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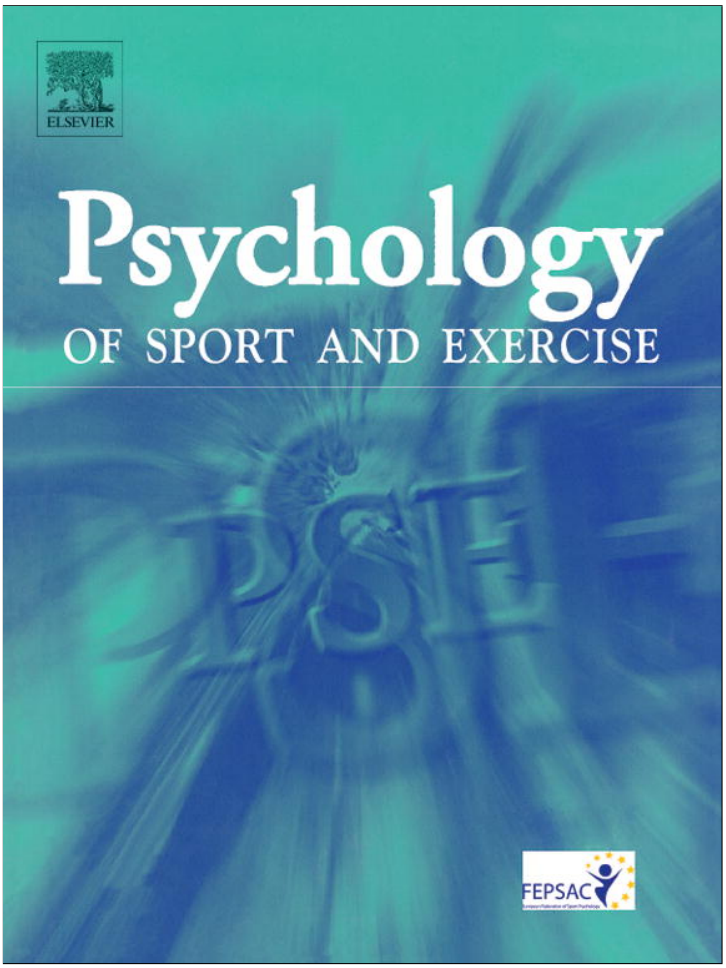

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Observed need-supportive and need-thwarting teaching behavior in physical education: Do teachers' motivational orientations matter?

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ABSTRACT

Objectives: The behaviors physical education (PE) teachers engage in affect a number of important student outcomes. Therefore, it is essential to study the antecedents of these teaching behaviors.
Design and method: Grounded in Self-Determination Theory, this cross-sectional study explored the relations between PE teachers' autonomous and controlled motivational orientations and a variety of observed need-supportive and need-thwarting teaching behaviors in 79 PE classes by means of regression analyses.
Results: Control-oriented teachers made less use of an overall need-supportive teaching style and provided less structure during the activity in particular, while they engaged in more need-thwarting teaching behavior in general and in more controlling and cold teaching behavior in particular.
Conclusion: Although autonomy-oriented teachers tended to display the opposite pattern of correlates, these associations were non-significant. As the current findings suggest that teachers' actual teaching behavior is rooted at least partly in their own dispositional motivational orientation, they may inform the design of effective continuous professional development programs and interventions aimed at enhancing teachers' need-supportive teaching. Directions for future research are discussed.
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According to self-determination theory (SDT, Deci & Ryan, 2000, 2002), a teacher can influence students' type of motivation by supporting or thwarting students' basic psychological needs for autonomy, competence, and relatedness. Specifically, when students feel supported in their needs, they are more likely to be autonomously motivated, a type of motivation characterized by a sense of ownership and self-endorsement when engaging in learning activities. In contrast, when students' basic psychological needs get thwarted, they display a more controlled type of motivation where they feel pressured to engage in activities.

In the specific context of physical education (PE) and consistent with SDT, research pointed out that need-supportive teaching behavior relates positively to high-quality (i.e., autonomous rather than controlled) motivation for PE (e.g., Koka & Hagger, 2010) and to subsequent positive outcomes, including enjoyment in PE (e.g., Tessier, Sarrazin, & Ntoumanis, 2010), motor skill development (e.g., Kalaja, Jaakkola, Watt, Liukkonen, & Ommundsen, 2009), and higher physical activity levels in leisure time (e.g., Haerens, Kirk, Cardon, De Bourdeaudhuij, & Vansteenkiste, 2010; Lim & Wang, 2009). In contrast, research has begun to show that need-thwarting teacher behaviors are related to controlled motivation and maladaptive student outcomes (Vansteenkiste & Ryan, 2013). Therefore, it is important to study the antecedents of need-

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supportive and need-thwarting teaching behaviors, a topic about which currently relatively little is known. The aim of the current contribution was to explore whether teachers' general motivational orientations, as conceived from the SDT perspective, relate to observed teaching behavior during a PE lesson.

Need-supportive teaching behavior

SDT (Deci & Ryan, 2000, 2002) is a general theory of social development and motivation that is increasingly being applied in the domain of education in general and in the domain of PE in particular (Sun & Chen, 2010; Van den Berghe, Vansteenkiste, Cardon, Kirk, & Haerens, 2012). Within Basic Psychological Needs Theory (Ryan & Deci, 2002; Vansteenkiste, Niemiec, & Soenens, 2010), one of the mini-theories in SDT, it is stated that teachers can either support or thwart students' basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). The need for autonomy refers to a sense of volition and psychological freedom when engaging in activities (e.g., when students experience a sense of choice to engage in an activity). The need for competence involves feelings of effectance in handling challenges (e.g., when students feel capable to effectively realize the tasks set out by the teacher). The need for relatedness refers to feelings of appreciation and connection to relevant others (e.g., when students experience a strong bond with their teacher or classmates during a PE lesson; Klassen, Perry, & Frenzel, 2012). When teachers manage to support students' basic psychological needs, they positively impact students' quality of motivation, well-being, and behavioral persistence (Ntoumanis, 2005; Standage, Duda, & Ntoumanis, 2003, 2005). In contrast, thwarting the basic psychological needs has been shown to result in negative affect, inadequate coping, and poor performance (Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011; Ryan & Deci, 2000). Through the provision of autonomy support, structure, and relatedness support, teachers would support the needs for autonomy, competence, and relatedness, respectively (Connell & Wellborn, 1991). Research in the domain of physical education has indeed shown that teachers' need support in terms of autonomy support, structure, and relatedness support is positively related to satisfaction of the three basic psychological needs (Taylor & Ntoumanis, 2007).

Autonomy support is characterized by the identification, nurturance, and development of students' interests and goals (Reeve, 2009). For instance, when a teacher allows students to choose between a number of games at the beginning of the lesson, the teacher is supportive of their need for autonomy. Autonomy-supportive teachers also encourage initiative, are empathic, and take the students' frame of reference. Experimental studies in PE revealed that induced autonomy support resulted in autonomous motivation (Ward, Wilkinson, Graser, & Prusak, 2008), greater enjoyment (Mandigo, Holt, Anderson, & Sheppard, 2008) and more vitality (Mouratidis, Vansteenkiste, Sideridis, & Lens, 2011) in students.

Structure has been defined as the provision of desired information and guidance such that students can successfully achieve various outcomes (Grolnick & Pomerantz, 2009; Skinner & Belmont, 1993). Teachers can provide structure by clarifying their expectations and giving clear guidelines prior to students' task engagement, by offering help during ongoing task engagement, and by providing positive feedback after successful task accomplishment (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009; Skinner & Belmont, 1993). Previous studies have shown that structure provided by the teacher is conducive to student engagement (Jang, Reeve, & Deci, 2010) and self-regulated learning, whereas it relates negatively to problem behavior (Vansteenkiste et al., 2012). Experimental studies in the PE domain have shown that competence support results in greater vitality, positive affect (e.g., Mouratidis, Vansteenkiste, Lens, & Sideridis, 2008), intrinsic motivation, and better motor performance (e.g., Moreno, Gonzalez-Cutre Coll, Martin-Albo, & Cervello, 2010).

Relatedness support is characterized by both quantitative and qualitative features of student–teacher interactions (Cox & Williams, 2008; Skinner & Belmont, 1993). Whereas the quantitative features of relatedness support refer to the degree of teachers' involvement (e.g., in terms of spending a considerable amount of time, energy and resources to students), the qualitative features refer to the way how teachers communicate their involvement in terms of warmth, responsiveness, and emotional support. Several studies showed that in particular the qualitative features of relatedness support, as expressed for instance in emotional support from the teacher, are related positively to students' emotional involvement during learning activities (Furrer & Skinner, 2003), autonomous motivation (Taylor & Ntoumanis, 2007), and students' enjoyment and negatively to students' worrying during PE (Cox, Duncheon, & McDavid, 2009).

Need-thwarting teaching behavior

According to SDT, a lack of teacher support for students' basic psychological needs does not automatically imply that teachers are actively thwarting the needs (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011; Vansteenkiste & Ryan, in press). Therefore, a separate assessment of teachers' need-thwarting behavior is required. Teachers can thwart their students' needs for autonomy, competence, and relatedness by being controlling and authoritarian (i.e., pressuring), by creating a chaotic environment, and by having cold interactions with the students (Deci & Ryan, 2000; Soenens, Sierens, Vansteenkiste, Dochy, & Goossens, 2012).

Teachers are controlling and thwart the students' need for autonomy when they ignore the students' perspective and instead pressure them to act, think, or feel in prescribed ways (Grolnick, 2003; Reeve, 2009). In addition to being controlling, teachers can thwart students' need for competence by creating a chaotic environment (Reeve, 2009). In a chaotic environment, the goals of the lessons are unclear or students are not informed about how they are expected to achieve these goals, such that they cannot develop a sense of competence with respect to the activity at hand. Also, in a chaotic environment, teachers provide little or few rules for adequate behavior, which creates an atmosphere of permissiveness. Third, the need for relatedness can be thwarted in an emotionally cold environment, where teachers are unfriendly or even reject or exclude (some) students (Skinner & Belmont, 1993). Most studies on 'the dark side' of teaching have focused on a controlling style, thereby showing that controlling teaching behavior related to more controlled motivation to study, less self-regulated learning, and lower academic performance in students (Soenens et al., 2012). Similarly, in the domain of sports, it has been found that a controlling coaching style relates to various ill-being indicators and disordered eating among athletes (Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011).

Antecedents of need-supportive and need-thwarting teaching behavior

Given that some teachers are relatively more need-supportive or need-thwarting than others and given that studies have shown that the quality of teaching behavior in PE relates to student outcomes, it is important to know which factors are causing teachers to adopt a more need-supportive or a relatively more need-thwarting teaching style toward their students. Accordingly, over the past

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decade, the literature has witnessed a shift from examining the outcomes of teaching behavior to studying its antecedents. One antecedent of teachers' behavior involves the degree to which teachers themselves experience pressure in their job. Such pressure can be categorized into three types, that is, pressure from above, pressure from within, and pressure from below (Pelletier, Seguin-Levesque, & Legault, 2002; Reeve, 2009). Pressure from above involves pressuring forces from the social environment, such as obligations to comply with a curriculum and pressuring standards for performance communicated by colleagues or parents. Pressure from below relates to the (teachers' perception of) students' lack of motivation, their negative attitude toward school, or their engagement in disruptive behavior. Research confirms that both pressures from above and pressures from below relate to low-quality motivation to teach and to more controlling teaching behavior (Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982; Flink, Boggiano, & Barrett, 1990; Sarrazin, Tessier, Pelletier, Trouilloud, & Chanal, 2006; Soenens et al., 2012).

Next to the pressures from above and below, pressure from within, that is, pressure arising from teachers' own beliefs, values, and personality dispositions, is also expected to relate to teaching behavior (Reeve, 2009). One important pressure from within is a teacher's controlled motivational orientation, a construct that has been studied within Causality Orientation Theory, another mini-theory in SDT (Ryan & Deci, 2002; Vansteenkiste, Niemiec, et al., 2010). General causality orientations are considered relatively enduring motivational orientations that characterize people's global understanding of the source of initiation and regulation of behavior (Deci & Ryan, 1985, 2002). The two most studied causality orientations are: (a) the controlled orientation which involves experiencing behavior as influenced by external or internal pressures or controls, such as threats, offered rewards, or demanding expectations, and (b) the autonomous orientation which involves having a sense of volition or freedom, and a tendency to take actions based on personally valued standards and interests (Deci & Ryan, 1985; Olesen, 2011).

These orientations have been found to relate to a wide range of outcomes in a variety of life domains. For instance, autonomous orientation has been found to relate positively to the quality of motivation for weight loss (Williams, Grow, Freedman, Ryan, & Deci, 1996) and to positive affect during exercise in the health context (Kwan, Hooper, Magnan, & Bryan, 2011). In contrast, controlled orientation relates to more defensive functioning, such as driving anger, aggressive driving behaviors, and traffic violations (Knee, Neighbors, & Vietor, 2001). In the domain of education, students' autonomous orientation has been associated with more confidence in academic abilities (Koestner & Zuckerman, 1994; Wong, 2000), whereas a controlled orientation has been negatively associated with students' academic performance and commitment (Wong, 2000).

In addition to these intrapersonal outcomes, a number of studies have addressed the interpersonal dynamics of autonomy- and control-oriented individuals. Autonomy-oriented individuals, who are considered to be more open and agreeable in terms of their personality functioning (Olesen, 2011), are expected to display a more curious, caring, and receptive attitude toward others. For instance, an early study by Bridges, Frodi, Grolnick, and Spiegel (1983) showed that autonomy-oriented mothers had a more secure attachment with their babies. Knee, Lonsbary, Canevello, and Patrick (2005) found that autonomy-oriented partners showed a better understanding of others and were less defensive in their interpersonal interactions. Applied to the context of PE, it could be argued that autonomy-oriented PE teachers would be interested in identifying students' interests and viewpoints to present learning material that fits with students' preferences (i.e., autonomy support) and would keep an eye on students' advancing skill-level, such that ongoing activities would be sufficiently challenging (i.e., structure or competence support). Because of their greater receptivity for input of the students themselves, they may connect better with their students and be more capable of following their students' rhythm rather than pushing them to achieve their own agenda (i.e., relatedness support). Consistent with this reasoning, Taylor et al. (2008) showed that autonomy-oriented PE teachers reported more use of three motivational need-supportive strategies (i.e., providing a meaningful rationale, providing help and support, and gaining an understanding of the students).

In contrast, control-oriented individuals are typically low on agreeableness (Olesen, 2011), a personality feature that relates negatively to hostility, interpersonal aggression, and distrust in social relationships (Olesen, Thomsen, Schnieber, & Tonnesvang, 2010). For instance, Bridges, Frodi, Grolnick, and Spiegel (1983) showed that control-oriented mothers were more controlling toward their infants. Reeve (1998) found that control-oriented teachers relied on more controlling motivational strategies toward their students compared to teachers with an autonomous orientation. Applied to the context of PE, control-oriented teachers may more easily lose patience when students fail to comply with their standards and instead force them to be cooperative and quiet, that is, to act as 'good' boys or girls during PE. Unfortunately, in doing so, control-oriented teachers might bypass their students' viewpoints, such that they come across as being controlling, uninvolved, and cold. The relation between a controlled orientation and chaos and structure may be less clear-cut. The rigid standards to which control-oriented PE teachers adhere themselves may lead them to set fairly strict standards for their students as well, such that they would not tolerate any deviation from their rules and such that chaos would be avoided. On the other hand, at least some control-oriented teachers may limit themselves strictly to what is required based on their job description and may fail to provide sufficient structure in unforeseen circumstances, such that a more chaotic climate is created.

The present study

The present study aimed to add to the small body of literature on causality orientations and teaching style by examining whether PE teachers' causality orientations relate to the way they interact with their students during everyday classes. In doing so, we extended past work by including a broad variety of both need-supportive and need-thwarting behaviors and by making use of observations of teaching behavior rather than relying on self-reports of teachers (as for example is the case in the studies of Chatzisarantis & Hagger, 2009; Cox, Smith, & Williams, 2008; Hagger et al., 2009). The reliance on observations is critical because previously observed associations between teachers' causality orientation and self-reported teaching may have been inflated and due to perceptual bias. Said differently, it is not guaranteed that teachers with a particular causality orientation actually behave in the way they say they behave. In line with this reasoning, previous research has shown that teachers do not always report accurately about the way they teach (Mosston & Ashworth, 2002). To overcome such problems, observation measures of teacher behavior can provide new insights. Although some previous studies included observations of teaching behavior (e.g., Reeve, Jang, Carrell, Jeon, & Barch, 2004; Tessier, Sarrazin, & Ntoumanis, 2008; Tessier et al., 2010), few of them examined antecedents of observed teaching behaviors. Sarrazin et al. (2006), for instance, examine the role of teacher expectations about student motivation in observed autonomy support and control. In the current study, we relied on a valid and

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reliable observation tool of Haerens et al. (2013) to capture teachers' provision of autonomy support, relatedness support and structure [divided into structure before (e.g., providing clear instructions) and during (e.g. providing help) the learning activity]. Elaborating on Haerens et al. (2013), we also rated teachers' engagement in 16 need-thwarting teaching behaviors, which were meant to capture the dimensions of controlling, cold, and chaotic teaching behavior.

Given that need support and need-thwarting represent relatively distinct styles that each have been found to be predicted by a different set of antecedents (e.g., Stebbings, Taylor, Spray, & Ntoumanis, 2012), we hypothesized that the autonomous orientation would relate primarily positively to observed need-supportive teaching behavior and its four need-supportive dimensions (i.e., autonomy support, structure before and structure during the activity, and relatedness support). The controlled orientation would relate primarily positively to observed need-thwarting teaching behavior and its three need-thwarting teaching dimensions (i.e., controlling teaching behavior, chaotic teaching behavior, and cold teaching behavior). Yet, we did not exclude the possibility of finding cross-paths as an autonomous orientation may serve as a resource against the use of need-thwarting teaching behavior, while control-oriented teachers may have no energy left to engage in more constructive, that is, need-supportive teaching behavior. The data will be explored for this possible relationship.

In examining the relation of both causality orientations with the observed teaching behaviors, we controlled for student, teacher and class characteristics, such as student gender, teaching experience, and student educational track, each of which might influence teacher–student interactions. As suggested by Van den Berghe et al. (2012), describing and including such characteristics is important as they reflect important features of the pedagogical context.

Method

Procedure

After being contacted by telephone, principals of 68 secondary schools in Flanders (Belgium) agreed to have their school participate in the study. Following the contact with the principal, the PE teachers who agreed to participate ($N = 126$) in the study were contacted personally. The teachers gave approval for participating in the study by means of an active informed consent form. Measures consisted of questionnaires filled out by the teachers and video-based observations of the teachers' behavior during one 50-min PE lesson. The questionnaire was handed out to the teachers two weeks before the assessment and was returned to the researcher on the day the PE lesson was videotaped. Teachers who failed to return the questionnaire in time were asked to fill out the questionnaire through an online assessment tool afterward. In the end, 79 teachers from 47 schools completed all required measures.

Teaching behavior was videotaped in an ad random chosen PE lesson. Teachers were asked to give their planned lesson and, to avoid that they would become overly self-conscious about their own teaching, were told that the main focus of this study was the students' behavior in PE. A digital camcorder used for videotaping the PE lesson was positioned on a fixed spot in the gymnasium, enabling us to capture the widest possible angles. The teachers were asked to wear a small microphone attached to a necklace to capture their verbal communication with students. Prior to assessment, students received an informed consent form to be signed by their parents or legal guardians, as authorization to videotape the students was required. Students without a signed informed consent form could not participate in the observed lesson. The Ethical Committee of Ghent University approved the study protocol.

Participants

The sample[7] consisted of 79 PE teachers (51.9% male, M age $= 36.1 \pm 11.0$ years, range $= 21–61$ years) who taught PE in a secondary school, with students ranging between 12 and 18 years of age. The participants had on average 13 years of teaching experience ($SD = 11$). Of the teachers, 54.4% taught in academic track, 19.7% in technical track, 19.7% in vocational track, and 6.3% in artistic track. Fifty three percent of the enrolled classes were single sex classes (29% boys-only and 24% girls-only), and 47% were co-educational classes. Each grade in secondary school was represented equally. Three classes included students of both 11th and 12th grade and two classes included students following an extra year of professional preparation. The number of students per class varied between 6 and 28 ($M = 16 \pm 5.3$).

Measures

Teacher and class background characteristics

The following teacher and class characteristics were assessed by means of a questionnaire filled out by the teacher: years of teaching experience, teachers' gender, gender distribution (single-sex or mixed-gender) and educational track (academic, technical, vocational and artistic track). Additionally, we counted the number of students participating in the videotaped PE lesson at the moment of the observation.

General causality orientation

A Dutch version (Soenens, Berzonsky, Vansteenkiste, Beyers, & Goossens, 2005) of the short General Causality Orientations Scale (Deci & Ryan, 1985) was used to measure teachers' autonomous and controlled orientation. Attesting to the validity of this scale, Soenens et al. (2005) showed that the autonomous and controlled orientations were related in theoretically predicted ways to individuals' styles of processing identity-relevant information. The questionnaire consists of 12 vignettes, each representing a situation in daily life (e.g., "You are asked to plan a picnic for yourself and your fellow employees. Your style for approaching this project could most likely be characterized as: …"), followed by responses that reflect the respondent's degree of autonomous (e.g., "…Seek participation: get inputs from others before you make the final plans.") and controlled motivational orientation (e.g., "…Take charge: that is, you would make most of the major decisions yourself."). The participants were asked to indicate on a five-point scale, ranging between 1 (*Completely Disagree*) and 5 (*Completely Agree),* to what extent they would feel or act in the way that the autonomy and control-oriented responses describe. Cronbach's alpha was .83 for the autonomous orientation and .74 for the controlled orientation.

Observed teaching behavior

To assess teachers' need-supportive behaviors, a valid and reliable observation tool was used, including 21 concrete teaching behaviors (Haerens et al., 2013). Each of the teaching behaviors was

[7] The sample of the current study had an overlap of 25 percent (i.e., 22 teachers) with the study of Haerens et al. (2013) in which the observation tool for need-supportive practices was developed. However, since both manuscripts have different perspectives (i.e., the development of an observation tool on need-supportive practices versus the examination of the relationship between causality orientations and teaching behavior) and since the analyses in the current study generate new insights in addition to previously published results, the data overlap was not considered problematic.

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coded on a 4-point scale ranging from 0 (*never observed*) to 1 (*observed sometimes*), to 2 (*observed often*), to 3 (*observed all the time)*, for each five-minute interval of the lesson. Interval scores were then summed to create a sum score of each behavior for the total duration of the lesson, which was then divided by the number of coded five-minute intervals in each lesson. Dimensional scores were created by averaging those items reflecting each of the three need-supportive teaching dimensions.

For the present study, the coding of the videotapes was conducted by four trained coders, consisting of researchers in the field of physical education and psychology. All were specialized in SDT, had experience with teaching or coaching young people, and were part of the expert panel that originally developed the observation tool for need-supportive teaching behaviors. Ultimately, each videotape was coded by one observer since Haerens et al. (2013) demonstrated adequate single rater reliability of the observation tool.

Compared to the Haerens et al. (2013) study, some adaptations were made to the final composition of the dimensions. First, as for the calculation of the dimensions, in the present study, raw mean scores were calculated, whereas in the Haerens et al. (2013) study factor composite scores were used as a way to validate the observation tool. Second, in terms of the specific behaviors being included, two differences can be noted. Specifically, in the Haerens et al. (2013) study, one item of the need-supportive behaviors (i.e., "The teacher encourages students to persist") did not have an adequate factor loading and another item ("The teacher asks the students questions about their interests, problems, values or wishes") had a cross-loading on three of the four factors. Therefore, these two items were removed from the final dimensions in the current study. The 19 remaining behaviors were included in those dimensions for which they had the highest factor loading. Only the item "The teacher provides a rationale" was retained in the calculation of scores for both structure before the activity and structure during the activity. This item had a theoretically plausible cross-loading on both dimensions of structure, meaning that teachers can provide a rationale at different points during the lesson (see Haerens et al., 2013). In summary, nineteen possible need-supportive teaching behaviors (see Appendix; $\alpha = .78$) were retained for the present study, reflecting the four need-supportive teaching dimensions of autonomy support (3 items, $\alpha = .30$; e.g., "The teacher offers choice to all students."), structure before the activity (5 items, $\alpha = .52$; e.g., "The teacher gives an overview of the content and structure of the lesson."), structure during the activity (7 items, $\alpha = .78$; e.g., "The teacher offers the students a rationale for tasks and exercises."), and relatedness support (5 items, $\alpha = .85$; e.g., "The teacher takes the perspective of students into account, is empathic.").

Similar to the development of the observation tool for the need-supportive behaviors, an observation tool was developed to tap into need-thwarting teaching behaviors. This instrument, which intends to assess the dimensions of controlling, cold, and chaotic teaching, contains 16 need-thwarting behaviors that were also coded on a 4-point scale every five minutes of the lesson. Literature and studies focusing on need-thwarting behaviors (e.g., Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011; Belmont, Skinner, Wellborn, & Connell, 1988; Ryan & Deci, 2006) served as a basis for formulating specific behaviors reflecting the three need-thwarting dimensions of controlling, chaotic, and cold teaching behavior. This list of behaviors was used as a tool for evaluating teaching behaviors in videotaped PE lessons by the same expert panel that developed the tool for need-supportive teaching behaviors (Haerens et al., 2013). Prior to the coding of all the videotapes for the current study, the coders viewed and scored several videos together. Possible discrepancies, interpretations and meanings of teacher behaviors were discussed and the coding scheme was adapted until general consensus was reached. Because the current study is the first study in which this instrument is used, some information on its internal structure is provided in the Results.

Plan of analysis

A Principal Component Analysis (PCA) with Promax rotation and Kaiser Normalization was conducted on the observed need-thwarting teaching behaviors. Further, all data were subjected to preliminary descriptive analyses using SPSS 19.0 for Windows. A paired-samples *t*-test was used to investigate whether the mean scores on autonomous and controlled orientation differed from each other. Similarly, paired samples *t*-tests were also used to investigate differences in overall need-supportive and need-thwarting behavior.

Pearson's bivariate correlations were conducted to examine the relationships between the included variables. After that, nine regression analyses were conducted to explore relationships between teachers' causality orientation and their behaviors. The students' gender, the teachers' gender, years of experience with teaching, the number of students per class, and the educational track (academic versus other) were entered as control variables. Dependent variables were (a) overall need support, (b) the four separate need-supportive dimensions, (c) overall need-thwarting, and (d) the three separate need-thwarting dimensions. Relationships between autonomous and controlled orientation and each of the above-mentioned dependent variables were investigated.

Results

Principal Components Analysis

A Principal Components Analysis (PCA) with Promax rotation and Kaiser Normalization was conducted on the observed need-thwarting teaching behaviors of a combined sample of 152 PE teachers, consisting of the teachers participating in the current study ($N = 79$) and 73 teachers from an additional data collection, from whom we had videotaped PE lessons but did not have data on causality orientations. In this larger sample, 66% of the teachers were male. They had a mean age of 36.8 years ($\pm$10.9 years, range = 21–61 years) and they all taught PE in a secondary school.

The scree plot of the PCA supported a 3-factor solution with a drop in eigenvalues between the third and the fourth factor (from 1.68 to 1.26). The three retained factors explained 53.8% of the variance in the observed need-thwarting teaching behavior. Table 1 presents the factor pattern and factor structure coefficients and the item communalities (h^2). The factor loadings after Promax rotation were all above .30 and the communality coefficients ranged between .34 and .80. Seven teaching practices (see Table 1) loaded on the first factor, explaining 30.1% of the variance. Given the content of these items (e.g., "The teacher exercises power over the students by interfering and demanding respect"), this factor was labeled 'controlling teaching behavior'. The second factor consisted of five behaviors and explained 13.3% of the variance and three items loaded exclusively on this factor. Given the content of the items (e.g., "The teacher is acting unfriendly and cold"), this factor was labeled 'cold teaching behavior'. The third factor consisted of four practices (e.g., "uses an illogical and inconsistent structure during the warming up and activity or in the transitions between exercises"), all loading exclusively on this factor. This factor explained 10.5% of the variance and was labeled 'chaotic teaching behavior'. Two behaviors displayed a cross-loading on the components representing controlling and cold teaching behavior. It was decided to

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Table 1
Factor loadings of pattern matrix and structure matrix of the observed need-thwarting teaching behaviors rotated to the Promax criterion.

The teacher…	$M \pm SD$	Controlling teaching behavior	Cold teaching behavior	Chaotic teaching behavior	h^2
… exercises power over the students by interfering and demanding respect	.35 ± .53	**.90**/.89	−.04/.16	.01/.14	.80
… commands students, uses controlling language and imperatives	.69 ± .75	**.84**/.81	−.13/.06	.02/.13	.67
… is irritated, loses his patience	.11 ± .22	**.76**/.75	−.05/.12	.04/.15	.57
… yells at the students	.12 ± .27	**.76**/.69	−.41/−.25	.21/.32	.69
… pressures the students by making an appeal to their self-confidence or pride or induces feelings of guilt and shame	.18 ± .32	**.65**/.65	.06/.21	−.15/−.07	.45
… uses destructive criticism when students not acting in the way the teacher expects them to	.18 ± .31	**.62**/.62	.10/.24	−.16/−.07	.42
… does not allow input from the students or reacts negatively to their input	.06 ± .17	**.43**/.49	**.31**/.41	−.09/−.03	.34
… does not pay much attention to the students	.05 ± .17	−.16/.03	**.77**/.74	.11/.08	.57
… is acting unfriendly and cold	.08 ± .21	**.52**/.66	**.60**/.72	.02/.09	.78
… takes distance from the students, is detached	.05 ± .20	.26/.65	**.59**/.66	−.02/.13	.49
… is distracted by activities not related to the students or the content of the lesson	.08 ± .19	−.23/.39	**.59**/.65	.12/.01	.34
… is acting inconvenient and annoying toward students	.08 ± .22	**.52**/−.08	**.54**/.54	.06/.09	.70
… loses time with the reorganization of groups, equipment…	.08 ± .16	.02/.16	.18/.18	**.72**/.72	.55
… doesn't know the students' names	.06 ± .20	−.10/.18	.12/−.21	**.63**/.65	.40
… allows chaos, and leaves the students to it	.06 ± .19	.15/.01	−.24/.09	**.63**/.61	.48
… uses an illogical and inconsistent structure during the warming up and activity or in the transitions between exercises	.11 ± .31	−.21/−.07	.26/.21	**.56**/.53	.37
Initial eigenvalues		4.82	2.12	1.68	
% of variance		30.1%	13.3%	10.5%	

Note. Factor pattern coefficients and factor structure coefficients are both presented (factor pattern/factor structure). Factor pattern coefficients greater than .30 are indicated in bold type. h^2 = communality coefficient.

include these two behaviors in the scale representing the factor to which they had the highest factor structure coefficient, that is, the scale for cold teaching behavior.

Two of the retained factors were sufficiently internally consistent, with a Cronbach's alpha of .80 for controlling teaching behavior and .76 for the dimension of cold teaching behavior. The chaotic teaching behavior items had a low internal consistency, with a Cronbach's alpha of .48. To assess inter-rater reliability of the need-thwarting observation items, three trained observers independently coded 30 identical videotaped PE lessons. To assess intra-rater reliability, one observer coded 20 lessons twice, with two weeks in between both ratings. Intra-rater and inter-rater reliabilities were calculated by means of intra-class correlation coefficients (ICC), thereby using a two-way random model. Values below .50 are considered as poor, whereas values from .50 to .75 and above .75 are considered as moderate and good, respectively (Portney & Watkins, 2009, p. 82). Inter-rater reliabilities (average measure ICC's) of all retained factors were adequate (controlling teaching behavior = .87; chaotic teaching behavior = .74, cold teaching behavior = .71) as were the intra-rater reliabilities (controlling teaching behavior = .95, chaotic teaching behavior = .97; cold teaching behavior = .99).

Total scores for the three need-thwarting dimensions distinguished by the exploratory factor analyses were computed for the sample of the current study ($N = 79$) following a similar procedure as for the need-supportive dimensions. First, item scores were created by summing the five-minute interval scores and by dividing them by the number of five-minute intervals in the specific lesson. Then, dimensional scores were created by averaging those items reflecting each of the three need-thwarting teaching dimensions. In addition, we created an overall need-thwarting score by averaging the three dimensional scores of need-thwarting (Cronbach's alpha = .78).

Despite the low internal consistency of some of the subscales (i.e., autonomy support and chaotic teaching behaviors in particular), we still deemed it interesting for explorative purposes to include these dimensions into the analyses in order to obtain a more fine-grained and detailed picture of the associations between teachers' causality orientations and the quality of their interactional style. It should be noted, though, that given their low reliability caution is warranted in interpreting the findings obtained with these dimensions.

Descriptive analyses and correlations

Table 2 provides the descriptive statistics and correlations of the study variables. Teachers scored significantly higher on the autonomous, relative to the controlled, orientation [$t\,(78) = -8.25$, $p < .001$; $d = -1.61$]. Average scores on need-supportive teaching behaviors varied between .38 and 1.59 and scores on need-thwarting teaching behaviors varied between .06 and .23 on a scale from 0 to 4. Need-supportive behaviors occurred significantly more often than need-thwarting behaviors [$t\,(78) = 22.86$, $p < .001$; $d = 4.39$]. These findings indicate that teachers are sometimes need-supportive and behave in a need-thwarting way relatively more rarely.

Autonomous and controlled orientation were significantly negatively related to each other, as were teachers' engagement in overall observed need-supportive and need-thwarting behaviors. The dimensions of autonomy support and controlling teaching behavior were significantly negatively related, as were the dimensions of relatedness support and cold teaching behavior. The dimensions of structure before and during the activity and chaotic teaching behavior were not related to each other. As can also be seen in Table 2, three of the four need-supportive teaching dimensions were significantly positively related (i.e., structure before and during the activity and relatedness support). Two of the three need-thwarting dimensions (i.e., controlling teaching behavior and cold teaching behavior) were also significantly positively related. Further, a controlled orientation was negatively related to overall need support and to structure during the activity, while it related positively to overall need-thwarting, and to controlling and cold

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Table 2
Descriptive statistics and correlations among study variables.

	Sum-score/*M*	*SD*	Min	Max	1	2	3	4	5	6	7	8	9	10
1. Controlled orientation	35.43	6.34	21	50	1									
2. Autonomous orientation	45.70	6.43	32	60	−.50**	1								
3. Overall need support	1.02	.25	.46	1.56	−.33**	.17	1							
4. Autonomy support	.38	.28	.00	1.28	−.04	.07	.45**	1						
5. Structure before the activity	.97	.33	.04	1.77	−.20	.07	.67**	.20	1					
6. Structure during the activity	1.16	.39	.31	2.01	−.47**	.33**	.61**	.05	.26*	1				
7. Relatedness support	1.59	.54	.17	2.97	−.14	.00	.79**	.17	.34**	.24*	1			
8. Overall need-thwarting	.13	.14	.00	.58	.37**	−.10	−.53**	−.32**	−.17	−.31**	−.49**	1		
9. Controlling teaching behavior	.23	.29	.00	1.12	.34**	−.15	−.49**	−.39**	−.14	−.22	−.48**	.85**	1	
10. Chaotic teaching behavior	.06	.14	.00	.94	.09	−.07	−.17	−.18	−.02	−.19	−.07	.43**	.04	1
11. Cold teaching behavior	.09	.17	.00	1.13	.27*	.08	−.34**	−.01	−.17	−.24*	−.36**	.72**	.39**	.17

Note. $N = 79$. *$p < .05$; **$p < .01$.

teaching behavior in particular. An autonomous orientation only related positively to structure during the activity.

Multiple regression analyses

Table 3 provides a summary of the model estimates of the regression models for provided need support and its four sub-dimensions in relation to the controlled and autonomous orientation. After controlling for several student, teacher, and class background variables, a controlled orientation yielded a significant negative relation ($p < .01$) to a composite measure of observed need support as well as to observed structure during the activity in particular ($p < .001$). A controlled orientation also tended to relate negatively to structure before the activity, although this association was only marginally significant ($p < .10$). No significant relationships were found between an autonomy orientation and the need-supportive dimensions.

Table 4 provides a summary of the model estimates of the four regression models in which need-thwarting teaching behavior and its three sub-dimensions were regressed on background characteristics and both causality orientations. A controlled orientation was significantly positively related to overall need-thwarting ($p < .001$) and to controlling ($p < .01$) and cold teaching behavior ($p < .01$) (but not to chaotic teaching behavior) in particular. The autonomous orientation was unrelated to the composite score of need-thwarting. However, in the regression analyses, the autonomous orientation was related positively to cold teaching behavior ($p < .05$), even though there was no significant correlation found between them (Table 2).

As for the background variables included in Tables 3 and 4, more experienced teachers engaged more frequently in cold teaching behavior and also tended to be more controlling and overall need-thwarting. Female teachers provided less structure during the activity than their male colleagues. Teachers of mixed-gender classes tended to provide less relatedness support than teachers of single-sex classes. Teachers also tended to be less chaotic in classes with a larger number of students.

Discussion

Several studies have demonstrated that students' perceived need support during PE relates to various positive outcomes, including effort, energy expenditure and persistence (e.g., Standage, Duda, & Ntoumanis, 2006). Also, intervention studies showed that PE teachers can be trained to adopt a more need-supportive teaching style, to the benefit of their students' motivation (Prusak, Treasure, Darst, & Pangrazi, 2004; Tessier et al., 2010) and other important psychological, educational, and behavioral outcomes (e.g., Mandigo et al., 2008; Mouratidis et al., 2011; Ward et al., 2008). Yet, far less research has been done to identify the antecedents of teachers' need-supportive and need-thwarting teaching style. The purpose of this study was to examine the relation between teachers' general autonomous and controlled causality orientation, as conceived within Causality Orientation Theory (Ryan & Deci, 2002; Vansteenkiste, Niemiec, et al., 2010) and coded observations of teachers' need-supportive and need-thwarting teaching behavior in PE.

The controlled orientation and observed teaching behavior

Results confirmed the hypothesis that a controlled causality orientation relates to more overall observed need-thwarting teaching behavior. Further, when breaking down the composite score into its sub-dimensions, a controlled orientation was related to controlling and cold teaching behavior in particular. Controlling teaching behaviors mainly referred to the application of pressure, such as when a teacher commands students, is irritated, and loses his/her patience. Cold teaching behaviors reflected a distant orientation toward students, involving unfriendly behaviors and not paying much attention to the students. The results are in line with the notion that teachers with a controlled orientation translate their personal way of functioning into the interpersonal style they use toward others. Much like they are oriented to meet externally or internally pressuring demands themselves, they would highlight pressuring elements (e.g., their own teaching agenda, competition, stressful interpersonal comparison, threatening evaluations) in their communication with students. By adopting such a style, they might come across as uninvolved and even cold as they likely bypass the students' perspective.

No relationships were found between a controlled orientation and chaotic teaching behavior. This could be due to the low internal consistency of the chaotic teaching behaviors scale. Also, the chaotic behaviors that were observed in the present study (e.g., "The teacher loses time with the reorganization of groups") reflect a situation in which teachers create chaos, hereby failing to nurture students' needs for competence. However, this might not necessarily imply that students are actively frustrated in their need for competence. We speculate that maybe a different relationship with a controlled orientation would have been obtained if we had measured teaching behaviors that more directly refer to the thwarting of students' need for competence. For instance, teachers may communicate quite directly to students that they are incompetent (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). Such communication would reflect more directly competence-thwarting behavior and might be related more closely to the other need-thwarting dimensions and have a stronger relationship with a controlled orientation of teachers. Clearly, this possibility requires future research.

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Table 3
Summary of the model estimates for the regression analyses of overall need-supportive teaching behavior and its dimensions.

	Overall need support		Autonomy support		Structure before the activity		Structure during the activity		Relatedness support	
	B (*SE*)	*β*	*B* (*SE*)	*β*	*B* (*SE*)	*β*	*B* (*SE*)	*β*	*B* (*SE*)	*β*
Background characteristics										
Constant	.15 (.44)		−.15 (.46)		−.05 (.46)		.21 (.40)		.24 (.45)	
Number of students	.01 (.02)	.03	.03 (.03)	.15	−.02 (.02)	−.08	.01 (.02)	.03	.00 (.02)	.01
Gender students[a]	−.38 (.23)	−.19	.08 (.24)	.04	−.10 (.24)	−.05	−.33 (.21)	−.17	−.45 (.24)	−.23+
Educational track[b]	.23 (.23)	.11	−.11 (.25)	−.06	.11 (.25)	.06	.17 (.21)	.09	.29 (.24)	.15
Teacher gender[c]	−.26 (.22)	−.13	−.24 (.24)	−.12	.22 (.24)	.11	−.41 (.21)	−.21*	−.20 (.23)	−.10
Teacher experience	.00 (.01)	−.04	−.01 (.01)	−.13	.01 (.01)	.15	.00 (.01)	−.02	−.01 (.01)	−.08
Motivational orientations										
Controlled orientation	−.35 (.13)	−.35**	−.00 (.13)	.00	−.23 (.13)	−.23+	−.42 (.11)	−.42***	−.21 (.13)	−.21
Autonomous orientation	.04 (.13)	.04	.09 (.14)	.09	−.06 (.14)	−.06	.17 (.12)	.17	−.05 (.13)	−.05
R^2		.18*		.06		.09		.31***		.12
$F(7,78)$		2.18*		.69		.95		4.52***		1.36

Note. N teachers = 79, +$p < .10$, *$p < .05$; **$p < .01$, ***$p < .001$.
[a] 0 = single-sex, 1 = co-education.
[b] 0 = general education, 1 = technical, vocational, and artistic education.
[c] 0 = male; 1 = female.

As for need-supportive teaching behavior, a controlled orientation related negatively to the composite score of need-supportive teaching and in particular to the provision of structure during the activity. Although the pattern was most clear for structure during the activity, there was also a tendency for control-oriented teachers to provide less structure before the activity actually begun. These results suggest that teachers scoring high on a controlled orientation provided less ongoing feedback to enhance students' competence levels and gave few new guidelines and advice so that students mastered the activity at hand. One possible explanation is that control-oriented teachers are at greater risk of feeling exhausted and washed out because of their greater experiences of need frustration at work (Soenens et al., 2012). As a consequence of their preoccupation with their own concerns, control-oriented teachers may have less energy available to invest in the students and to facilitate the learning process. The presumed lack of vitality that goes along with a controlled orientation may also explain the negative relation with observed relatedness support: that is, teachers need to have sufficient energy available to be genuinely interested in the students' experiences and perspective. Washed out teachers may have a rather strict and narrow view of their tasks and responsibilities as a teacher. They would reduce their job content to its essential duties and provide some guidelines and information in the beginning of a PE class (cf. the dimension "structure before the activity"), but refrain from continued help and advice during the activity itself, especially when unexpectedly requested by students. One interesting avenue for future research is to examine how control-oriented teachers handle inadequate student behavior (e.g., disruptive behavior or display of boredom) during a class. They might more easily lose patience and get irritated by such behaviors, because of their own need-frustrating experiences.

The results of the present study suggest that control-oriented teachers, because of their higher engagement in need-thwarting teaching behaviors, might form a critical target group for future intervention studies or continuous professional development programs. This might be a real challenge as a recent meta-analysis indicated that control-oriented individuals are to a lesser extent receptive for change than autonomy-oriented teachers (Su & Reeve, 2011). Effective change is only expected when the importance of the behavioral change is fully internalized by the individual, which is more likely to occur when teachers' basic psychological needs for autonomy, competence, and relatedness are met during the training (Deci, 2009). Considering that more control-oriented teachers are more resistant to change, however, meeting their basic psychological needs during a training might require a

Table 4
Summary of the model estimates for the regression analyses of overall need-thwarting teaching behavior and its dimensions.

	Overall need-thwarting		Controlling teaching behavior		Chaotic teaching behavior		Cold teaching behavior	
	B (*SE*)	*β*	*B* (*SE*)	*β*	*B* (*SE*)	*β*	*B* (*SE*)	*β*
Background characteristics								
Constant	−.32 (.43)		−.45 (.44)		.65 (.46)		−.59 (.42)	
Number of students	.00 (.02)	−.01	.00 (.02)	.02	−.04 (.02)	−.23+	.03 (.02)	.14
Gender students[a]	.05 (.23)	.03	.08 (.23)	.04	.07 (.24)	.04	−.07 (.22)	−.03
Educational track[b]	.03 (.23)	.01	.02 (.23)	.01	−.05 (.25)	−.03	.07 (.23)	.03
Teacher gender[c]	.13 (.22)	.07	.19 (.22)	.10	.30 (.24)	.15	−.23 (.22)	−.12
Teacher experience	.02 (.01)	.21+	.02 (.01)	.22+	−.01 (.01)	−.11	.02 (.01)	.25*
Motivational orientation								
Controlled orientation	.43 (.12)	.42***	.35 (.13)	.35**	.08 (.13)	.08	.40 (.12)	.40**
Autonomous orientation	.08 (.13)	.08	−.03 (.13)	−.03	−.02 (.14)	−.02	.26 (.13)	.26*
R^2		.19*		.17+		.09		.22*
$F(7,78)$		2.43*		2.13+		.95		2.89*

Note. N teachers = 79, +$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.
[a] 0 = single-sex, 1 = mixed-gender.
[b] 0 = general education, 1 = technical, vocational, and artistic education.
[c] 0 = male; 1 = female.

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different approach than with more autonomy-oriented teachers. In that respect, it might be useful to address teachers' causality orientations as well as the reasons for their resistance. Research shows that both autonomy and controlled orientations can be primed experimentally (e.g., Radel, Sarrazin, & Pelletier, 2009) and it has been argued that interventions might change both controlled and autonomous orientations in individuals (Hodgins & Knee, 2002; Vansteenkiste, Smeets, et al., 2010). Such results are promising because they suggest that a controlled causality orientation might, to some extent, be malleable.

The autonomous orientation and observed teaching behavior

Although the results for a controlled orientation were clear-cut, this was far less the case for an autonomous orientation. Contrary to expectations, an autonomous orientation was unrelated to observed need-supportive teaching behavior. In the regression analyses, there was also a small and unexpected association between an autonomous orientation and a cold teaching style. Because this association was not observed in the correlations and only occurred when controlling for the variance shared with a controlled orientation it seems to represent a statistical artifact (i.e., a suppression effect to be more precise) that does not need substantive interpretation. Several explanations can be provided for the overall pattern of null-findings with the autonomous orientation. First, most of the observed associations for the autonomous orientation were in the expected direction, yet, few of them reached the commonly accepted significance level, perhaps due to a lack of power ($N = 79$). Although relationships were less pronounced, a larger sample might possibly increase the power to detect such more subtle relationships. Second, an autonomous orientation might indirectly relate to teachers' teaching interactions through their association with teacher motivation and attitudes. In the studies of Lam and Gurland (2008) and Taylor et al. (2008), for instance, an autonomous orientation related positively to psychological need satisfaction, job satisfaction and work motivation, while controlled orientation was unrelated to job satisfaction or identification with the school's purposes. Third, although an autonomous orientation involves acting on the basis of emerging interests and personally held values and ideals, the current scale, which was developed back in the 1980s (Deci & Ryan, 1985), fails to capture the latter aspect. The reason for this is that the intrinsic-extrinsic motivation distinction was fairly dominating at that time, while this distinction has now been replaced by autonomous-controlled motivation distinction. Yet, the assessment of identified motivation, which refers to engaging in an activity because it is personally relevant and meaningful, might be critical, as this subcomponent might be more closely related to need-supportive and need-thwarting teaching. This is because teaching in a need-supportive way requires quite some energy and past work has shown that identified regulation in particular yields predictive validity for tasks that demand a lot of energy and effort (Koestner & Losier, 2002).

Teacher and student background characteristics

When studying dynamics involved in teachers' behavior, it is recommended to describe and include key characteristics of the pedagogical context (e.g. number of students in the class, Van den Berghe et al., 2012) that are put forward by teachers as influential of their teaching behavior (Aelterman et al., 2013). Although the results of the present study showed that the included class and teacher characteristics were in most cases not significantly related to need-supportive or need-thwarting teaching behavior, some interesting findings did emerge. First, experienced teachers tended to engage more frequently in need-thwarting behavior and in particular in cold interactions with their students. Possibly, a generation gap, illustrating differences in values and priorities between younger and older teachers (because they probably followed a different PE teacher education program), can explain these differences. Whereas in the 1950's a teacher-centered style of PE was very common, with a focus on teaching and learning sport techniques, nowadays PE teachers are taught to use modified and non-traditional games and sports with more student-centered teaching styles, with the teacher having a more indirect influence on students (Kirk, 2011). For the class characteristics, gender-distribution and number of students in the class were found to be important for some dimensions, but not all. In larger classes, teachers tended to show less chaotic behavior, but they did not necessarily provide more structure before and during the activity. Teachers in co-educational classes provided less relatedness support than teachers in single-sex classes. This might explain why previous studies showed that girls in single-sex classes have a more positive attitude in PE in comparison with girls in co-educational classes (Derry & Phillips, 2004). Future research could examine possible interactions between teachers' causality orientations and the way they act toward boys and girls in single-sex versus co-educational classes.

Occurrence of observed teaching behaviors

One final set of findings deserves to be commented, that is, the occurrence of observed teaching behaviors. Similar to the results of the Haerens et al. (2013) study,[7] the frequency of occurrence of the different teaching dimensions revealed that, on average, PE teachers of this sample were sometimes need-supportive toward their students. These results suggest that most PE teachers engage in need-supportive practices but that there is room for improvement. As such, this finding underscores the need for pedagogical oriented teacher education programs and continuous professional development programs to focus more directly on motivational teaching dynamics (see also Haerens et al., 2013).

Teachers engaged only rarely in need-thwarting teaching behaviors, which can be considered as a positive result. However, it is important to bear in mind that bad experiences and events in a variety of settings have been shown to have a larger impact on individuals than positive events (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). As such, a one-time occurrence of a specific need-thwarting practice may have a more substantial impact on students than multiply occurring need-supportive behaviors. Indeed, research in the area of controlling parenting has shown that, even though levels of control are typically low, controlling parenting does represent a strong and robust predictor of maladaptive developmental outcomes (Kins, Soenens, & Beyers, 2012; Soenens, Vansteenkiste, & Luyten, 2010). It would be interesting for future research to investigate how the need-thwarting dimensions observed in the present study relate to student outcomes such as their quality of motivation for PE. Based on the study of Bartholomew, Ntoumanis, Ryan, Bosch, et al., 2011, in which a controlling coaching style related to ill-being indicators and disordered eating among athletes, it is expected that students would also display negative outcomes such as boredom, anxiety or a low quality of motivation for PE when their teachers exhibit more need-thwarting behaviors.

Limitations and directions for future research

This study had a number of shortcomings. First, although we limited ourselves to the assessment of one pressure from within, it is assumed that different kinds of pressures all have their share in

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explaining the variance in need-supportive and thwarting teaching behaviors. Causality orientations can also affect teaching behavior indirectly or in interaction with other types of pressures (Grolnick, 2003; Grolnick, Price, Beiswenger, & Sauck, 2007), a possibility that was not addressed in the current study. Second, there are also a few shortcomings regarding the method and design of this study. We could not demonstrate causal relationships because of the cross-sectional design. Further, the generalizability of the findings to a more diverse and heterogeneous sample of teachers was limited because the sample of PE teachers was relatively small and homogeneous. Also, the internal consistency of some of the need-supportive and need-thwarting dimensions was low, indicating that these scales, and the items they consist of, might need further refinement. By deleting two items from the subscale of autonomy support because of their cross loading on other factors, the internal consistency dropped from .59 in the (Haerens et al., 2013) to .30 in the present study. Further revision might involve the formulation of additional items for the dimension of autonomy support that solely load on this dimension, and of items that more directly reflect active thwarting of the need for competence. Third, it could be argued that the observations of only one PE class might not represent a teacher's general teaching style, as teaching behavior might differ on a day-to-day basis. It is possible that teachers' need-supportive or need-thwarting behaviors depend on day-to-day changes in a variety of antecedents such as student behavior or the teacher's own need satisfaction as a result from the need support or need-thwarting from colleagues, family members or friends. Future research could address this issue by means of longitudinal studies assessing teaching behaviors and fluctuating antecedents (e.g. teachers' need satisfaction) on a day-to-day basis. In this respect, other antecedents could mediate the relationship between general causality orientations and teaching behaviors in class.

Conclusion

The present study showed that teachers who are more control-oriented less frequently engaged in a wide range of observed need-supportive teaching behaviors, while they engaged more frequently in need-thwarting teaching behaviors. As the quality of teaching behavior is known to be predictive for a number of important educational, behavioral and psychological outcomes among students, it is recommended to focus on teachers' causality orientations in future (intervention) studies. The results of the present study also point to the need for teacher education programs as well as continuous development programs to focus more directly on motivational dynamics involved in the teaching profession.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.psychsport.2013.04.006.

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