinning's (2009) view of professional teachers acting as role models and by this achieving PE's goals, the thesis sensitizes teachers as well as teacher educators for the relevance and extend of PE teachers' personal characteristics, which includes knowing, accepting as well as tolerating personal strengths and weaknesses. The gained knowledge therefore affects not only PE teachers in schools, but also PE teacher education as well as professional training and by this PE's overall development. The thesis' abovementioned impact implies accompanied practical implications, which guarantee the results' implementation and thus enable the desired impact.

4.3 Contribution to Physical Education Practice

This dissertation thesis was guided and is consequently characterized by its practical relevance. The Federal Ministry of Education and Research (2018) states the aggregation of scientific knowledge and practical experiences as key element of social innovation. Therefore, the thesis aims to closely link detected findings to teaching

practice, paving the way for practical experiences of the scientific results. Within this aim and further following the framework program's demands, the thesis tries to bring together stakeholders within different stages of PE teachers' careers – researchers as well as practitioners. Practical implications can be divided into direct implications to practitioners in schools and indirect implications via e.g., practitioners in teacher education as well as teacher professional training. By this, implications affect all career stages. In line with the followed personality understanding and accompanied combination of general, rather stable plus context-specific less stable *motivational characteristics*, direct as well as indirect teaching implications in the following further cover two approaches: I) *Making use of what is out there: knowing stable personal characteristics and adapt teaching accordingly* and II) *Developing of what is out there: knowing motivational characteristics and guide professional development accordingly*. This dichotomy can and has been further applied to the student part of the thesis and accompanied results plus analyses. Article 2 and Article 4 extensively highlight the approach's derivation and justification in regard to the two key players.

4.3.1 Direct Implications: Practitioners in Schools

Direct implications address PE teachers in schools. The gained results can guide PE teachers' lesson planning, teaching as well as reflection afterwards. Because this thesis has in its secondary focus also analyzed students in the PE context, implications consider both key players and by this gain impact for complex teaching situations. This dissertation thesis allows a clear description of different groups (e.g., genders, age groups/class levels, school types) of PE teachers as well as students by the aggregated examination and analysis of personal characteristics. The overriding objective and basis for further implications has been to raise awareness for the topic. The thesis intends to highlight and implement the theoretically known and valid assumption – that effective teaching comes in heterogeneous forms but also in different teacher personalities – to PE teachers in schools. PE teachers can deliberately be encouraged to reflect on their personality and accompanied teaching behavior in order to make the best possible use of their requirements. This could e.g., be achieved via an online assessment tool, which after giving a brief introduction to the topic, e.g., in form of a video, invites participants to examine the individual configuration of personal characteristics. After completing the test, participating teachers could instantly receive information about their individual characteristics' manifestation and by general graphics or explanations, which are attached to personal results, identify their strengths and

possible weaknesses. By knowing their strengths and weaknesses, PE teachers can orient their lesson planning as well as teaching accordingly. Knowing their strengths, they can apply special methods deliberately or by the analysis of weaknesses avoid methods, which do not match their personal requirements. Neurotic PE teachers e.g., might prefer closed and predictable lesson sequences whereas extraverted PE teachers might flourish in student-oriented and flexible lesson sequences including a wide scope of actions for their students. The study's results on the student side could supplement and be integrated into the assessment tool's informative but also applied part. PE teachers could e.g., first be informed about students' requirements and receive or personally develop teaching strategies in relation to different student groups. In a next step, participating PE teachers could be encouraged to record individual results and knowledge to develop an action plan that is within their means. Here the assessment tool could a) offer general recommendations regarding suitable teaching methods or teaching strategies beneficial for their personality configuration and in line with their student group as well as b) provide specific links to professional training opportunities. Because of the close cooperation with DSLV, this aspect could be linked to DSLV's professional training program and will further be explained in Section 4.3.2.

Further, PE teachers can share their results and ideas – ideally digitally implemented into the tool – with colleagues to e.g., balance their interests and consequently split lesson planning and preparation accordingly. Further, they can share ideas or tutor each other. This fosters their professional as well as personal development within a team. The assessment tool has to be easily and free-of-cost accessible to PE teachers. It further should be simple to use, ensure a quick familiarization with the content and clearly highlight practical relevance by e.g., offering easily understandable and implementable examples to suggested methods and teaching strategies.

In summary, PE teachers after personal reflection need to make use of their resources when e.g., cooperating with colleagues, planning lessons as well as when teaching. Consequently, by considering their personal resources, PE teachers can better take their students' characteristics into account in order to provide personality reflective learning situations and offer target group-oriented teaching scenarios.

4.3.2 Indirect Implications: Practitioners in Teacher Education and Professional Training

In order to reach all stages of PE teachers' careers and by this support the extent, acceptance, and impact of deduced implications, implications have to be prepared for

and transferred to practitioners in PE teacher education as well as teacher professional training.

In general educational research, Mayr's (2012) abovementioned supply-use model but also research of e.g., McEvoy et al. (2018), McEvoy et al. (2015), or Mordal-Moen and Green (2012) considering teacher education, show that offerings in teacher education and thus teacher educators' work have a decisive influence on how student teachers use and develop their personalities and thus their professional behavior. Further, the context decisively influences teachers' professional development and should be regarded in implications aiming to positively affect this process. Mayr (2014) has formulated implications of the personality approach for the recruitment as well as education and professional development of teachers. In this process, he differentiates between three groups of actors: student teachers/teachers, educational consultants/teacher educators, higher education institutions/educational politicians. He further differentiates between three strategies to make use of the teacher's personality: changing, accepting, and choosing personalit(y)ies. Mayr's (2014) implications and accompanied courses of actions in the general educational context can be applied to this dissertations thesis' results in the PE context.

Table 3 summarizes the thesis author's development of courses of actions for PE student teachers, PE educational consultants/PE teacher educators, and higher education institutions/educational politicians. The provided examples are explicitly derived from the study's results and aligned to the PE context. They are based on Mayr's (2014) and Mayr and Neuweg's (2006) classification as well as related ideas and summarize the thesis' results as possible recommendations for action.

At the beginning of the ladder, higher education institutions, acting under the guidelines of educational politicians, are responsible for providing necessary resources and learning environments. Following the ladder up, PE educational consultants and PE teacher educators take on the role of key motivators. They should – within the given environment – encourage PE student teachers to further their personal development and encourage as well as advice in a targeted manner. Within this process, they have to consider and make use of the stability or variability of relevant personal characteristics. PE teacher educators' role model function is only successful though if they themselves reflect on their personal requirements, beliefs, and actions and further transfer this reflexiveness to their student teachers (Mordal-Moen & Green, 2012). This rectifies student teachers' position at the end of the ladder. PE student teachers should consciously and at an early stage take into account their personal requirements, clarify their resources, listen to their personal needs, and be honest with them-

Table 3: Implications Considering Physical Education Teachers' Personal Characteristics for the Recruitment as well as Education of Physical Education Teachers

Accepting personalit(y)ies	Changing personalit(y)ies	Choosing personalit(y)ies
<i>General non-cognitive characteristics</i>	<i>Motivational (PE-specific) characteristics</i>	<i>General non-cognitive & motivational (PE-specific) characteristics</i>
PE student teachers		
<p>Making use of strengths & dealing with weaknesses</p> <p>e.g.,</p> <ul style="list-style-type: none"> trying out different teaching methods & reflecting on personal resources generating strength profiles & discussing it with PE teacher educators or fellow students sharing strengths within study groups & collaborating 	<p>Developing personally</p> <p>e.g.,</p> <ul style="list-style-type: none"> taking part in voluntary courses experiencing teaching attempts in internships self- & peer evaluation processes (short & long term) via e.g., observation & accompanied tools 	<p>Selecting suitable career paths</p> <p>e.g.,</p> <ul style="list-style-type: none"> selecting study courses & voluntary training school type specialization
PE educational consultants/PE teacher educators		
<p>Arranging mentoring in a personal reflexive manner</p> <p>e.g.,</p> <ul style="list-style-type: none"> being aware, accepting & considering person-related differences in mentoring (social sensitivity) applying self-reflection & aligning mentoring with own personal requirements supporting general awareness of the topic initiating reflection processes within student teachers offering continuous support 	<p>Offering coaching/ Professional training</p> <p>e.g.,</p> <ul style="list-style-type: none"> applying self-reflection as basis sharing personal development offering professional competence trainings, personal consultation & micro-teaching courses initiating video-feedback influencing curricula sensitizing new colleagues 	<p>Providing support in career choices</p> <p>e.g.,</p> <ul style="list-style-type: none"> providing & publically communicating school type profiles encouraging to try out different school types (e.g., compulsory teaching experiences in different school types & accompanied reflection processes) enabling & supporting school type specification change within studies

Table 3 continued

Accepting personalit(y)ies <i>General non-cognitive characteristics</i>	Changing personalit(y)ies <i>Motivational (PE-specific) characteristics</i>	Choosing personalit(y)ies <i>General non-cognitive & motivational (PE-specific) characteristics</i>
Higher education insitutions/Educational politicians		
Providing individualized & differentiated offers e.g., <ul style="list-style-type: none"> • providing sufficient staff • preparing staff for diversity • prompting staff to personal reflection & engagement with the topic • providing sufficient job opportunities for different teacher types 	Creating personality-promoting learning environments e.g., <ul style="list-style-type: none"> • offering various educational paths, courses & choice options • supporting curricula including practical experiences & offering • selection options 	Providing support & selection measures/ Encouraging & facilitating cooperation of stakeholders e.g., <ul style="list-style-type: none"> • offering job consultation & introduction days • allowing & facilitating school type changes • allowing & demanding internships at different school types • setting up national cooperation of institutions

Note. Based on Mayr (2014) as well as Mayr & Neuweg (2006)

selves when it comes to choosing concrete teaching strategies. The metaphor of a ladder illustrates the dependence of the individual actors within teacher training and speaks for cooperation as well as exchange between actors in different stages of PE teachers' career. If higher education institutions supported by educational politics provide the basics for teacher educators to meaningfully teach and thus train future PE teachers to reflexive teacher personalities, implications can achieve impact. In order to make this impact sustainable, the link to PE teachers in schools has to be established. Student teachers develop into PE teachers and take on different roles once finished with their studies. Therefore, PE teacher educators at university should closely collaborate with PE teachers in school as well as teacher educators in PE teacher professional training. Teacher professional training can e.g., include personal development training in their standard program. Teacher professional training programs could deliberately initiate and offer courses focusing on the development of e.g., individual motivational characteristics in the PE context, e.g., classroom competence. Both approaches can be applied in cooperation with the DSLV and by this reach PE teachers nationwide. In general, because of their voluntary character, implications in teacher professional training should be as practical as possible, concretely oriented to the respective addressees, easily accessible, and time-efficient.

Research on teachers' personal characteristics in general and this dissertation thesis in particular have aroused sensitivity for teachers' personal characteristics; more precisely, sensitivity for personal characteristics' individuality, variety but also comprehensive nature as well as changeability and accompanied courses of actions within different stages of the teaching profession – from teacher education to professional training. The results can impact individual stages of PE teachers' careers and contribute to target group-oriented teaching from the onset. Student teachers can consider their personal resources and aim to continuously develop personally as well as professionally. Motivational characteristics especially can guide PE teachers' development. PE teachers can either e.g., deliberately take part in professional training courses focusing on their weaknesses in order to receive helpful strategies on how to teach with their weaknesses. Or, in line with the abovementioned focus and deliberate strengthening of strengths, show how to concentrate on individual strengths and transfer new gained knowledge or ideas to (future) teaching situations.

Furthermore, the nationwide character of the study and accompanied awareness on a theoretical as well as cooperation on a practical level, facilitate nationwide consideration of the gained results. Therefore, abovementioned implications considering the teacher as well as the student side have to be discussed with stakeholders in all stages

of PE teachers' career in the individual federal states. Further, tools, e.g., the targeted online assessment platform, have to be made available and explained to all educators involved. This requires targeted and thoughtful communication as well as careful preparation of information material in order to reach the involved stakeholders without implying too much burden or demand to change. Implications should always obtain a voluntary character while clearly highlighting possible strengths and benefits. The existing cooperation with the DSLV can serve as important basis in this step. The concrete realization of this step exceeds the thesis' extend and thereby represents a future task.

4.4 Contribution on Societal Level

The Federal Ministry of Education and Research (2018) highlights the relevance and possibilities of successful educational processes and accompanied educational research for society's development. Besides the thesis' impact on educational research in general as well as PE research and the subject's accompanied development in particular, its societal contribution is noteworthy and ties in well with PE's mandate as well as peculiarities and demands.

With the thesis, teacher educators as well as PE teachers themselves obtain a comprehensive picture of characteristics relevant for PE teaching. This in turn affects the achievement of PE's mandate, which via motivation to take part in PE, implies students' intrinsic motivation to be physically active in and outside school. Students' intrinsic motivation can be promoted by PE teachers deliberately applying their personal resources but also by considering characteristics on the student side. The knowledge of e.g., students' *motives to be physically active*, which this thesis has examined within students' personal characteristics, allows to align teaching accordingly and address students adequately in PE lessons. This in turn also affects students' perception of and motivation within PE as well as their relationship to and personal relevance of physical activity in after school settings – and by this their health. It therefore indirectly counteracts the abovementioned decline in physical activity among children and adolescence as well as associated health consequences. Further, lacking student motivation has been identified as stress factor for teachers (Altenberger, 2005) and by this can negatively affect PE teachers' health.

PE teachers obtain a vocational inherent aim to personally as well as professionally develop and by this continuously reflect on or enhance their effectiveness. Teacher effectiveness in turn is negatively correlated with teacher burnout and positively with

teacher well-being, which in turn also affects students positively (Schleicher, 2018). The idea that teachers knowing their strengths can deliberately strengthen them in order to weaken their weaknesses, speaks for the applied comprehensive examination of teachers' personal characteristics. The thesis' approach thoroughly depicts teachers' requirements providing anchors for positively influencing teachers' health. Dubs (2009) in this regard highlights the relevance of teachers' identification with vocational tasks as well as personal resources.

Following Dubs' (2009) understanding of desired authentic humanistic teacher personalities, teachers attempt to exceed the narrow aim of encouraging each student to perform well in the educational context by the aim of strengthening students' self-concept through targeted and individualized teaching. PE teachers therefore have an impact on students' personality development within the educational process, which is part of school's general as well as PE's particular mandate. Authentic PE teachers knowing their personal characteristics as well as their students' characteristics contribute positively to fulfilling this demanding task.

4.5 Strengths and Limitations

One clear strength of this dissertation thesis is its comprehensive analysis of teachers' as well as students' personal characteristics specifically in the PE context. This allows to purposefully describe both key players and to highlight practical relevance for PE teaching. The comprehensive examination distinguishing between different groups of teachers and students can be considered as innovative to educational research and contributes to existing research on individual characteristics within the educational context in general as well as the PE context in particular. The study's sample size along with the sample's variety and national coverage clearly depict another strength. Further, the thesis' design of combining the theoretical derivation including scoping reviews followed by a comprehensive empirical examination, speak for the thesis' relevance. The study's comprehensive character facilitates deducing practical implications by consciously aligning them with the respective groups. The study includes an encompassing discussion leading to prospective practical implications, which impact PE teaching, PE teacher education as well as PE teacher professional training. This is benefitted by the multilevel structure, analyzing PE teachers and students. The study has managed to comprehensively picture PE teachers' as well as students' personal characteristics and by this provides an innovative solution to meet PE's special requirements. It was possible to deduce practical implications on four levels: impli-

cations and accompanied courses of action on a direct level for 1) PE teachers in schools – as well as indirect implications and accompanied courses of actions for 2) PE student teachers, 3) PE educational consultants/PE teacher educators, and 4) higher education institutions/educational politicians (see Table 3). By this, this thesis has great potential to be transferred to teaching practice and achieve its aim to contribute to educational research in general as well as PE research and the accompanied development of the subject in particular.

Nevertheless, the study's limitations should be mentioned as well. Cooperating with DSLV allowed recruiting a large sample covering many federal states in Germany, but might have influenced the sample in a way that rather motivated PE teachers participated. In the overall sample, 28% of participants were members of the DSLV. In terms of research economics, this was the only way to achieve such a comprehensive sample. Further, students were recruited via participating PE teachers. Similar to the teacher side, this might have influenced the sample.

Finally, a number of potential shortcomings, which were beyond this thesis' aims and by this represent advice for future research, need to be mentioned and will further be explained in the next section. The analyses and accompanied results within this thesis have mostly descriptive character and should be expanded by the analysis of relationships to teaching outcomes, e.g., student motivation. Accompanied modelling approaches will enhance the gained knowledge. Teaching outcomes have so far only been considered theoretically. Further or connected to this demand, the teacher and the student sample should be matched and their perspectives compared. Both intentions can be implemented using *SuM PLuS*' data.

The study's meaningfulness can be enhanced by external observations in addition to the available self-reported data. Research has shown that other-reports are a valuable supplement and partially more precise (Dinger et al., 2014; Kim et al., 2018). Possible external perspectives include the here collected teacher and student data in comparison but also additional perspectives from e.g., teacher educators or principals on the teacher side as well as e.g., parents or peers on the student side.

The present study further provides a comprehensive picture of PE teachers' and students' personal characteristics by cross-sectional data. In order to infer about PE teachers' professional development as well as students' intended personal development and by this see how successful the suggested practical implications are, a longitudinal examination of particularly PE teachers' and students' less stable context-specific motivational characteristics is advisable.

5 Outlook

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5.2 Students in the Physical Education Context

5.2.1 Dissertation-Related Outlook:
Students in the Physical Education Context

5.2.2 *SuM PLuS*-Related Outlook:
Students in the Physical Education Context

This thesis highlights the relevance and opportunities of analyzing teachers' and students' personal characteristics in the PE context. By an aggregated examination, PE's key players have been described in detail and different groups compared. Finally, deduced from the thesis' discussion, an outlook to future work will be provided. Following the thesis' multilevel approach with its main focus on the PE teacher and subordinate focus on the students, the outlook is divided into two parts (see Sections 5.1 and 5.2). Both sections are subdivided into dissertation-related outlook and *SuM PLuS*-related outlook.

First, dissertation-related outlook ties in with the thesis' aim of describing PE's key players via their personal characteristics (see Sections 5.1.1 and 5.2.1). This part predominantly suggests research considering the here examined data set highlighting further methodological suggestions and additions in order to enhance the gained picture.

Second, *SuM PLuS*-related outlook extends the thesis' aim but is linked to and complements the thesis' work, which can be considered as one work package within *SuM PLuS*. *SuM PLuS*-related outlook considers the research project's wider approach and aim to analyze person-related factors on the teacher and the student side determining student motivation in PE. *SuM PLuS*-related outlook considers already collected data within the research project. Table 1 and Table 2 in Section 2.3.2 provide a complete overview of all analyzed variables within the project *SuM PLuS*. Besides PE teachers' and students' personal characteristics, which are in the focus of this and the corresponding dissertation thesis, the project examined further person-related factors on the teacher and the student side including teacher behavior (*provided basic needs support*) and students' perceived teacher behavior (*perceived basic needs satisfaction*). These additional variables allow enhancing the existing description of PE's key players, which this thesis has provided.

5.1 Physical Education Teachers

5.1.1 Dissertation-Related Outlook: The Physical Education Teacher

The presented results on the one hand can additionally be analyzed in relation to teaching outcomes, e.g., teacher effectiveness or student performance in PE and by this allow for comparisons as well as context-related classifications within studies in educational research examining individual teacher characteristics or related outcomes. These analyses would enhance and concretize the formulated impact.

On the other hand, clustering techniques combining the individual personal characteristics could be applied. Cluster analyses could yield teacher types, which in themselves obtain a similar manifestation of personal characteristics. By this, the gained picture becomes even more tangible and probably appealing to work with for practitioners. Results and implications could be integrated into the abovementioned online assessment tool. PE teachers then, by taking the test, can ascertain to which type/s they fit and work with implications tailored to this/these type/s. Describing teacher types has been popular due to its simplicity and often visual underpinning. Schaarschmidt (2004) e.g., has identified teacher types on patterns of vocational behavior and experiences, which have influenced future research or the development of teaching implications. Internationally, working with teacher types in the general educational context is common as well (Göncz, 2017) – also in less scientifically profound and practically oriented teaching recommendations. Therefore, by applying a clustering approach, results could gain further international recognition. To the best knowledge of the thesis' author, neither nationally nor internationally, researchers have identified PE teacher types by using an aggregated examination of personal characteristics, which encompasses the necessary consideration of general, rather stable traits and interests as well as vocational context-specific motivational characteristics. Overall, the variable-oriented approach of examining individual characteristics' effect on teaching outcomes dominates research and needs to be supplemented by a person-centered approach – especially in the PE context, where the setting represents a specialty and where teacher-student interaction processes receive a different dynamic (Gerber, 2015). This thesis has provided the first step in this regard, analyzing characteristics which have been proven to correlate positively with teaching outcomes in a person-centered manner. This could be elaborated by suggested future analyses such as clustering techniques.

In addition, the so far cross-sectional study design could be supplemented by a longitudinal examination of PE teachers' personal characteristics in order to infer about the development of particularly motivational characteristics. Following the national work of e.g., Miethling (2007) and underlining the abovementioned three-fold explanation of implication strategies, it seems interesting to consider PE teachers' development starting in teacher education, continuing in teacher training over to teaching after completing all educational phases plus further professional training.

Connected to this idea, in order to assess the impact of proposed implications, future research could possibly conduct intervention studies, which e.g., examine PE teachers' classroom competence before and after a deliberate training, also considering a control group not receiving training. Additionally, observational studies examining

PE teachers' personal characteristics could support the results' consideration on the teaching level by considering further perspectives. These possibilities take up the developmental character of teachers' professional competence and thus try to do justice to teachers' profession immanent strive for further personal as well as professional development.

As the thesis' discussion has highlighted, PE teachers' development clearly depends on the education and professional training they receive. In order to evaluate the status quo including the general awareness and acceptance of the topic in regard to its implications, future studies could examine educational institutions. This examination can be two-fold. First, PE teacher educators could be examined via e.g., qualitative interviews or mixed methods approaches, which assess their personal characteristics quantitatively, supplemented by a qualitative analysis of their needs, views but also concrete actions within their professional activities. Second, the examination could include the analysis of underlying curricula. This mixed methods approach therefore connects practical actions and theoretical requirements. It builds on the role model function of teacher educators, which in a first step should be aware of and reflect on their own personal characteristics. McEvoy et al. (2018) have highlighted the relevance of personal relationships within teacher educational phases, which implies the relevance of personal characteristics of the involved individuals. To the best knowledge of the thesis' author, research in this regard, explicitly linking different stakeholders' requirements, does not exist so far, would positively affect the implications' effect chain though. In connection with the scope and extent of practical implications, future research within such status quo or stakeholder analyses could further analyze international curricula and existing research by the means of collecting best practice examples, which can be discussed and possibly applied to the targeted national context. Vice versa, national results can be communicated to the international audience, not only via the existing publications in international literature but also via more practically oriented procedures, e.g., introducing the abovementioned assessment tool, including its exemplary teaching strategies or methods. This work can support researchers to determine what is feasible considering and realizing what may already be unconsciously implemented.

5.1.2 *SuM PLuS*-Related Outlook: The Physical Education Teacher

Besides personal characteristics, *SuM PLuS*' additional questionnaire variables allow further interesting research on the teacher side. In order to elaborate the gained picture of PE teachers' personal characteristics, sociodemographic data, PE teacher

occupational well-being, and physical activity were examined and can be analyzed individually or in connection with abovementioned personal characteristics.

Occupational well-being research e.g., has gained popularity in general and in relation to the teaching profession in particular (e.g., Bardach et al., 2021; Klusmann et al., 2008; Saaranen et al., 2006; Schaufeli et al., 2009). Especially in the PE context, considering PE teacher well-being and highlighting accompanied strategies in order to positively influence PE teaching outcomes as well as teacher attrition seems relevant because of the subject's immanent stressors (Thomas et al., 2019). In the general educational context, trainable teacher competencies which promote teachers' occupational well-being are considered in regard to effective teaching (Eckert & Sieland, 2017). Teacher occupational well-being substantially influences teacher-student interactions and by this teaching (Collie et al., 2015). Vice versa, teachers' and students' interpersonal relationship predicts teachers' joy (Hagenauer et al., 2015) and in consequence well-being. Analyzing PE teachers' occupational well-being brings along promising implications in two ways: 1) contributing to teachers' health and by this professional development and in turn also impact on societal level as highlighted in Section 4.4 and 2) contributing to teaching and related outcomes especially considering teacher-student interactions.

SuM PLuS' research strand considering PE teacher physical activity stems from mostly student-oriented research discussing the ideal or desired PE teacher. Here students describing their PE teachers ascribed special importance to the PE teachers' physical appearance including their cognitive competence or expertise as well as fitness and within this highlighted desired competencies. This fact links to Gerber's (2015) abovementioned stress factor for PE teachers: PE teachers' competence is constantly visible and demanded by their students. PE teachers obtain a double role model function. Their competence is physically as well as cognitively described. The physical aspect, e.g., PE teachers' competence to physically perform and explain lesson content or interact and take part in physical activity involving lesson sequences, is unique for the subject. Research in the PE context should therefore also include aspects of PE teachers' physical competence in relation to their occupational well-being or further outcomes on the teacher as well as the student side. This data represents a valuable and context-specific addition to PE teachers' professional teaching competence. Both ideas – the importance of PE teachers' occupational well-being as well as their physical activity – appeared in the preceding scoping review (see Article 1), which has influenced *SuM PLuS'* study design.

In order to fulfil the project's aim to analyze student motivation in PE within the consideration of teacher as well as student person-related factors, *SuM PLuS* examined

teaching behavior via teachers' provided basic needs support and accompanied students' perceived basic needs satisfaction as positive predictor of student motivation. To the best knowledge of the thesis' author, *SuM PLuS* is the first study examining student basic needs in the PE context from both perspectives – teachers and students – being able to match the two datasets by the use of anonymized codes. This represents an innovative solution adding to existing research and accompanied demands of a multifaceted as well as multilevel approach in order to tackle the problem of declining motivation in PE within adolescence. More precisely the existing data and accompanied prospective analyses comparing teacher ratings of their teaching behavior with students' perception allow drawing valid conclusions on PE teaching outcomes. These analyses complement and build on the analyses of the key players' personal characteristics within this dissertation thesis and particularly provide PE teachers with teaching-related implications.

In addition to the abovementioned practical implications considering PE teachers' as well as students' personal characteristics, the research team in future work intends to transfer prospective results considering basic needs into recommendations for PE teachers and communicate these directly to PE teachers in schools, e.g., via professional training courses. On an indirect level, prospective results can also be valuable for PE teacher education and accompanied courses. This approach responds to existing research's request to complement information on teachers' personal characteristics by valuable information considering tangible teaching behavior and thus implementation of teacher professional competence in practice. Further, relationships between PE teachers' personal characteristics and their teaching behavior can be analyzed. This additive information and knowledge gain lead to direct courses of action that by their concreteness likely receive great acceptance of practitioners in schools or teacher education, which are responsible for the results' implementation in practice.

5.2 Students in the Physical Education Context

5.2.1 Dissertation-Related Outlook: Students in the Physical Education Context

On the student side, the thesis' results can in many aspects be widened in a comparable methodological way to suggestions considering the PE teacher sample (see Section 5.1.1). This section will highlight future research with the existing and already

worked with dataset in regard to the underlying research question considering personal characteristics.

First, in order to evaluate the personal characteristics' practical relevance, their relationships to teaching outcomes, e.g., students' motivational regulation or performance in PE can be analyzed – either separately for the individual characteristics in order to distinguish their importance or agglomerated.

Second, by the means of cluster-analytical methods, the so far individual configuration of personal characteristics can be jointly presented in student types and thus enrich the description considering students' personal characteristics. Clustering becomes especially important on the student side, as PE teachers typically are confronted with heterogeneous and big student groups, which they have to adequately address in their lessons. Results from e.g., cluster analyses would add to the existing profound and comprehensive description in this dissertation thesis (see Article 4 or the corresponding dissertation thesis for a closer consideration), which so far mostly allow for implications on a general level and in relation to the examined groups (e.g., different genders). Student types would provide a manageable and tangible tool for PE teachers when planning or reflecting on their PE lessons and by this, similar to the idea on the teacher side, concretize e.g., Döhring and Gissel's (2016) global guidelines. Ideally, PE teachers can easily allocate students to one type and by this consider the individual student types' requirements when lesson planning and teaching. This reduces the complexity immensely and again by its concreteness most likely increases the acceptance to consider the empirical results in teaching among practitioners.

Third, students' personal characteristics could also be analyzed longitudinally. By this, the theoretically assumed developable nature of motivational characteristics, e.g., students' physical self-concept can be verified and consequences for stakeholders within students' school career developed. Further, by intervention studies, PE's role and impact within students' personal development can be explicitly examined and implications for targeted personality development deduced. Last, also on the student side, observational studies could increase the link to teaching's action level and enhance the gained picture.

5.2.2 *SuM PLuS*-Related Outlook:

Students in the Physical Education Context

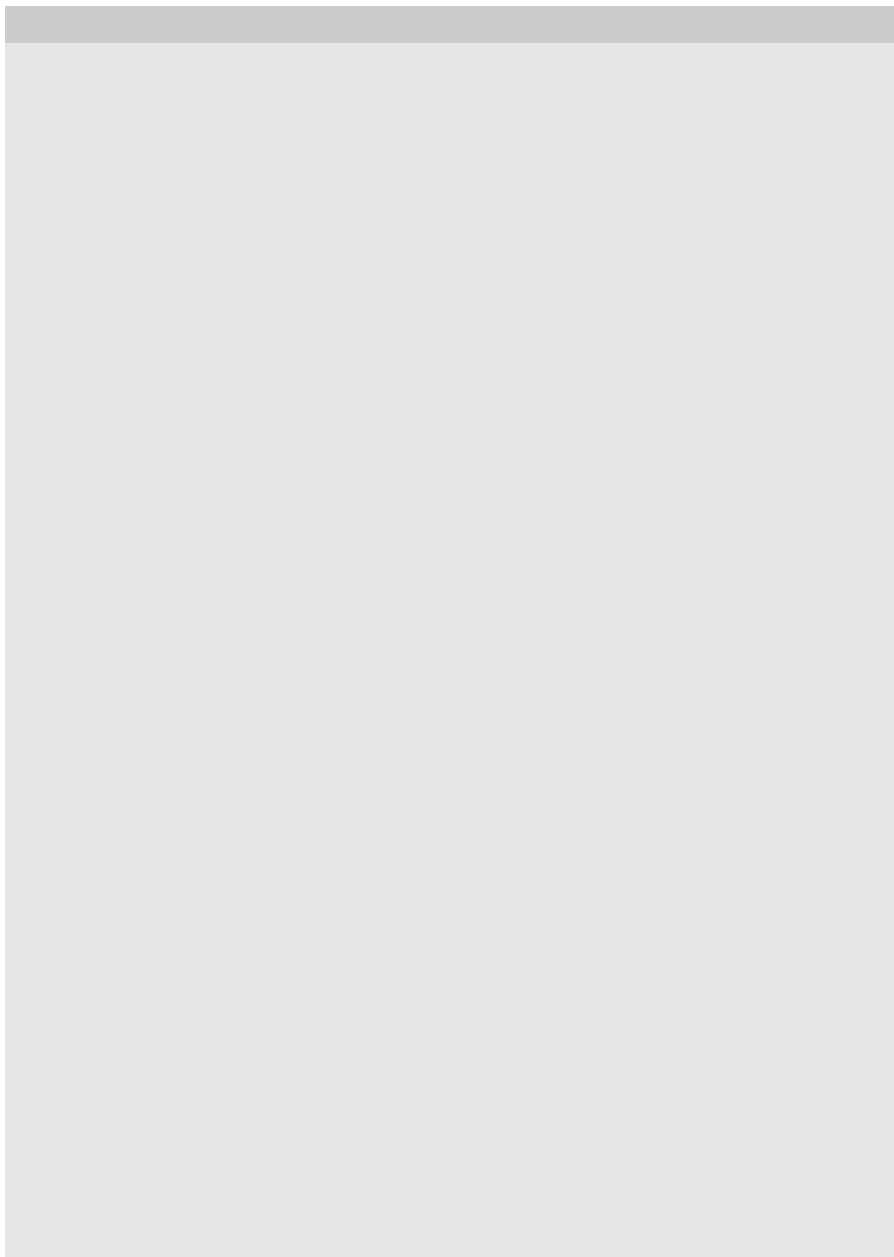
Besides students' personal characteristics, *SuM PLuS* has examined sociodemographic data, student sport club activity, PE participation and perception, and general

information regarding PE (see Table 2). This additional information leaves the thesis' focus on the PE context. It is essential though in order to class PE's role and opportunity in contributing to a healthy lifestyle in general and in comparison to out-of-school settings in particular. Similar to data on the teacher side, information on students' sport club activity as well as further examined sociodemographic data (e.g., migration background) can therefore elaborate the present description of students and by this facilitate or extend the range of practical implications. Additionally, it underlines the subject's context-specificity and provides essential context-related information for targeted teaching.

Students' *perceived basic needs satisfaction* can as mentioned above be compared and linked to PE teachers' self-rated *provided basic needs support*. Further, students' *perceived basic needs satisfaction* can be related to their motivational regulation in PE e.g., in order to receive a comprehensive picture of motivational processes, which can serve as starting points for further practical implications aiming to enhance student motivation within PE lessons.

Overall, the thesis' analyses plus highlighted future analyses within *SuM PLuS'* extensive dataset, on the one hand allow a comprehensive description of PE's key players in order to align teaching as well as PE teacher education and professional training. On the other hand, the work adds to existing research on individual factors in the PE context or within general educational research and by this responds to prevailing demands. It particularly ties in well with educational research's demand of multilevel approaches, e.g., considering teachers and students in order to effectively and sustainably affect the educational process.

6 Conclusion



With reference to the introductory quote from Theo Bergen – “Great teachers are neither born nor made but they may develop” – this dissertation thesis contributes to PE’s development in general and PE teachers’ development in particular.

Development has guided the author’s dissertation process on a meta-level, both personal development as well as professional development. This dichotomy on a meta-level can be applied to the analysis and description of PE teachers’ role within PE’s development. PE student teachers enter their studies and by this the profession with a certain set of personal characteristics. Knowledge about these can contribute essentially to their personal as well as professional development and by this their teaching. In the last consequence, this has an effect on PE’s success as a subject, which represents a unique alignment among other school subjects and obtains exceptional opportunities to contribute to students’ education by its distinctive physical characterization. Successful PE teaching adequately addressing students has the chance to motivate students for lifelong physical activity and by this raises awareness for and importance of physical activity for a healthy lifestyle. This dissertation thesis has, on the one hand, highlighted that PE teachers as well as teacher educators need to make use of existing personal characteristics and apply this knowledge in lesson planning, teaching as well as reflection. On the other hand, this dissertation thesis has highlighted opportunities for PE teachers’ personal as well as professional development. Both approaches have been innovatively combined and by this contribute to existing research in the educational context and essentially affect PE’s development.

The thesis’ primary goal of describing PE teachers and by this their contribution to PE’s development has been supplemented by the secondary goal of describing students’ characteristics in the PE context in order to enhance and sustainably design development opportunities also on the student side. Development involves opening the narrow consideration of the key players’ role and includes a wide understanding of their requirements in the educational process as well as the consideration of context-specific conditions and relationships in order to adequately address students within PE lessons.

This dissertation thesis has initiated sensitivity and offered first courses of action, which add to existing research and by this initiated *DEVELOPMENT* or metaphorically *MOVEMENT: MOVEMENT* towards the image of PE teachers that are neither born nor made but develop.

7 Appendix

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References

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List of Abbreviations

ANOVA	Analysis of Variance
DSLVB	Deutscher Sportlehrerverband
MANOVA	Multivariate Analysis of Variance
PE	Physical Education
<i>SuMPLuS</i>	Sportunterricht und Motivation: Personbezogene Faktoren von LehrerInnen und SchülerInnen als Determinanten der Schülermotivation (<i>Physical Education and Motivation: Teachers' and Students' Person-Related Factors as Determinants of Student Motivation</i>)

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Summary

The dissertation thesis aims to describe PE teachers' requirements comprehensively. In its theoretical part, the thesis summarizes and analyzes research on PE teachers' personality. The scoping review provides basis for the design of the subsequent empirical part, which analyzes PE teachers' general as well as vocational-specific personal characteristics. On a subordinate level, the thesis in comparable manner (scoping review + empirical study) analyzes students in the PE context. Findings are discussed in terms of their contribution to the research area and their implementation in PE teaching, teacher education or professional training. The thesis is embedded within the research project SuM PLuS (Sportunterricht und Motivation: Personbezogene Faktoren von LehrerInnen und SchülerInnen als Determinanten der Schülermotivation / Physical Education and Motivation: Teachers' and Students' Person-Related Factors as Determinants of Student Motivation).