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Development and evaluation of a training on need-supportive teaching in physical education: Qualitative and quantitative findings

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H I G H L I G H T S

- ▶ We design an in-service teacher training on need-supportive teaching in PE.
- ▶ We collaborate with experienced PE teachers to develop and optimize the training.
- ▶ We use both quantitative and qualitative methods to examine teachers' appreciation.
- ▶ Theoretical framing is of added value in designing and delivering a training.
- ▶ Trainers' authenticity is critical to increase teachers' tendencies to change.

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This study investigated 35 physical education teachers' appreciation of a continuous professional development (CPD) training on need-supportive teaching, embedded in Self-Determination Theory, using qualitative (i.e. focus groups) and quantitative methods (i.e. questionnaire). The findings suggest that teachers highly valued opportunities for active participation, collaboration and experiential learning (e.g. microteaching). Of particular interest was the unexpected essential value they placed on theoretical knowledge. In addition, it was critical to be authentic to the content by delivering the training in a need-supportive fashion. Implications for the use of theory and the relevance of congruent teaching in the wider CPD literature are discussed.

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1. Introduction

The gap between educational research and practice is a well-documented and lively debated issue (Vanderlinde & van Braak, 2010). Specifically, practitioners frequently criticize theoretical models and reflections on education and didactics for their perceived lack of practical value to challenges faced by today's school teachers (Mullen, 2003). Yet, it remains important for in-service teachers to engage in continuous professional development (CPD) since a year-on-year update of innovations in

educational practice and an assimilation of new knowledge, skills and expertise is likely to enhance the quality of students' learning (Fishman, Marx, Best, & Tal, 2003). Whereas current CPD programs tend to treat teachers as merely receivers and transmitters of knowledge, alternative models of CPD increasingly argue in favor of a social constructivist perspective (Behets & Vergauwen, 2006; Kirk & MacDonald, 1998), in which the participation of teachers in inquiry and research to facilitate their engagement in reform and improvement is encouraged (Casey, 2010; Groundwater-Smith & Sachs, 2002). Illustrative of this trend is the growing popularity of action research or 'practitioner' research (Reason & Bradbury, 2008) and design-based research (Cobb, Confrey, diSessa, Lehrer, & Schauble, 2003; The Design-Based Research Collective, 2003), in which teachers and researchers collaborate to address key issues of concern with the

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aim of meaningfully improving their strategies, practices and knowledge of the classroom.

Previous CPD research focusing on education (e.g., Altrichter & Posh, 2009; Day, 1999), and physical education (PE) in particular (Armour & Makopoulou, 2012; Armour & Yelling, 2004, 2007; O'Sullivan & Deglau, 2006), indicated that teachers expect CPD to be relevant and applicable, to be delivered by a good presenter who understands the real world of teaching, to be challenging and thought provoking, and to offer time for reflection and collaboration. With respect to PE, it is remarkable that PE teachers mainly undertake professional development in sport-specific update courses (Armour & Yelling, 2004). However, according to the governmentally determined standards in Flanders, various elements of personal, social and emotional development and the adoption of a physically active and healthy lifestyle are also important student learning goals. Consequently, CPD addressing a wider range of topics is needed to optimize the profession. As students' motivation is one of the major concerns among PE teachers, CPD on strategies to optimally motivate students toward PE will be of additional value to the profession. For example, teachers indicate that students are not always willing to put effort in exercises, to be attentive during instructions, to help the teacher to put the sports equipment ready, etc.

The current paper describes the systematic development and optimization of a teacher training on creating an optimally motivating learning environment for students during PE class based on the principles of a specific psychological theory on human motivation, that is, the Self-Determination Theory (SDT; Deci & Ryan, 2000). Following the example of action research (Reason & Bradbury, 2008) and design-based research (Cobb et al., 2003), experienced secondary school PE teachers were closely involved in the optimization process by qualitatively and quantitatively investigating their appreciation of the training along iterative cycles.

2. The motivating role of the teacher: the relevance of need-support

Over the last four decades, Self-Determination Theory (SDT; Deci & Ryan, 2000) has been established as a well-validated theoretical framework for the conceptualization and investigation of motivation in several life contexts, including classroom settings such as PE classes (see Vansteenkiste, Niemiec, & Soenens, 2010 for a recent overview). SDT also provides theoretical grounds for how the environment can promote optimal forms of motivation, engagement in learning, and continued persistence (Deci, Vallerand, Pelletier, & Ryan, 1991). Critical in this respect is teachers' capacity to support students' basic psychological needs for autonomy, competence, and relatedness. The need for autonomy refers to experiencing a sense of volition and psychological freedom when engaging in an activity and being the initiator of one's own actions (Assor, Kaplan, & Roth, 2002; Deci & Ryan, 2000). Competence refers to feelings of effectiveness when trying to master a task or exercise (White, 1959). The need for relatedness involves the experience of closeness, trust, or friendship in relationships with others (Baumeister & Leary, 1995).

According to SDT, teachers who provide autonomy support, create a well-structured environment, and who are involved and caring will promote students' enjoyment of activities and the autonomous self-regulation of behaviors. Conversely, controlling, chaotic, and uninvolved teachers typically thwart students' psychological needs, further impeding students' autonomous motivation (Deci & Ryan, 2000).

Teachers' autonomy support refers to the interpersonal sentiment and behavior teachers provide to identify, nurture, and

develop students' inner motivational resources (Assor et al., 2002; Reeve, 2009). Autonomy-supportive teachers facilitate students' autonomy by offering the desired amount of choice and allowing opportunities for initiative-taking (e.g., Mouratidis, Vansteenkiste, Lens, & Sideridis, 2011; Patall, Cooper, & Wynn, 2010; Ward, Wilkinson, Graser, & Prusak, 2008), by acknowledging students' perspectives, problems and feelings (e.g., Deci, Eghrari, Patrick, & Leone, 1994), and by providing a meaningful rationale for learning goals and activities (e.g., Jang, 2008; Reeve, Jang, Hardre, & Omura, 2002). Beside these rather verbal or instructional strategies, autonomy-support also includes more content-related teaching behaviors such as presenting interesting, relevant, and enriched activities and optimal challenge, and by sparking off curiosity and enthusiasm (e.g., Jang, Reeve, & Deci, 2010). In contrast, controlling teachers adhere to a teacher-centered agenda by relying on outer sources of motivation (e.g. directives, deadlines, incentives, and threats of punishment) and using pressure-inducing language to influence students to think, feel, or behave in a particular way (e.g., Reeve & Jang, 2006; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004).

Students' need for competence is fostered when they experience their classrooms as well-structured. Structure refers to the amount and quality of information teachers provide about their expectations and ways of effectively achieving desired course-related outcomes (Reeve & Jang, 2006; Skinner & Belmont, 1993). Teachers provide structure by clearly communicating guidelines and expectations to initiate a learning activity (Jang et al., 2010; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009), by offering sufficient guidance during the lesson and by providing step-by-step directions thereby following the pace of the learners (e.g., Jang et al., 2010), and by giving positive and constructive feedback (e.g., Koka & Hein, 2005; Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008) to help students build on their skills and sense of competence. Chaotic teachers, on the other hand, create confusion among students by giving unclear instructions, by exerting an illogical and incoherent structure when offering the tasks or exercises, and by expressing ambiguous feedback or even destructive criticism (Reeve & Jang, 2006).

Finally, teachers are involved when demonstrating sincere concern and unconditional regard (Grolnick & Ryan, 1989; Sheldon & Filak, 2008) and by providing emotional support (Cox & Ullrich-French, 2010; Cox & Williams, 2008), whereas uninvolved teachers are characterized by indifference and a lack of interest in their interactions with students. Teachers' interpersonal involvement nourishes students' need for relatedness with teachers and peers and is considered a fundamental motivator for students (Connell & Wellborn, 1991; Deci & Ryan, 2000).

Although the benefits of autonomy-support, structure, and interpersonal involvement on students' need satisfaction and intrinsic motivation have been confirmed in several correlational studies (e.g., Ntoumanis, 2005; Taylor & Ntoumanis, 2007), intervention studies testing whether teachers can learn to adopt a more need-supportive style are relatively scarce, especially in the context of physical education.

3. Interventions on the promotion of need-supportive teaching in education

In a recent meta-analysis, Su and Reeve (2011) summarized the findings of 19 intervention studies in which socializing agents were trained to adopt a more autonomy-supportive and less controlling interpersonal style. Specifically, research with pre-service teachers (Reeve, 1998), middle and high school PE teachers (Chatzisarantis & Hagger, 2009; Tessier, Sarrazin, & Ntoumanis, 2008, 2010) and academic high school teachers (Reeve, Jang, Carrell, Jeon, & Barch,

2004) demonstrated that teachers can learn to become autonomy-supportive during instruction by means of a training. In addition, students of these trained teachers were found to substantially benefit from increased autonomy-support in terms of their motivation and course-related outcomes.

Although the content of these training programs slightly differed across the studies, some elements systematically returned. First, the majority of the programs entailed a group-delivered information session in which the basic tenets of SDT were introduced including different types of student motivation and teaching styles. Second, empirical evidence was presented to support the beneficial effects of autonomy-supportive teaching on students' functioning and well-being. Finally, all programs consisted of a more practice-oriented section in which teachers had the opportunity to exercise the strategies. However, considerable variation in these practice-oriented sections existed across studies, ranging from writing an essay on how strategies can be implemented in the classroom (Reeve, 1998), over a study-specific interactive website where teachers can access audio-visual clips to translate the strategies to their own class situation (Reeve et al., 2004), and group work activities (Tessier et al., 2008), to a 2-h session where teachers are invited to analyze their own teaching style based on video images recorded before the training (Tessier et al., 2010).

Based on the meta-analysis, a set of prerequisites for effective trainings increasing teachers' autonomy support, could be identified (Su & Reeve, 2011). Specifically, highly effective training programs were structured in ways that trained multiple elements of autonomy support and were presented in relatively brief (1–3 h) sessions in a laboratory training setting that focused on skill-based activities and utilized multiple types of media to deliver the content.

Despite their evidenced-based effectiveness, at least two shortcomings can be noted in this literature. First, prior studies mainly focused on either a conglomerate of autonomy-supportive strategies or on a single autonomy-supportive strategy (e.g., choice), thereby leaving out features of structure and interpersonal involvement. However, autonomy support, structure, and interpersonal involvement are not independent, but rather complementary dimensions of a teacher's interpersonal style, so that students' motivation will thrive most when an autonomy-supportive teaching style is accompanied by a well-structured learning environment (Jang et al., 2010) and the presence of high interpersonal involvement (Skinner & Edge, 2002). Yet, Tessier et al. (2010) included some strategies to provide structure and being interpersonally involved into their training program and further expanded previous findings by showing that PE teachers can learn to be need-supportive on all three dimensions.

A second shortcoming is that in previous SDT-based intervention studies no attempt was undertaken to involve teachers in the development of the training. Also, to our knowledge, no previous study has focused on teachers' evaluative appreciation of the training. Yet, to help bridge the gap between research and practice in PE, it is important and relevant to maximally involve PE teachers in the development and optimization of a training. Doing so would help to gain insight in teachers' specific wishes, interests and expectations, which in turn would engender a greater willingness to try to implement the proposed strategies and being persistent in the changes made in their teaching repertoire over time.

4. SDT's viewpoint on designing motivating trainings

In line with the literature on congruent teaching suggesting "to teach what you preach" (e.g., Swennen, Lunenberg, & Korthagen, 2008), it is instructive to discuss the way how a teacher training

can best be developed from the SDT-perspective. Not only students are motivated toward a PE course when their basic psychological needs are fulfilled, but also teachers are more likely to accept and internalize the message brought during the training when their basic needs are met. Consequently, a teacher training is hypothesized to be more successful when presented in a need-supportive way. The more this is the case, the more teachers are said to become convinced of the value and effectiveness of the proposed motivating strategies and the more they will enjoy the training. This, in turn, increases the chance that they will implement the proposed strategies in their own PE lessons and will recommend the training to colleagues. In line with this general claim, Gagné, Koestner, and Zuckerman (2000) found that employees of a company in transformation were more likely to accept the organizational change if they perceived their employers to adopt a need-supportive style in communicating and implementing changes.

To meet teachers' need for autonomy, they need to actively participate and to be given the opportunity to voice their opinion. When teachers' doubts and critical thoughts are suppressed, they will not have the feeling they can be themselves during the training, hence blocking their experience of autonomy need satisfaction. Further, it is critical that the training provides opportunities for teachers to feel successful in applying the proposed motivating strategies (i.e. competence satisfaction). This implies being detailed and specific on the way teachers can implement need-supportive teaching strategies and providing guidance as to help overcome any obstacles to implementation. Finally, it is also important that teachers experience a sense of connection or closeness with both the trainer and fellow participants in the training (i.e. relatedness satisfaction).

5. The present study

The purpose of the present study was to develop a training for PE teachers on how to create a need-supportive learning environment. The systematic and research-based development and optimization process occurred as an iterative design process featuring cycles of planning, implementation, response and revision in close collaboration with experienced in-service PE teachers (i.e. design-based research; Cobb et al., 2003). When developing and refining the training, special attention was paid to the method of delivery by applying relevant SDT-principles of need-support such that PE teachers would come to voluntarily accept our message (i.e. congruent teaching, Swennen et al., 2008). In this research we made no attempt to evaluate the impact of the training on either PE teachers' teaching behaviors nor students' outcomes; instead we used both quantitative and qualitative methods to advance our insight in teachers' appreciation of the training in order to optimize its content as well as its method of delivery.

6. Method

6.1. Development of the training and procedure

An extensive literature review and several meetings with experienced PE teachers and experts in the field of interventions in the educational context resulted in an initial standardized half-day (i.e. 3 h) training consisting of three parts: (1) *Part I*: theoretical background, (2) *Part II*: overview of motivating teaching strategies, and (3) *Part III*: application exercise.

In *Part I*, SDT was introduced as the theoretical framework. Through interactive exercises the qualitative distinction between autonomous and controlled forms of motivation and amotivation was elucidated. PE teachers were invited to share concrete

examples from their daily lives (e.g., 'Are you attending this training voluntarily or because the principal told you to do so?'). From this perspective, the focus gradually shifted from PE teachers' motivation to students' different motives to participate in PE. By sharing experiences, a sense of connectedness among the participants was created. Furthermore, starting from teachers' insights in and awareness of their personal functioning is likely to increase their appreciation of the message and their willingness to participate and change, because of the experienced autonomy satisfaction. In addition to motivational regulations, the concepts of need satisfaction and need support were introduced and empirical evidence was provided to support the argument that when students feel supported in their needs for autonomy, competence and relatedness, they better enjoy PE and acknowledge the value and personal benefits associated with PE.

Part II existed of an overview of specific instructional strategies to create a more need-supportive class environment promoting an optimal motivation. During this part, teachers were presented eight concrete strategies to support students' needs for autonomy and competence. With regard to autonomy-support, (1) adopting an empathic attitude, (2) providing choice, (3) offering a rationale, and (4) integrating fun elements, were put forward. As for structure, PE teachers were provided with strategies such as (1) giving an overview and communicating expectations, (2) offering help, (3) giving positive feedback, and (4) encouragement. To avoid an overload of information and because relatedness-support often co-occurs with autonomy-support and even structure, involvement-promoting strategies were not presented as a separate category, but rather as general basic teaching qualities that help support autonomy and provide structure (Reeve & Jang, 2006). For each of the eight strategies the applicability and feasibility was illustrated by concrete practical examples and video images of authentic PE classes. For the selection of these videos 116 secondary school PE classes in Flanders were videotaped. For 27 of these classes permission was obtained from both teachers and students to use the video images as 'good practices'. The video images used in the training were selected out of these 27 videotapes.

In *Part III*, PE teachers were given the opportunity to practice the proposed motivating strategies. In groups of three or four, teachers received a paper version plan of a volleyball lesson and were asked to revise or optimize this plan by integrating as much proposed strategies as possible. They had about 15 min to finish this paper-and-pencil exercise. In the next 15 min, the proposals and alternative actions were exchanged and discussed with the whole group.

This training was evaluated and revised by presenting it to PE teachers in the field and by systematically improving its content and method of delivery based on teachers' responses on an appreciation questionnaire and their feedback and suggestions given during focus group discussions.

Four schools voluntarily agreed to participate in the study and the training was offered as a professional development training for PE teachers on a students' day off. The training was delivered to all PE staff within the same school. PE teachers appreciated that a more specific session was organized for them during a professional development day, where attendance of all teachers, including PE teachers, was required by the school principal. Immediately after training, PE teachers were presented with a questionnaire to obtain quantitative data on the acceptability and feasibility of the training. Focus groups took place in the afternoon and followed a standardized protocol based on established guidelines about planning and conducting focus group discussions (Krueger, 1998; Morgan, 1998).

In accordance with the principles of design-based research (Cobb et al., 2003), the appreciation of the training was repeatedly checked in the four participating schools resulting in a revised training from

one group to another. Data collection took place from October 2010 to January 2011, ensuring enough time to implement revisions between different training sessions. The initial training (i.e. Training I) was presented to and evaluated by group 1 (school 1). Next, the appreciation of a first revision was evaluated in group 2 (school 2) (i.e. Training II). A second revision was then presented to and evaluated by group 3 (school 3 and 4). Because no substantial changes were made from the third to the fourth school, the results of these two schools were combined (i.e. Training III). Accordingly, the optimization of the training was effected along three iterative cycles.

6.2. Participants

Four focus group discussions were conducted with a total of 35 PE teachers (20 men, 15 women; M age = 36.74 ± 11.05 years) from four different secondary schools in Flanders (see Table 1). The number of participants per focus group ranged from 6 to 10. Twenty-six percent of the teachers taught PE in academic education, 42.5% in technical education, and 31.5% in vocational education. All secondary school grades were represented, with 17% of the teachers teaching in 7th–8th grade, 42% in 9th–10th grade, and 41% in 11th–12th grade. PE teachers had on average about 14 years ($M = 13.77 \pm 11.20$ years) of teaching experience (range from 2 to 36 years). From the participating teachers, 54.3% obtained a master degree in movement and sport sciences at university, whereas 45.7% had received an education at college level (i.e. bachelor in education).¹

6.3. Measures

6.3.1. Appreciation questionnaire

Immediately after the training, PE teachers were asked to independently complete a questionnaire tapping into their appreciation toward several aspects of the training. The questionnaire included two sets of items to be rated on a 5-point Likert scale from 1 (*totally disagree*) to 5 (*totally agree*) and is represented in Table 2. The first set of items included the *acceptability* of the three parts of the training in terms of (1) *Interaction*, (2) *Innovation*, (3) *Interest*, (4) *Intelligibility*, and (5) *Essentiality*. The second set of items included general statements on the *practical usefulness* and *feasibility* of the motivating strategies, the *intention to implementation* and the extent to which one would *recommend* the training to others.

6.3.2. Focus groups

Focus groups were chosen in addition to the self-report questionnaire for several reasons. The flexible questioning and synergetic effect of group conversations increases the likelihood that data and ideas will be produced that would remain uncovered with exclusive reliance on a self-reported questionnaire. Also, the direct interaction between researcher and teachers allows for in-depth discussing divergent thoughts and feelings about different aspects of the training in a safe and comfortable environment. Focus groups are furthermore valuable as a first research step in optimizing the training and generating ideas about possible effective strategies for future intervention studies.

Before the focus group discussion started, teachers were asked to fill out an informed consent and a short registration form. Permission to audio- and videotape during the session was

¹ In the Flemish educational system PE teachers can be trained at university colleges or at university. Students granted by university colleges are professional bachelors, in the case of the present study bachelors in secondary education – physical education. Students granted at university receive an academic master degree in movement and sport sciences.

Table 1
Overview of the focus groups conducted in four secondary schools.

	N	Gender	Age M (SD)	Range	Teaching experience M (SD)	Range	Pre-service teacher training
Focus group 1	6	2 men/4 women	31.00 (3.03)	28–35	8.50 (3.27)	6–14	3 university/3 college
Focus group 2	9	6 men/3 women	34.11 (10.96)	25–55	8.38 (9.09)	3–30	7 university/2 college
Focus group 3	10	8 men/2 women	34.20 (8.73)	25–52	12.71 (10.47)	3–30	4 university/6 college
Focus group 4	10	4 men/6 women	46.00 (12.46)	23–57	22.00 (12.44)	2–36	5 university/5 college

requested. All four focus group discussions were facilitated by a trained moderator, who was familiar with the questioning route and the goals of the study. To stimulate free communication among the teachers, the moderator was different than the trainer and the trainer was not present during the discussion. Focus group sessions started with explaining both the purpose and the procedure of the discussions. The moderator was assisted by a co-moderator, who was responsible for handling logistics, taking notes and monitoring the recording equipment. Furthermore, to conclude the focus group discussion, the co-moderator briefly summarized the main points of view and asked the teachers whether this perception was accurate. After each focus group session, the moderator and co-moderator debriefed; they discussed unexpected findings, notable quotes and possible differences with previous focus group sessions.

An entire focus group interview lasted on average 49.5 (SD = 18.43) min. Schools were asked to provide an empty, comfortable and neutral room to conduct the focus groups. All sessions were audio- and videotaped and recordings were later used to perform a content analysis of the conversations.

The protocol included a semi-structured questioning route that was developed to ensure consistency in questions asked across groups. The main themes covered in the focus groups were (1) *content* of the training, including the theoretical background, the motivating strategies, and the application exercise, and (2) *method of delivery*, including the didactical approach (video-images, practical examples and interactive exercises) and the support of teachers' psychological needs (i.e. congruent teaching).

6.4. Analyses

With respect to the qualitative data, thematic content analysis (Aronson, 1994) was used to analyze the focus group transcripts using the software program NVivo Version 9.0 (Gibbs, 2002). Two researchers independently conducted a priori (deductive) content analysis on each of the four transcripts. The transcripts were coded

Table 2
Items of the appreciation questionnaire: acceptability, practical usefulness, feasibility, intention to implementation and recommendation.

	Items
Acceptability	
Interaction	Part I/II/III of the training was sufficiently interactive
Innovation	Part I/II/III of the training was innovative
Interest	Part I/II/III of the training was fascinating and interesting Part I/II/III of the training arose my interest in this subject
Intelligibility	Part I/II/III of the training was easy to understand Part I/II/III of the training showed a logical coherence
Essentiality	Part I/II/III of the training is essential to the whole training
Practical usefulness	The motivating strategies are useful for my PE lessons
Feasibility	The motivating strategies are feasible
Intention to implementation	I have the intention to implement the motivating strategies in my PE lessons
Recommendation	I would recommend this training to colleagues

using a presupposed tree structure, including 11 'parent' nodes representing the different topics of the focus group questioning route, which were subdivided in one or more 'child' nodes. Subsequently, these topics were thematically reorganized distinguishing between content-related comments and comments related to the method of delivering the training.

With respect to the quantitative data, PASW 18.0 was used to analyze demographic and questionnaire data. First, repeated measures analyses of variance were used to assess PE teachers' global appreciation in terms of Interaction, Innovation, Interest, Intelligibility, and Essentiality across the three parts of the training (i.e. within-subject analyses). Accordingly, the part of the training was entered as an independent variable (i.e. within-subject factor), and repeated measures of the five acceptability variables were entered by turns as dependent variables. The overall mean for each variable was calculated, representing the mean across the different parts. A polynomial default for the within-subject factor was selected to test for linear and quadratic associations. Second, bivariate correlations were calculated to map out how the appreciation of the training is related to the practical usefulness and feasibility of the proposed motivating strategies, the intention to implement the strategies, and the extent to which the training is recommendable to others. Therefore, mean scores for the appreciation of Part I, Part II and Part III, respectively, and the global appreciation of the training were calculated.

7. Results

7.1. Qualitative evaluation of the training

In the description of the focus group findings a distinction is made between the content of the training and the method of delivery, each including relevant themes that arose during the discussions.

7.1.1. Content of the training

7.1.1.1. Theoretical background. All PE teachers agreed that the provision of theoretical background is an essential component, as it is considered an indispensable base to proceed to the more practical part. Specifically, the interactive exercises illustrating the different types of motivation made teachers aware of the different reasons students can have to engage in PE class. Through these exercises teachers were given the opportunity to get familiar with the concepts of SDT, which they valued positively as shown by the following quotes: 'Theoretical framing is always important. Without this information, I don't really think you know what you're doing.' (Training I), and 'It's a starting point, it has to be part of the training, the rest builds on that theory.' (Training I).

Despite its perceived essentiality, teachers reported that too extensive theoretical framing might go beyond its usefulness: 'I don't really think it is useful to bring that theory so extensively. (...) I would reduce it to a minimum' (Training I). PE teachers rather preferred a shorter introduction to have more time left for putting the motivating strategies into practice. For example, a teacher commented: 'It's not that the theory is long-winded, but there

wasn't a good balance between theory and practice' (Training III). More particularly, complex figures and models adopted from scientific publications were suggested to be removed.

7.1.1.2. Motivating teaching strategies. In Part II, PE teachers were provided with four autonomy-supportive and four structure-related strategies. Although PE teachers found it important to discuss structure-related strategies, they wanted to deal with these strategies rather quickly as to have more time left to discuss the autonomy-supportive strategies in greater detail. For example, some teachers suggested reversing the order of the strategies: 'Actually the overview should start with the structure-related strategies, followed by the autonomy-supportive strategies' (Training I). The majority of the PE teachers indicated that the structure-related strategies and specific guidelines were not entirely new to them. For example, a teacher commented: 'It is not entirely new, because I think everyone of us already uses several of these strategies' (Training II). Particularly offering help, providing positive feedback, and encouragement were strategies that teachers reported to use frequently in their PE classes and were considered fairly repetitive of what they had already studied during pre-service teacher training. In contrast, autonomy-supportive strategies were considered more innovative, useful and necessary to motivate students as shown by the following comments: 'Well, I think we can learn the most from autonomy-support. Structure we are already quite familiar with (Training I).' and 'Yes, it's really autonomy-support that is most useful for PE teachers in the field (Training I).'

It seemed important that the overview of motivating strategies is exhaustive: 'It is good to get an exhaustive overview now and then and I'm happy to have heard it again, because after a couple of years everything has a bit grown dim'. Yet, teachers held the opinion that the overview of motivating strategies should neither be too time-consuming nor contain too much information, so that there is sufficient time left to practice these strategies in a more authentic situation. A teacher for example commented: 'The content of the strategies sounded quite familiar to me. I think it would be more useful for us to go more deeply into the practical application of the strategies.' (Training II), another teacher held: 'Personally I found the overview of the strategies too long-winded, especially in comparison with the time we had to practice them in the gymnasium. I think that could really be cut down a little.' (Training III). On the other hand, several teachers expressed their need for 'very specific and concrete guidelines that are immediately applicable to their PE classes' (Training I) and they suggested that 'it is useful to sufficiently elaborate on these guidelines by means of concrete examples and exercises' (Training II).

7.1.1.3. Application exercise. All PE teachers agreed that Part III was the most important and useful part since it provided opportunities to put the motivating strategies into practice. However, the initial paper-and-pencil assignment, in which teachers received a plan of a volleyball lesson and were asked to integrate as much motivating strategies as possible on paper, was a long way off their expectations about a practical session. For example, one of the teachers asked: 'For what reason was there no practical part? (...) I think it would be more fun to do a practical session in the gym' (Training I), and another said: 'We actually thought we had to bring our sports suit' (Training I). Teachers were convinced that 'they would learn more about the motivating strategies if they would be given the opportunity to experience them in a teacher-student situation' (Training I). Additionally, PE teachers perceived volleyball as a technical, and hence, fairly difficult sport to exercise the implementation of the proposed strategies for the first time, which may preclude opportunities to feel successful and effective in implementing these strategies. For example, a teacher commented:

'I don't think volleyball is the best topic you can take here. (...) It is one of the most difficult sports' (Training I). Another teacher suggested: 'Wouldn't it be interesting, because we now all had to teach the same topic, to have four different lesson plans?' (Training I). It seemed that providing lesson plans for different topics or exercise domains would allow teachers to experience how the motivating strategies can be implemented across different PE class topics.

Whereas most comments of the teachers resulted in gradual revisions along the different cycles, a radical change was made to the application exercise (i.e. Part III) from Training I to II based on teachers' abovementioned suggestions. First, teachers found it useful to double the duration of Part III leaving them with 1 h instead of 30 min to exercise the motivating strategies. As a result, PE teachers would receive a better chance to express their concerns and doubts. Secondly, volleyball was dropped as the subject of the lesson plan and replaced by three other PE class topics (gymnastics, basketball, and rope skipping), from which PE teachers could choose. As a final change, we moved the application exercise from the classroom to the gymnasium, because 'PE staff enjoy being physically active during in-service training sessions' (Training I). Each group of three or four PE teachers received a paper version of a lesson plan and had about 15 min to amend the lesson by implementing both autonomy-supportive and structure-related strategies. Next, every group had about 10–15 min to teach (a part of) their lesson to the other groups (i.e. microteaching). Afterward, the trainer provided feedback and suggestions for improvement, thereby focusing primarily on what the teachers did well to increase their confidence in applying the recommended strategies.

7.1.2. Method of delivery

7.1.2.1. Didactical approach. The use of practical examples and video fragments was considered a meaningful didactical method to illustrate the proposed motivating strategies in concrete PE situations. For example, a teacher commented: 'The video images are a good way to bridge the gap between theory and practice' (Training I). However, there seemed to be room for improvement, since teachers noted that the practical examples could often be more innovative and original as is clear from the following comment: 'I expected something really innovative. I would have liked some very original and useful guidelines on how the strategies can concretely be applied' (Training II). In addition, teachers seemed concerned about the representativeness of the video fragments for several reasons. First, it was suggested to include video fragments with 'bad practices' as well to get a more inclusive picture on how certain teaching practices can be both need-supportive and need-thwarting for students. For example, a teacher suggested: 'Maybe you could also show a 'bad' fragment. (...) I think the strategy sometimes just doesn't work or doesn't work as intended' (Training I). Furthermore, the video images seemed to exclusively represent classes where nothing goes wrong in terms of class management and student behavior as is illustrated by the following comment: 'I wonder if you'd also have some video fragments of classes where the students don't cooperate or don't listen to the instructions, because in our classes that is often the rule rather than the exception' (Training III). Finally, PE teachers, and especially those teaching in technical and vocational education, regretted that the majority of video images included academic education and sports classes. For example, a teacher commented: 'The fragments always show a perfect situation and do not represent our context at school' (Training III). This critique was partially appropriate because the 27 PE classes for which we obtained permission to use the video images as didactical material existed for 63% of academic education classes. Consequently, we were limited in the selection of useful video images from technical and vocational education and we were not able to meet this concern.

Although the training already provided some opportunities for teachers to share their ideas and experience, for several motivating strategies it was suggested to start from a concrete class situation or case study to increase the interaction among the teachers in the audience. The PE teachers believed that exploiting the interactive method even more would help them to better absorb the different strategies and to think more for themselves about concrete problems and possible solutions as shown by the following comments: 'Wouldn't it be more fun to start from a couple of concrete class situations to introduce the different strategies? (...) I think I would remember the strategies better' (Training II), and 'I sometimes had the feeling that when we were asked to analyze a video fragment, the answer was given straight away. I think that there is room for more interaction.' (Training II).

In contrast to the paper-and-pencil assignment, the use of microteaching and role-playing as a didactical approach in Part III aligned better with what PE teachers expected from an application exercise. Many teachers even mentioned they would not mind if the training would take an entire day if they had the opportunity to practice the motivating strategies more intensively and during a longer period as is shown by the following two comments: 'In my opinion, the time we had for the application exercise was too short.' (Training III), and 'If the training would have taken till 4 o'clock [pm], there would have been a good balance between theory and practice.' (Training III).

7.1.2.2. Supporting teachers' psychological needs. In developing and delivering the training, we attempted to nurture teachers' psychological needs for autonomy, competence, and relatedness. Yet, the teachers also provided us with a number of additional suggestions to maximize need satisfaction and engagement during the training. As already noted, PE teachers attached great value to interaction among participants. For example a teacher commented: 'Maybe you can ask the audience for concrete examples from their practical experience? (...) Because then you can immediately start a discussion about certain problems or situations' (Training II). Cases were often put forward as a way to increase the interaction. This shift to a more problem-based learning approach speaks to teachers' need for autonomy, because they can actively participate, are invited to share their experiences and are given the opportunity to voice their opinion. In addition, teachers' need for competence is better met, because they are offered the opportunity to acquire motivational skills in concrete situations. Another suggestion was to reduce the number of video fragments to activate the teachers' thought process and increase their input, because as a teacher commented: 'it's often better to offer less and let the group think more themselves' (Training II). Specifically, this would fulfill teachers' need for autonomy since they are given the opportunity 'to exchange new ideas and to discuss different solutions for very concrete PE class related problems' (Training II).

The inclusion of microteaching and role-playing after Training I also allowed us to better nurture teachers' psychological needs. For instance, to stimulate teachers' initiative-taking and, hence, their feelings of autonomy, one or more teachers per group could take the role of PE teacher and teach a part of the lesson, whereas the others took a student role. Further, the provision of choice between different PE topics not only gave teachers the opportunity to experience how the strategies can be implemented in different PE situations, but also aligned more with the SDT-principles of an autonomy-supportive approach. Finally, PE teachers seemed to find it useful to have one member of the group to serve as an observer on the sideline during microteaching. For example, a teacher commented 'I think it is pretty interesting and informative to have the opportunity to observe each other' (Training II). The observer could take notes of which motivating strategies were used and

provide feedback on the teaching of their own and the other groups before the trainer provided additional feedback. Here again, the call for interaction was prominent as for example a PE teacher reported that 'It is meaningful to have a discussion afterward and to give feedback on each other's teaching' (Training III).

Every training along the three cycles (i.e. Training I, Training II and Training III) resulted in an optimization compared to the previous version, so there was no degeneration to a prior stage in the training. In our view, there were no 'negative cases' and teachers' perspectives actually aligned quite well from one school to another. Table 3 shows a schematic overview of the main changes made across the iterative design cycles.

7.2. Quantitative evaluation of the training

The collection of self-reported data after the training allowed us to examine to what extent focus group findings and quantitative analyses converged or yielded complementary information. Separate repeated measures analyses of variance for each of the five acceptability variables (i.e. Interaction, Innovation, Interest, Intelligibility and Essentiality) were conducted to compare PE teachers' appreciation across the three parts of the training. To this, data from Training I, II and III were taken together. The results in Table 4 indicate that overall, the acceptability scores were rather high with a mean score above 3 for all variables, with the exception of Innovation, further suggesting that on average PE teachers highly appreciated the training. Fig. 1 provides a graphic overview of the trends of the five acceptability variables across the three parts of training. As can be noticed, a significant positive linear association was found for Innovation and Essentiality, pointing to a significant increase in PE teachers' appreciation across the three parts of the training, with the application exercise receiving the highest appreciation, followed by the overview of the motivating strategies, and the theoretical background. A significant negative linear association for Intelligibility shows that PE teachers found the theoretical background more intelligible compared to the overview of the strategies and the application exercise. Further, there was a significant quadratic association for Interest, suggesting that PE teachers judged the theoretical background and the application exercise as more interesting than the overview of the motivating strategies. Finally, both the linear and quadratic association for Interaction were significant, indicating that PE teachers found the strategy overview slightly less interactive than the theoretical background, but the application exercise was rated as most interactive.

Intercorrelations among the study variables are presented in Table 5. The global appreciation of the training was positively correlated with its perceived usefulness and feasibility, as well as with the intention to apply and to recommend the training to colleagues. Interestingly then, when breaking down this global appreciation score into three subcomponents, reflecting the appreciation of the three different parts, a number of specific relations were found. Specifically, whereas the appreciation of the theoretical background and the overview of the motivating strategies (but not the application exercise) was positively associated with the extent to which PE teachers would recommend the training to others, the appreciation of the application exercise (but not of the two other parts) was positively associated with the practical usefulness and the feasibility of the training as well as the intention to implement the proposed strategies.

8. Discussion and conclusions

In an attempt to overcome the perceived research-practitioner gap in education, several models (e.g., action research; Reason

Table 3
Schematic overview of the main revisions to the training along the three cycles.

	Part I: theoretical background	Part II: overview of motivating strategies	Part III: application exercise
Initial content	Introduction SDT: - Types of motivation - Concepts of need satisfaction (autonomy, competence, relatedness) and need support (autonomy support, structure, interpersonal involvement)	Concrete motivating strategies for PE teachers on how to support students' needs: - Autonomy-support: 4 strategies - Structure: 4 strategies Illustrations for each strategy	Application of the motivating strategies
Initial duration	±60 min	±90 min	±30 min
Initial method	Verbal explanation Interactive exercises	Verbal explanation Didactical material: - Video images used as 'good practices' - Concrete PE related practical examples	Paper-and-pencil exercise in small groups (revision of a lesson plan) Class discussion and feedback
Revisions	<i>After Training I</i> - Reduction in number of slides - Deletion of non-essential content <i>After Training II</i> - No changes <i>After Training III</i> - Development of a pocket-sized booklet of the handouts in which solutions are omitted and space is provided to write down the answers and/or personal thoughts	<i>After Training I</i> - Reversing the order of presentation of the strategies from Autonomy support-Structure to Structure-Autonomy support - Addition of video images used as 'bad practices' <i>After Training II</i> - Reduction in number of practical examples to increase the input from the audience - Starting from a 'case' to introduce a strategy in order to improve the interaction with and between the PE teachers <i>After Training III</i> - Subdivision of the strategies in very concrete and useful guidelines - Increase in the number of cases to stimulate active participation and self-reflection - Provision of concrete tools as teaching aids - Repeatedly underlining the link between the specific guidelines and the basic psychological needs	<i>After Training I</i> - From paper-and-pencil exercise to role play and microteaching in the gymnasium - Extension of the duration from 30 min to 1 h - From one topic (volleyball) to different topics (basketball, gymnastics, rope skipping) <i>After Training II</i> - From feedback by the trainer to feedback by fellow PE teachers <i>After Training III</i> - Extension of the duration to an entire day - From feedback by fellow PE teachers to self-reflection - Group discussion to share ideas and voice concerns and obstacles on how to implement the strategies in class

& Bradbury, 2008; design-based research; Cobb et al., 2003) have stressed the continuing cycle of interplay between theory, practice, and reflection as a way to engender changes in teachers' attitudes and practices. In the field of CPD, the engagement of teachers in inquiry and research is said to be essential. Translating this social constructivist perspective (Behets & Vergauwen, 2006) to the context of PE, we developed and evaluated a professional development training on how to create a need-supportive learning environment during PE class for and together with experienced PE teachers. In doing so, we used both qualitative and quantitative methods.

8.1. Content of the training on need-supportive teaching

Following the example of prior intervention studies, we designed our training with different parts of moderate duration.

Except for a supplemental follow-up activity, which we did not include, the training design, involving a theoretical part, a part on motivating strategies, and an application part, is in agreement with recently published suggestions and recommendations for developing and implementing effective need-supportive training programs (Su & Reeve, 2011).

8.1.1. Theoretical background

Existing SDT-based research (Su & Reeve, 2011) and the wider CPD literature (e.g., Day, 1999; O'Sullivan & Deglau, 2006; Pedder, Opfer, McCormick, & Storey, 2010) indicate that the presence of theory-based instruction is viewed as less critical for the effectiveness of a training. However, the PE teachers in our study highly appreciated the theoretical background information (i.e. Part I) to be able to understand and follow the rest of the training. In addition, although teachers recognized the theory from their

Table 4
Means and standard deviations for the appreciation across the three parts of the training.

	Part I: theoretical background		Part II: motivating strategies		Part III: application exercise		Overall mean (SD)	F	η ² _p	
	M	SD	M	SD	M	SD			Linear	Quadratic
Interaction	4.15	0.70	4.12	0.81	4.50	0.56	4.25 (.50)	13.70**	5.43*	.41
Innovation	2.68	0.77	3.06	0.78	3.26	0.83	3.00 (.60)	18.83***	0.93	.47
Interest	3.64	0.51	3.47	0.60	3.62	0.79	3.58 (.52)	0.01	7.82**	.22
Intelligibility	4.41	0.48	4.29	0.41	4.21	0.55	4.30 (.41)	7.42*	0.00	.21
Essentiality	3.82	0.85	4.24	0.75	4.27	0.72	4.10 (.50)	6.20*	1.94	.20

Note. *p < .05, **p < .01, ***p < .001. η²_p = partial eta squared effect size.

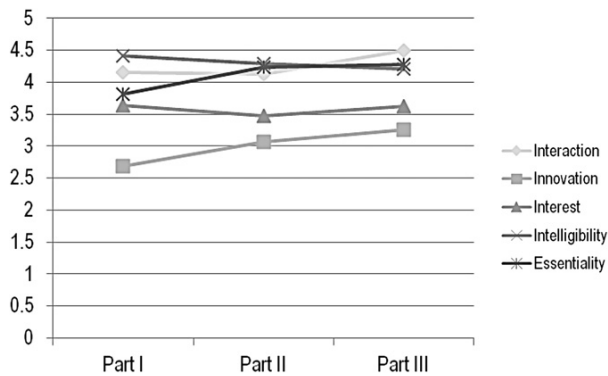


Fig. 1. Overview of the trends of the five acceptability variables across the three parts of training.

undergraduate studies, they admitted that it had 'grown dim' over time. Furthermore, the quantitative data showed that the theoretical background was judged as quite essential and that teachers who positively appreciated this part were more likely to recommend the training to colleagues. So, despite the increasing call for 'practical' and 'relevant' CPD among teachers across the board, this finding indicates that theoretical framing is of added value when designing and delivering teacher trainings.

8.1.2. Overview of motivating strategies

Expanding on existing SDT-based trainings and in line with the argument that it is the combination of high autonomy-support and high structure that best respects students' perspectives (Jang et al., 2010), we included multiple motivating strategies to support both students' needs for autonomy and competence. Although, structure-related strategies were considered largely familiar and obvious, PE teachers agreed upon its indispensable value as an approach to motivate students. On the other hand, autonomy-supportive strategies were found to be more unfamiliar and thus more innovative. This finding is in accordance with the literature (Reeve, 1998; Skinner & Belmont, 1993) and might explain and justify the more explicit focus on autonomy support in previous intervention studies (e.g., Chatzisarantis & Hagger, 2009; Reeve et al., 2004).

Although a positive association was found between the appreciation of Part II and the extent to which teachers would recommend the training to colleagues, the overview of motivating strategies was evaluated as the least interactive and interesting part of the training. Since PE teachers are especially looking for practically relevant and useable ideas in their professional development (O'Sullivan & Deglau, 2006), substantial efforts were made to enhance the intrinsic appeal of Part II. First, strategies that initially were considered as obvious and little innovative, were presented from a different angle, thereby trying to increase their usefulness and value to the teachers. Specifically, we attempted to overcome the evident nature of certain structure-related strategies by (a) subdividing them in less obvious and more specific guidelines, and (b) by highlighting their association with students' basic psychological needs at points where this link was less clear. For example, instead of merely emphasizing the need for a clear communication of expectations, we added that teachers do well to offer a meaningful rationale for their expectations. As for the linkage between the proposed strategies and students' needs, we highlighted, for instance, that providing help is not by definition helpful (see Weinstein, De Haan, & Ryan, 2010), that is, some help – although well intended by the PE teacher – does not build a sense of

competence. To illustrate, students who already master buck jumping² will not develop a sense of competence if the teacher holds their arm while doing the jump; even on the contrary, such unneeded help could be interpreted as a sign of distrust and lack of confidence. Therefore, the seemingly very evident and straightforward strategy 'offering help' was changed into 'offering help when needed', and concrete ways to operationalize this were discussed.

A second change involved the provision of very concrete tools to increase the chance for actual implementation in practice. For example, teachers were given a time line to visualize for students what the lesson program will look like along the school year and stick-on labels that can be used to highlight elements of choice and fun in their lesson plan.

8.1.3. Application exercise

The application exercise, in which teachers exercised the proposed strategies, was most strongly appreciated, especially after changing it from a paper-and-pencil assignment to microteaching in the gym (i.e. after Training II). More specifically, Part III was judged as most essential to the training, because it offered teachers the opportunity to implement the proposed strategies and to exercise and improve their motivating skills in a safe and comfortable PE situation. Moreover, teachers' appreciation of the application exercise was not only positively associated with the practical usefulness and feasibility of the proposed strategies, but also with their intention to effectively implement these strategies in their own PE lessons. In line with recommended principles for CPD design and delivery (O'Sullivan & Deglau, 2006), these results suggest that this part of the training is very valuable as it provides experiential learning opportunities in a setting that is close to teachers' authentic work situation. Furthermore, PE teachers even suggested extending this part by prolonging its duration to an entire day. Therefore, we allocated half a day (i.e. 3 h) for Part I and II, while another 3 h were reserved for practicing the strategies in the gym.

8.2. Delivering the training in a need-supportive way

8.2.1. Didactical approach

Concurring previous research, PE teachers attached a great value to information that is directly relevant and applicable to their instruction (Armour & Yelling, 2007). Especially the use of authentic PE class video images seemed very meaningful as a didactical method to illustrate the proposed motivating strategies. However, the representativeness of these video images raised some concern. Consequently, because the exclusive reliance on 'good examples' may lead teachers to doubt their competencies as if they would fail to teach in the ideal way, a number of bad practices were added (i.e., respectively, four and two of the six video images were 'good' and 'bad' practices).³

Furthermore, the call for more interaction and active participation was a comment that systematically returned across the different focus groups, which is in agreement with previous studies advocating the value of collaborative activities in professional learning (Armour & Makopoulou, 2012; Armour & Yelling, 2007). Therefore, substantial changes were made to the final product of the training to meet teachers' personal interests and to increase the

² A buck is a cylindrical, leather-covered block mounted in a horizontal position on a single vertical post set in a steel frame, used in gymnastics for vaulting.

³ For the selection of these bad practices we relied on video material from a French intervention study on motivating teaching behavior in PE (Tessier et al., 2010), in which permission for use was obtained.

Table 5
Bivariate correlations between appreciation variables and practical usefulness, feasibility, intention to implementation and recommendation.

	<i>M</i>	<i>SD</i>	α	1	2	3	4	5	6	7
1. Global appreciation	3.86	0.31	.77	–						
2. Appreciation theoretical background (Part I)	3.80	0.37	.65	.75**	–					
3. Appreciation motivating strategies (Part II)	3.84	0.35	.51	.84**	.60**	–				
4. Appreciation application exercise (Part III)	3.96	0.49	.77	.75**	.20	.45**	–			
5. Practical usefulness	3.94	0.70	–	.47**	.23	.34	.49**	–		
6. Feasibility	3.94	0.83	–	.35**	.06	.23	.47**	.85**	–	
7. Intention	4.27	0.52	–	.37**	.09	.14	.54**	.48**	.55**	–
8. Recommendation	3.63	0.71	–	.50**	.66**	.57**	.01	.11	.07	.03

Note. ** $p < .01$.

level of interactivity. For example, at the beginning of the training teachers were invited to introduce themselves and to share their expectations. As such, the trainers could better match the training with these expectations, provide examples that are more in line with their viewpoints, and give certain accents along the training. Said differently, the training was better tailored to teachers' wishes and preferences. In addition, fourteen short cases were included as to more interactively engage teachers in reflecting on and discussing about their own and others' teaching (O'Sullivan & Deglau, 2006).

8.2.2. Supporting teachers' psychological needs

Corroborating the concept of congruent teaching emphasizing the importance of attuning learning and teaching (Swennen et al., 2008), we attempted to be authentic (i.e., a good model) to our own message by adopting a need-supportive teaching style. Specifically, we attempted to maximize PE teachers' opportunities to get their basic needs met during the training as to increase their likelihood to accept, implement and persist in the changes in their motivating style. To promote the internalization process of the proposed strategies, we structured the training in such a way that the different parts each met the teachers' basic psychological needs. First, the theoretical background appears to be important to the fulfillment of teachers' need for autonomy, since it includes a meaningful rationale for the substantial role of the PE teacher in influencing students' course-related motivation and outcomes. Second, delivering the overview of motivating strategies in a well-structured and interactive fashion speaks to both teachers' needs for autonomy and competence. Specifically, the provision of detailed, specific, and very concrete guidelines on how teachers can be need-supportive toward students helps to reduce teachers' doubts about their skills and increases their feelings of competence to undertake change in their teaching practice. The use of video images and cases not only makes it more interesting for teachers to reflect on the theory and the proposed strategies, but also provides meaningful opportunities to translate these theoretical concepts and guidelines to their teaching practice. Finally, the microteaching and role-playing exercises are likely to fulfill teachers' need for competence, as they create a comfortable forum for teachers to develop and improve their motivating skills. All through the training, the trainer tries to create a warm environment by being open and friendly and by showing unconditional interest in and respect for teachers' opinions and ideas. The group bond was strengthened by allowing groups discussions and by asking the PE teachers to prepare the microteaching in small groups.

Besides offering the training with a general structure that is largely in accordance with the SDT-principles of need-support, other more specific efforts were made to maximally nurture teachers' psychological needs. For example, a problem-based

learning approach was intensified and more opportunities for discussion and exchanging opinions on different motivating approaches were provided as to fulfill teachers' needs for autonomy and competence. Furthermore, because (self-)reflection plays a critical role in opening teachers' minds toward accepting an alternative teaching style (e.g., Reason & Bradbury, 2008) and is highly valued among PE teachers as a substantial component in CPD (Armour & Yelling, 2004; O'Sullivan & Deglau, 2006), opportunities were created to enhance teachers' insights in whether and how the proposed motivating strategies are related to students' basic psychological needs. For example, after microteaching, teachers in the teacher role first had the opportunity to reflect on their own teaching before letting others give feedback on what they had observed. This shift from feedback from fellow teachers to self-reflection has multiple advantages in terms of need satisfaction, for both the observers and the role players. First, because the trainer did not comment up front on the microteaching, but allowed the group dynamic to unfold, the group process was generally strengthened, fostering a sense of relatedness. Second, more initiative and responsibility was given to the teachers to steer their own learning process, fostering a sense of autonomy. Third, rather than the trainer adopting an expert-position in which he would evaluate the role players, the observers and role-players exchanged thoughts in a more informational and dialogical way. These discussions contributed to a more in-depth reflection of how the proposed strategies can be implemented, thereby fostering a sense of competence.

8.3. Limitations and future directions

A major limitation of the current research is that the appreciation of the final product of the training was neither qualitatively nor quantitatively tested any further. Also, because the training was evaluated by four different groups of teachers, we were not able to examine whether differences in appreciation across the three cycles were due to the adaptations made from one training to another or to other characteristics of the groups (i.e. specific school characteristics) not related to the training. Therefore, it would be interesting for future research to also include across-school focus groups to examine whether school-related factors play a role in teachers' appreciation of the training.

Having extensively evaluated and optimized our training, a next research step is to set up an intervention study to investigate whether PE teachers can actually be trained in incorporating a need-supportive teaching style. In addition, it is interesting to examine whether potential changes in teacher behavior are perceived as such by the students and affect students' course-related motivation and outcomes, such as physical activity levels and engagement. Furthermore, based on the principles of

congruent teaching (Swennen et al., 2008) and need-support (Deci & Ryan, 2000), we would predict that the degree of experienced need satisfaction by the PE teachers themselves during the training will determine whether they effectively implement the changes on a later moment (i.e. persistence) and are capable of creatively using the strategies for PE activities and situations that were not dealt with during the training (i.e. transfer). Future research can include a measure of the experienced need satisfaction by the PE teachers during the training to investigate whether this mechanism plays a role in the prediction of effectively implementing the motivating strategies in class. Finally, future studies may also address teachers' pre-training beliefs, expectations, and values about the proposed motivating strategies in terms of credibility, feasibility, and usefulness (Reeve, 1998; Su & Reeve, 2011).

8.4. Conclusion

The present paper described how researchers and experienced secondary school PE teachers closely collaborated to develop a CPD training grounded in Self-Determination Theory's principles of need-supportive teaching. The systematic and research-based revision process (cf. action research, Reason & Bradbury, 2008) ultimately resulted in a training that concurs quite well with what PE teachers expect from effective CPD (Armour & Yelling, 2007; O'Sullivan & Deglau, 2006). Specifically, teachers are given the opportunity to update their knowledge and skills through the dissemination of applicable information by experts in the field, that is, a motivational psychologist and a university teacher in PE pedagogy. Furthermore, along the training there is room for active participation and collaborative activities, such as (spontaneous) conversations with colleagues and like-minded peers from other institutions, and microteaching, which allow teachers to reflect on their own and others' practice and to learn from each other (Armour & Makopoulou, 2012; Armour & Yelling, 2007; Day, Sammons, Stobart, Kington, & Gu, 2007; O'Sullivan & Deglau, 2006).

Interestingly, although the CPD literature tends to report that 'theory' is too removed from practice and that CPD should focus on specific, classroom-based knowledge (e.g., O'Sullivan & Deglau, 2006), the PE teachers in this study placed essential value to the theoretical background information as a starting point for the training. The Self-Determination Theory seemed to make sense to the teachers because its concepts fit with teachers' personal life experiences and their interactions with students, and because SDT's principles of need-support shed an innovate and useful light on approaches to motivate students toward PE. The findings indicate that not only the theory itself but especially the way the theory was translated into practice was appealing. Specifically, teachers appreciated the use of didactical materials (e.g., cases, video images of authentic PE classes), the provision of opportunities for active participation and collaboration throughout the training, and the possibility to directly apply the proposed strategies in a setting that is close to their authentic work (i.e. microteaching). In addition, the trainers' authenticity to the message, that is, their attempt to maximize PE teachers' opportunities for basic psychological need satisfaction during the training, was highly valued.

Although physical education was a specific context in this study, our research has implications that may be relevant to the wider CPD literature. For example, CPD providers in other learning contexts or subjects may consider to find new ways of involving theory-based knowledge in their CPD trainings, for instance by taking it into a practical application exercise immediately. Furthermore, it remains important for CPD providers that besides passing on an acceptable and convincing content, it is also critical – whatever the theoretical framework is – to deliver the message in

such a way that it is in accordance with its content and principles (i.e. 'teach as you preach', Swennen et al., 2008) as to increase teachers' tendency to accept (i.e. internalize) and implement the proposed changes into their own classroom. The present study has surely shown that Self-Determination Theory is an outstanding example of how to go about this.

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