

TEACHING ENVIRONMENTS AND STUDENT MOTIVATIONAL OUTCOMES

Running head: PERCEIVED TEACHER CONTROL, STUDENT NEED FRUSTRATION AND MOTIVATION

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Beware of Your Teaching Style:

A School-Year Long Investigation of Controlling Teaching and Student Motivational Experiences

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Abstract

Relatively little research drawing from self-determination theory has examined the links between controlling teaching environments and student motivation. To this end, two longitudinal studies were conducted to explore how students' perceptions of controlling teaching behavior and experiences of psychological need frustration related to a number of motivation-related outcomes over a school year. Multilevel growth modeling indicated that changes in perceptions of controlling teaching positively related to changes in need frustration across the school year (Studies 1 & 2) which, in turn, negatively predicted autonomous motivation and positively predicted controlled motivation and amotivation in Study 1 ($N = 419$); and positively related to fear of failure, contingent self-worth, and challenge avoidance in Study 2 ($N = 447$). Significant indirect effects also supported the mediating role of need frustration. These findings reinforce the need for research on the negative motivational pathways which link controlling teaching to poor quality student motivation. Implications for teacher training are discussed.

Keywords: self-determination theory; controlling teaching; need frustration; physical education.

1. Introduction

Negative student attitudes toward school are on the rise in the classroom (Kowalski, 2003). This may, in part, be due to a perceived lack of self-determination among students. Many students spend their time in school feeling compelled to follow someone else's rules, study someone else's curriculum, and submit continually to someone else's evaluation (Kohn, 1993). Thus, in order for teachers to successfully facilitate engagement in compulsory curriculum subjects, such as Physical Education (PE), it is vital that students perceive the teaching and learning environment to be motivationally supportive (Haerens, Kirk, Cardon, & De Bourdeaudhuij, 2011; Kirk, 2005). In this regard, the influence of social factors, including the interpersonal style adopted by the teacher, appears to be paramount for student motivation (e.g., Wentzel, 2002). For instance, it has been shown that teachers' instructional behaviors can be discerned according to their dimensions of influence (i.e., power or dominance vs. submission) and proximity (i.e., friendliness or cooperation vs. opposition; Gurtman, 2009). Research suggests that students' perceptions of these types of teacher behaviors relate to outcomes such as student satisfaction, confidence, and effort (Wubbels & Brekelmans, 2005). However, whilst there has been extensive empirical evidence on the role of positive teaching behavior for adaptive student motivation, comparatively less research has been carried out examining the mechanisms via which negative teaching behaviors can undermine students' motivation (Juvonen & Wentzel, 1996; Wentzel, 1999).

Self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2002) is a widely applied contemporary framework for the study of motivation which differentiates between optimal (e.g., autonomy-supportive) and non-optimal (e.g., controlling) teacher behavior (Van den Berghe et al., 2013). Educational research guided by SDT has consistently shown that an autonomy-supportive teaching style nurtures a motivational pathway toward optimal functioning (e.g., Jang, Kim, & Reeve, 2012; Tessier, Sarrazin, & Ntoumanis, 2010; Vansteenkiste et al., 2012). However,

since the work of Author and colleagues (Author et al., 2011; Author et al., 2011; Author et al., 2010), the existence of a separate maladaptive pathway activated by controlling social environments has been increasingly measured and empirically tested in a systematic way. Nonetheless, very few studies in education have examined controlling teaching behaviors, as explicated by SDT, and the mechanisms by which such behaviors predict maladaptive cognitive, affective, and behavioral outcomes from a longitudinal perspective (Wentzel, 1999).

1.1 Controlling Teaching Behaviors

Teachers are controlling when they ignore students' perspectives and behave in authoritarian and pressuring ways in order to impose a specific and preconceived way of thinking, feeling, and behaving (Author et al., 2009; Grolnick, 2003; Reeve, 2009). According to SDT, a controlling interpersonal style can be expressed in two different ways: externally controlling and internally controlling. Externally controlling teaching refers to the activation of a sense of external obligation in students by using explicit and overtly controlling strategies (Ryan, 1982). For example, Author et al. (2009) identified intimidation as a controlling strategy which fosters external regulation by creating pressure from outside to behave in certain ways. Behaviors which are used to intimidate others involve the display of power-assertive strategies such as yelling, the use and threat of physical punishment (e.g., running laps in PE), and overly critical attacks on individual students which are designed to humiliate and belittle.

Internally controlling teaching refers to the use of tactics that trigger maladaptive motivational forces that reside inside the student by appealing to their feelings of guilt, shame, anxiety, and self-worth. Such internal pressures are usually activated in more covert and subtle ways (Soenens & Vansteenkiste, 2010). For example, teachers may use negative conditional regard (i.e., withdrawing attention, interest, and care when the student fails to act as expected) and other

guilt-inducing strategies to express disappointment when their expectations are not met (Author et al., 2010; Soenens, Sierens, Vansteenkiste, Goossens, & Dochy, 2012).

Such external and internal controls pressure students to adhere to the values held by the teacher and can, therefore, be used to enforce discipline and secure student compliance (Soenens et al., 2012). However, behaviors obtained via these compliance techniques are problematic as they impede the internalization of the underlying values of the action (e.g., the health, social, and psychological gains associated with physical activity) and, therefore, undermine optimal student motivation (Deci & Ryan, 2000; De Meyer et al., 2014).

Controlling teaching is largely incompatible with the adaptive teaching dimension of autonomy support (Grolnick, 2003). Autonomy-supportive teachers try to foster students' sense of volition and inner motivational resources so that students perceive themselves as the initiator of their actions (Reeve, 2009). However, the behaviors associated with the two interpersonal styles are not necessarily antipodal (Author et al., 2009; 2010; Tessier, Sarrazin, & Ntoumanis, 2008) and the presence of controlling teaching behavior cannot simply be equated with the absence of autonomy-supportive behavior (Author et al., 2011). In the same way as fostering growth takes more than the absence of control, it takes more than the absence of autonomy support to predict negative motivational outcomes. Thus, perceptions of controlling teaching and their impact on student motivation must be assessed in their own right. Whilst this assertion is becoming increasingly accepted in the SDT literature, most research has still focused on adaptive teaching dimensions and their beneficial effects on students; far fewer studies have explicitly addressed controlling teaching and its consequences in terms of student motivation, cognition, and well-being (*cf.* cross-sectional research by Assor, Kaplan, Kanat-Maymon, & Roth, 2005; De Meyer et al., 2014; De Meyer, et al., 2016; Haerens et al., 2015; Soenens et al., 2012). As far as the authors are aware, the present study

will be the first to examine the longitudinal associations between controlling teaching behaviors (i.e., intimidation and negative condition regard) and student motivation-related outcomes in PE.

1.2 Basic Psychological Need Frustration

Deci and Ryan (2000) suggest that the negative impact of controlling teaching environments occurs because such contexts thwart students' basic psychological needs. Three such needs are identified, those for autonomy, competence, and relatedness (Deci & Ryan, 2000). Autonomy reflects a need for individuals to feel volitional and responsible for their own behavior (deCharms, 1968; e.g., when students experience a sense of choice in relation to the activities they engage in). Competence reflects feelings of effectance and confidence in achieving desired outcomes (White, 1959; e.g., when students feel capable of completing the tasks set by the teacher). Finally, relatedness concerns the degree to which individuals feel connected to and accepted by significant others (Baumeister & Leary, 1995; e.g., when students experience a strong bond with their PE teacher or classmates). Students experience feelings of need frustration when their psychological needs are thwarted in controlling teaching environments (Vansteenkiste & Ryan, 2013). For example, controlling strategies pressure students to change their behavior to conform to their teacher's expectations (autonomy frustration) and, over time, may cause students to doubt their capabilities (competence frustration), and feel rejected and disliked by their teacher and classmates (relatedness frustration; Author et al., 2011; Haerens et al., 2015).

It is becoming increasingly recognized in SDT that the experience of need frustration is distinct from the absence of need satisfaction (Author et al., 2011; Costa, Ntoumanis, & Bartholomew, 2014; Vansteenkiste & Ryan, 2013). This important conceptual differentiation has practical significance as it suggests that processes associated with need satisfaction and need frustration will relate to different motivational and educational outcomes (Author et al., 2011; Vansteenkiste & Ryan, 2013). Importantly, Costa et al. (2014) showed that such differential

relations are not simply due to the positive and negative wording of the items used to tap experiences of need satisfaction and need frustration, respectively, and associated positive and negative outcomes (i.e., method effects). Whereas need satisfaction should relate primarily to optimal motivation, good academic performance, and well-being; need frustration should be primarily predictive of maladaptive motivational orientations, poor performance, and ill-being. Initial evidence for the practical import of this theoretical assertion has been provided in the sport context (Author et al., 2011; Balaguer et al., 2012). For example, Author and colleagues tested an integrated model incorporating both a positive motivational pathway (i.e., from perceived coach autonomy-support to athlete well-being via need satisfaction) and a negative pathway (i.e., from perceived coach control to athlete ill-being via need frustration). As expected, need satisfaction strongly related to vitality and positive affect whereas need frustration better predicted disordered eating, burnout, depressive symptoms, and perturbed physiological arousal (i.e., higher levels of salivary-immunoglobulin A before training). In addition, similar findings have been obtained in contexts such as work (Gillet, Fouquereau, Forest, Brunault, & Colombat, 2012), health (Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013), personal relationships (Costa et al., 2014) and, more recently, PE (Haerens et al., 2015).

Using a cross-sectional design, Haerens et al. (2015) examined optimal and non-optimal motivational pathways among secondary school PE students and found initial cross-sectional support for a positive pathway in which perceived need satisfaction primarily related to perceived autonomy-supportive teaching and beneficial motivation (i.e., autonomous motivation) and a negative pathway in which need frustration primarily related to perceived controlling teaching and maladaptive motivation (i.e., controlled motivation and amotivation). The present study will be the first to examine whether such relations remain over an extended period of time (i.e., a whole school year).

1.3 A Differentiated Approach to Motivation and the Process of Internalization

When autonomously motivated, an individual fully endorses an activity because it is interesting, challenging, and enjoyable (i.e., intrinsic motivation) or personally important (i.e., identified motivation). Students experience a sense of volition in both cases and, as such, intrinsic and identified motivation represent autonomous forms of motivation. Previous research in the context of PE has shown that autonomous motivation is associated with a number of positive outcomes including greater engagement (Aelterman et al., 2012), concentration (Ntoumanis, 2005), and better grades (Barkoukis, Taylor, Chanal, & Ntoumanis, 2014).

Contrastingly, when behaviors are engaged in for reasons which have not been fully internalized, students experience controlled motivation. To be controlled means to act with a feeling of pressure (Deci & Ryan, 2000). Coercive demands and reward contingencies (i.e., external motivation), or one's sense of guilt or obligation (i.e., introjected motivation), can all pressure an individual into engaging in requested behaviors. For instance, students may cooperate during a PE class because they are afraid of getting into trouble or, in the case of introjected regulation, to prove that they are a good student and avoid feelings of guilt. The final regulation embraced by SDT is amotivation, a state in which individuals engage passively in activities without any sense of intention or reason to act in a particular way. An amotivated student may attend class but 'just go through the motions' without directing actions toward an intended outcome (Ntoumanis & Standage, 2009). Controlled motivation and amotivation for PE have been shown to predict boredom and unhappiness (Ntoumanis, 2001), decreased effort (e.g., Aelterman et al., 2012), and lower grades (Barkoukis et al., 2014).

Understanding the aspects of teaching styles which forestall student internalization for behavioral engagement is, therefore, important. SDT-based empirical research has indicated that controlling teaching behaviors are associated with maladaptive motivational regulations because

they frustrate students' basic psychological needs (Haerens et al., 2015); need frustration, in turn, leads to psychological accommodations and negative cognitive, affective, and behavioral outcomes (Deci & Ryan, 2000). It could be, for instance, that experiences of need frustration predispose individuals to fear failure, avoid challenges, and be insecure about their self-worth (Assor & Tal, 2012; Crocker, 2002).

1.4 Fear of Failure, Contingent Self-Worth, and Challenge Avoidance

School is an environment where achievement is highly sought and part of a student's self-worth may be contingent on their ability to demonstrate competence and success (Crocker, Luhtanen, Cooper, & Bourvrette, 2003). Feelings of inadequacy and failure can, therefore, lead to shame and self-doubt. This may lead some students to fear failure (i.e., hold beliefs concerning the likelihood that failing to complete a certain task or meet a specific standard will lead to aversive consequences; Conroy, Willow, & Metzler, 2002). Ultimately, exposure to controlling teaching environments may produce high-levels of contingent self-worth as students learn that they are less valuable as a person if they fail or do not perform in line with teacher expectations. In such circumstances, students could come to exhibit maladaptive coping strategies as a way of protecting themselves from feelings of failure (De Castella, Byrne, & Covington, 2013). One such coping response is challenge-avoidance: the tendency to withdraw and avoid challenges when chances of success are not clear and/or success is not quickly or easily apparent (Covington, 1992; Elliot & Church, 1997). For instance, if someone fails because they did not fully engage with the challenging situation, then the failure does not necessarily suggest that the person lacks the ability or talent to succeed. This avoidant response may minimize further shame because most people believe that when effort investment is minimal, failure does not imply a lack of competence (Dweck, 1999). Adopting such a response to challenges in controlling environments which invoke concerns about failing may, therefore, help protect contingent self-worth and prevent further

experiences of need frustration. Nonetheless, fear of failure, contingent self-worth, and challenge avoidance have all been shown to undermine school adjustment and academic success (Caraway, Tucker, Reinke, & Hall, 2003; Crocker, Sommers, & Luhtanen, 2002; Shim & Ryan, 2005). As such, we would expect controlling teaching behaviors and experiences of need frustration to positively predict cognitive-affective concerns such as fear of failure, affective outcomes including contingent self-worth, and self-protecting behavioral modifications such as challenge avoidance (Deci & Ryan, 2000). Initial evidence for such assertions comes from interviews with PE students in which perceptions of controlling teaching were associated with helplessness beliefs and lesson avoidance behaviors (Ntoumanis, Pensgaard, Martin, & Pipe, 2004).

1.5 Gender and Sport Participation

A recent report by the Women's Sport and Fitness Foundation (WSFF, 2012) suggested that some school girls are being put off physical activity by their PE lessons. According to the report, many young girls feel self-conscious when exercising or unhappy during PE. The report found that only 12% of girls aged 14 get enough physical activity each week. Likewise, Ruiz et al. (2011) and Troiano et al. (2008) found that boys were more physically active than girls. Similar findings have also been reported in Greece where only 5% of 15-year old girls and 18% of their male counterparts are physically active (World Health Organization, 2010). It is possible that the extent to which males and females perceive their teachers to be controlling and/or experience need frustration during PE might account for the reported sex differences in motivation and engagement. Another individual difference factor which may affect experiences in PE is whether students participate in sport outside of school. For example, Ntoumanis, Barkoukis, and Thøgersen-Ntoumani (2009) showed that Greek students who did not participate in out-of-school sport activities were less self-determined and more amotivated during PE lessons. Therefore, the predictive role of both gender and sport participation will be examined in the present paper.

1.6 The Present Studies

To date, no longitudinal studies have been conducted to examine controlling teaching from a SDT perspective. As such, little is known about *how* this aspect of teacher behavior relates to student motivation and other cognitive, affective, and behavioral factors associated with school adjustment and academic success over time. Hence, this study adds to the literature by examining the ways by which controlling teaching environments across a school year are related to experiences of need frustration and, in turn, student motivation in Study 1; and maladaptive cognitive-affective (fear of failure), affective (contingent self-worth), and behavioral (challenge avoidance) outcomes in Study 2. Psychological need frustration was expected to mediate the relation between students' perceptions of controlling teaching behaviors and maladaptive motivation-related outcomes. The predictive roles of gender and sport participation were also explored. Such questions have important theoretical and practical implications in terms of better understanding the origins and processes associated with student dissatisfaction in education so that more targeted motivational interventions can be developed in schools.

PE was deemed a particularly suitable context in which to explore these issues given the number of school-aged children who appear to dislike the subject but are still required to participate in lessons because they are a compulsory part of the curriculum (European Commission, 2013). Research suggests that teachers may rely more heavily on controlling strategies when they perceive their students to be lacking in motivation for the subject (Skinner & Belmont, 1993). We expect that the theoretically based relations amongst controlling teaching and student need frustration will also be applicable to other school subjects. Relations among autonomy-supportive teaching behaviors and experiences of need satisfaction have been related to positive outcomes in schools in general (Vansteenkiste et al., 2012; Tian, Chen & Huebner, 2014) as well as in specific subjects (e.g., science; Black & Deci, 2000). Furthermore, the outcomes examined across both studies are

important in all lessons. Thus, the motivational mechanisms tested in this study in the PE setting are expected to be relevant to other school subjects.

Similarly to the way in which PE is organized in many European countries and in North America, students in our study participated in two compulsory 45-minute PE classes every week with a focus on team games, personal fitness, and the development of physical competencies associated with the adoption of an active lifestyle during adulthood. Our participants were students aged around 14 years, as previous research has shown that motivation towards PE, and other curriculum subjects, decline around this time (Ntoumanis et al., 2009; Gottfried, Fleming, & Gottfried, 2001). The importance of supportive teacher-student relationships in middle school has also been emphasized in previous research (Pianta, Stuhlman, & Hamre, 2002).

2. Study 1

The aim of Study 1 was twofold. First, we examined the temporal patterning of each variable. In line with previous research (Barkoukis et al., 2009; Digelidis & Papaioannou, 1999), we expected to observe increases in perceived control, need frustration, and maladaptive indices of motivation (i.e., controlled motivation and amotivation) and decreases in autonomous motivation across the school year (hypothesis 1). The second aim was to provide a longitudinal examination of the relation between perceived controlling teaching and students' experiences of need frustration and, in turn, their motivational orientations. The mediating role of need frustration was also tested. In line with SDT, and based on the limited cross-sectional work currently available (Haerens et al., 2015), it was hypothesized that controlling teaching behavior would positively co-vary with need frustration which, in turn, would positively co-vary with controlled motivation and amotivation, and negatively co-vary with autonomous motivation at each time point (hypothesis 2). Furthermore, on the basis of previous evidence (e.g., Craig, Goldberg, & Dietz, 1996; Ntoumanis et al., 2009), it was hypothesized that females and those students who did not participate in out of school sport would

perceive higher levels of controlling teacher behavior, need frustration, controlled motivation, and amotivation (hypothesis 3).

3. Method

3.1 Participants

Four hundred and nineteen students (52.6% males; $M_{\text{age}} = 14.5$, $SD = 0.53$) participated in Study 1. One student missed the first wave of assessment, while another two and nine students missed the second and the third wave of assessment, respectively. A MANOVA comparing the students who provided information across all three waves of assessment with those who missed the T3 assessment showed non-significant statistical differences in the mean scores of T1 and T2 measured variables (Wilk's $\Lambda = .992$, $F [10, 405] = 0.33$, $p = .97$). Therefore, the missing observations were considered to be random. The students belonged to 9 classes from three middle schools located in an urban area of average socioeconomic status in Northern Greece. In addition to participating in two 45 minute PE classes each week, 62.6% of the students engaged in out-of-school sport activities, such as soccer ($n = 55$), basketball ($n = 47$), athletics ($n = 30$), volleyball ($n = 25$), handball ($n = 20$), and dance ($n = 16$).

3.2 Procedure

Prior to the initial data collection, written informed consent was obtained from the schools' head-teachers, the participating students' parents, and the students themselves. The first data collection (T1) occurred in November, while the second (T2) and the third (T3) took place in January and April, respectively. At all three assessment times, a research assistant visited the schools and explained the purpose of the study to the students. The students were told that their participation was voluntary and that their responses would remain confidential and would not be shared with their teachers or parents. No students refused to participate in the study. A coding system was developed to match students' responses over time while protecting their anonymity.

3.3 Measures

3.3.1 Controlling Coach Behaviors Scale (CCBS; Bartholomew et al., 2010). Two four-item subscales (Intimidation and Negative Conditional Regard), taken from the CCBS scale, were adapted and used for the purposes of the present study (e.g., “My PE teacher shouts at me in front of others to make me do certain things”). We excluded items from the CCBS that were not relevant to the PE context (e.g., “My coach tries to control what I do during my free time”). Bartholomew et al. provided evidence for the internal consistency and factorial validity of the CCBS and its subscales. In the present study the internal consistency (Cronbach alphas) of the scale was .81 for T1, .87 for T2, and .92 for T3 (see Table 1). A test of factorial invariance across time (i.e., where the loadings of the items on the latent factor of perceived controlling teaching are presumed to remain invariant across the three waves of assessment) yielded acceptable fit: $S-B\chi^2(74) = 410.04$, CFI = .931, RMSEA = .068.

3.3.2 Psychological Need Thwarting Scale (PNTS; Bartholomew et al., 2011). The PNTS was adapted and used in the present study. The stem was “During PE class” and students responded to three 4-item subscales in order to assess perceptions of autonomy frustration (e.g., “I feel pushed to behave in certain ways”), competence frustration (e.g., “There are situations in which I am made to feel incompetent”), and relatedness frustration (e.g., “I feel I am disliked”). Bartholomew et al. showed that the scale scores had high internal consistency and factorial validity. Similarly, in the present study, the Cronbach alphas for all the subscales across the three waves of assessment ranged between .72 and .86 – see Table 1. Furthermore, a test of factorial time invariance, with the three latent factors of autonomy, competence, and relatedness frustration allowed to freely covary, showed acceptable fit $S-B\chi^2(171) = 695.89$, CFI = .942, RMSEA = .054.

3.3.3 Revised Perceived Locus of Causality in Physical Education Scale (PLOC-R; Vlachopoulos, Katartzi, Kontou, Moustaka, & Goudas, 2011). The PLOC-R assesses different

types of motivation for engaging in PE. In particular, the PLOC-R contains 19 items and students were asked to indicate the degree to which they engaged in PE class activities for intrinsic (e.g., “Because it is enjoyable”), identified (e.g., “Because it is important to me to do well in PE”), introjected (e.g., “Because I would feel bad if I did not do it”), and external (e.g., “Because in this way I will not get a low grade”) reasons as well as the absence of any reason (i.e., amotivation; e.g., “I don’t see why we should have PE”). Vlachopoulos et al. provided evidence for the reliability and validity of the PLOC-R. Similar to previous studies and aligned with SDT, intrinsic and identified motivation were aggregated to represent a composite score of autonomous motivation, and introjected and external motivation were used to compute a composite score of controlled motivation. A test of factorial time invariance with each set of items defining the respective latent factors (but also [a] with the errors between an intrinsic item and an identified item being allowed to covary and [b] an item from the external regulation subscale being allowed to cross-load to introjected regulation) yielded marginally acceptable fit: $S-B\chi^2(506) = 2075.10$, CFI = .907, RMSEA = .070. All measures were assessed on a 7-point scale anchored by 1 (*Strongly disagree*) and 7 (*Strongly agree*).

3.4 Plan of Analyses

As a first step, we calculated descriptive statistics, Cronbach alphas, and zero-order correlations amongst the variables of our study. Then, through separate univariate multilevel models, we examined whether there were linear, curvilinear, or no temporal changes in each of the measured variables. We used multilevel modelling because repeated measures were nested within persons. Given that multilevel models can handle missing cases effectively (Raudenbush & Bryk, 2002), we retained all the available information in each model, including those students for which we had missing values at T1 ($n = 1$), T2 ($n = 2$), or T3 ($n = 9$). We disregarded the classroom level as the small number ($n = 9$) would result in unreliable estimates (Maas & Hox, 2005). To ease the

interpretation of the coefficients, all continuous predictors were converted into z-scores so that standardized regression coefficients could be reported (Hox, 2010).

In our main analyses, we tested the hypothesized associations within a single multivariate multilevel model in which all of the dependent variables (i.e., autonomous motivation, controlled motivation, and amotivation) were simultaneously regressed on to two sets of predictors, the within- and between-person predictors. The within-person predictors included perceived controlling teaching and need frustration and their parameter estimates represented the averaged associations between these variables and the motivational regulations across the three waves of assessment (i.e., across whole school year). The between-person predictors included gender and out-of-school sport participation and were used to capture between-student differences in the mean levels of autonomous motivation, controlled motivation, and amotivation across the three waves. The multilevel analysis was favored over other analytical approaches (e.g., cross-lag models) because (a) it does not assume that change in a variable across two time points is independent of both earlier changes and later changes in the same construct (Curran & Hussong, 2002) and (b) it calculates change in relation to the individual and not the group (Curran, 2000).

The within-person predictors were group mean centred to reflect the average within-person relations among the measured variables across the three waves of assessment. Further, the between-person predictors were grand-mean centred to represent the predicted score for all students, regardless of their gender or out-of-school sport participation status. No cross-level interactions (i.e., interactions between between-person and the within-person variables) were estimated as including such cross-level interactions yielded unstable standard errors.

4. Results

4.1. Preliminary Analyses and Temporal Changes

Descriptive statistics, Cronbach alphas, and zero-order correlations are presented in Table 1. With respect to the temporal changes, multilevel analyses showed that perceived controlling teaching and controlled motivation increased linearly ($\pi_{10} [\text{time-linear}] = 0.08, SE = 0.03, p < .01$ and $\pi_{10} [\text{time-linear}] = 0.25, SE = 0.04, p < .01$, respectively). The opposite was true for autonomous motivation which decreased linearly across time ($\pi_{10} [\text{time-linear}] = -0.21, SE = 0.04, p < .01$). These results suggest that students reported, on average, more perceived controlling teaching, more controlled motivation, and less autonomous motivation over time. Amotivation showed a curvilinear trajectory with increases becoming significant (and more marked) at the third semester ($\pi_{10} [\text{time-linear}] = 0.11, SE = 0.12, p > .05$ and $\pi_{20} [\text{time-quadratic}] = 0.17, SE = 0.06, p < .01$). No statistically significant temporal changes were found for need frustration ($\pi_{10} [\text{time-linear}] = 0.03, SE = 0.03, p = .27$). It should be noted, however, that there was considerable variability in the time-related changes for all variables as indicated by the random slopes of the models ($e_{ij} = 0.15, 0.18, 0.27, 0.28$, and 0.47 , all $ps < .05$, for perceived teaching control, need frustration, autonomous motivation, controlled motivation, and amotivation, respectively). These results suggest that the observed changes across time varied substantially from student to student.

4.2 Main Analyses

The model is presented in Figure 1. Each path at the within-person level represents the averaged relation between the measured variables across all measurement waves. At the intrapersonal (i.e., within-person) level, and as hypothesized, perceived teacher control related positively to need frustration ($\beta = .52, p < .01; 95\% CI: .30 - .74$) which, in turn, related negatively to autonomous motivation ($\beta = -.14, p < .01; 95\% CI: -.24 - -.04$) and positively to controlled motivation ($\beta = .23, p < .01$) and amotivation ($\beta = .32, p < .01; 95\% CI: .14 - .50$). These results suggest that the more students perceived their teacher to be controlling across the school year, the more their needs were frustrated, and the less autonomous motivated and more controlled motivated and amotivated they

felt. Perceived teacher control and need frustration explained, approximately, 8.8%, 0.8%, and 15.2% of the variance in autonomous motivation, controlled motivation, and amotivation, respectively.

A test of the indirect effects revealed that the paths between perceived controlling teaching and autonomous motivation ($B = -0.08$, $SE = 0.03$, $z = -2.81$, $p < .01$), controlled motivation ($B = 0.07$, $SE = 0.03$, $z = 2.49$, $p = .013$), and amotivation ($B = 0.13$, $SE = 0.03$, $z = 3.89$, $p < .01$), were all statistically significant. This finding suggests that need frustration mediated the relations between perceived controlling teaching and autonomous motivation, controlled motivation, and amotivation.

At the between-person level, females as compared to males, reported, on average, less control from the teacher ($\beta = -0.34$, $p < .01$), less need frustration ($\beta = -0.17$, $p < .01$), and lower levels of amotivation ($\beta = -0.28$, $p < .01$). These results suggest that regardless of the patterns of associations among perceived controlling teaching, need frustration, and the three types of motivation, females perceived their teachers as less controlling, reported less need frustration, and were less amotivated than males. Moreover, students who participated in organized sport activities after school reported more autonomous motivation ($\beta = 0.28$, $p < .01$) and less amotivation ($\beta = -0.12$, $p < .01$) than students who did not participate in such sport activities. Gender and out-of-school sport participation explained, approximately, 8.7%, and 20.6% of between-student differences in autonomous motivation and amotivation, respectively.

5. Summary of Study 1

Partial support was found for hypothesis 1 in that linear increases were observed in perceived controlling teacher behavior and controlled motivation across the school year whilst a linear decrease was observed for autonomous motivation. However, a curvilinear trajectory was observed for amotivation with changes becoming more marked at T3. In addition, no changes were reported

in perceived levels of need frustration across time. In line with hypothesis 2, perceptions of controlling teaching significantly and positively related to feelings of need frustration which, in turn, were negatively associated with autonomous motivation and positively associated with controlled motivation and amotivation over time. Need frustration was also shown to mediate the relations between perceived controlling teaching and autonomous motivation, controlled motivation, and amotivation. Contrary to hypothesis 3, female students reported lower levels of perceived controlling teaching behavior, need frustration, and amotivation, compared to males. Finally, and as expected, students who engaged in sport outside of school displayed more autonomous motivation for PE and less amotivation compared to students who did not engage in such activities.

These findings provided initial support for the existence of a negative pathway toward maladaptive student motivation that is mediated by experiences of psychological need frustration. Subsequently, a second longitudinal study was conducted to examine whether these findings could be replicated with an independent sample and extended to predict other negative outcomes.

6. Study 2

In addition to undermining motivation, Deci and Ryan (2000) posit that exposure to controlling teaching and need frustration will lead students to engage in other cognitive, affective, and behavioral accommodations associated with impaired school adjustment and academic achievement. Hence, in Study 2 we examined whether controlling aspects of the teaching environment manifested in PE predisposed individuals to fear failure, develop contingent self-worth, and avoid challenging situations. As in Study 1, the mediating role of need frustration was also examined. We expected to see increases in all variables across the school year (hypothesis 1). Similarly to Study 1, our second hypothesis stated that perceived controlling teaching behavior would positively covary with need frustration which, in turn, would positively co-vary with all three

negative outcomes across time (Assor & Tal, 2012; Crocker et al., 2003; De Castella et al., 2013). Finally, individuals who engaged in sport outside of school were expected to report lower levels of each maladaptive outcome (Ntoumanis et al., 2009; hypothesis 3). However, given the unexpected findings in Study 1, no specific hypotheses were made regarding gender.

7. Method

7.1 Participants

Participants were $n = 447$ students (44.7% males; $M_{\text{age}} = 14.6$, $SD = 0.58$). Twenty-six, 21, and 33 students (representing accordingly 5.8%, 4.7%, and 7.4% of the full sample) were absent at T1, T2, and T3, respectively. A MANOVA showed no significant differences in the variables studied at T2 and T3 between those who were absent and those who were present at T1 (Wilk's $\Lambda = .980$, $F [10, 388] = 0.79$, $p = .64$). The same was true when we compared those who were absent either at T2 or at T3 with their counterparts who were present (Wilk's $\Lambda = .965$, $F [10, 381] = 1.37$, $p = .19$ and Wilk's $\Lambda = .982$, $F [10, 391] = 0.71$, $p = .72$, respectively). Hence, the missing observations were considered to be random.

The students were from 9 classes from four middle schools (different from those in Study 1) located in an urban area of average socioeconomic status in Northern Greece. A substantial proportion of the sample, 58.1%, took part in out-of-school sport activities, such as soccer ($n = 54$), dance ($n = 37$), basketball ($n = 32$), swimming ($n = 26$), athletics ($n = 25$), handball ($n = 19$), jogging ($n = 14$), and tae-kwon-do ($n = 9$).

7.2 Procedure

An identical procedure to Study 1 was followed with the three waves of assessment taking place in November (T1), January (T2), and April (T3). Similarly to Study 1, a research assistant explained the purpose of the study to the students and highlighted that participation was voluntary and that individual responses would not be disclosed. All students agreed to participate. The same coding

system that had been used in Study 1 was applied to track students' responses while protecting their anonymity.

7.3 Measures

7.3.1 Controlling Coach Behaviors Scale (CCBS; Bartholomew et al., 2010) and Psychological Need Thwarting Scale (PNTS; Bartholomew et al., 2011). As in Study 1, the CCBS and PNTS

were used to assess students' perceptions of their PE teacher's controlling interpersonal style and feelings of need frustration, respectively. Cronbach alphas were acceptable (see Table 2) and so were the tests of factorial time invariance for both the CCBS ($S-B\chi^2 [74] = 349.87$, CFI = .948, RMSEA = .055) and the PNTS ($S-B\chi^2 [171] = 620.38$, CFI = .946, RMSEA = .049).

7.3.2 Performance Failure Appraisal Inventory (PFAI; Conroy et al., 2002). We used the short form of the PFAI to assess students' fear of failure (a dispositional measure of appraisals associated with the fear of failure). An example item from this five-item scale is "When I am failing, I worry about what others think about me". Extensive evidence for the reliability and validity of the PFAI (both the long and the short form) has been provided by Conroy et al. The internal consistency (see Table 2) and factorial time invariance ($S-B\chi^2 [23] = 75.78$, CFI = .967, RMSEA = .048) were also acceptable in the present study.

7.3.3 Contingencies of Self-Worth Scale (CSWS; Crocker et al., 2003). The CSWS measures contingent self-worth in several domains. For the purposes of the present study, we adapted and used four items that tap academic competence-related contingent self-worth. The adapted scale assessed students' self-evaluations about whether their self-worth increased or decreased following success or failure in PE lessons. An example item of the scale is "My self-esteem is influenced by my performance in PE lessons". Evidence for the construct validity and reliability of the CSWS was provided by Crocker et al. In the present study, the four-item scale showed marginally acceptable

internal consistency (see Table 2) and factorial invariance across time ($S-B\chi^2$ [12] = 64.74, CFI = .952, RMSEA = .091).

7.3.4 Challenge Avoidance Scale (Assor & Tal, 2012). Five items, originally used to assess withdrawal from academic challenges, were adapted for the purposes of the present study to measure the degree to which students tended to avoid challenging situations in PE (e.g., “If I don’t succeed at a task in PE for the first time, I stop trying”). The scale showed acceptable levels of reliability in Assor and Tal’s study. The same applied to our study, both in terms of internal consistency (see Table 2) and factorial time invariance ($S-B\chi^2$ [23] = 99.45, CFI = .986, RMSEA = .029). All measures were assessed on a 7-point scale anchored by 1 (*Strongly disagree*) and 7 (*Strongly agree*).

7.4 Plan of Analysis

Similarly to Study 1, we first inspected the means, standard deviations, and the bivariate correlations among the measured variables and examined their temporal patterning across the year (i.e., linear, quadratic, or no-changes). We then tested a single multivariate multilevel model to assess the degree to which perceived teacher control positively related to need frustration and, in turn, the extent to which need frustration was positively associated with contingent self-worth, challenge avoidance, and fear of failure, across the school year. Centering decisions were identical to those made in Study 1. Only statistically significant pathways were retained in the final model.

8. Results

8.1 Preliminary Analyses and Temporal Changes

Descriptive statistics, Cronbach’s alphas, and bivariate correlations among the measured variables, are provided in Table 2. Two scales yielded marginally low internal consistency estimates (.66; fear of failure and contingent self-worth) but were retained. The main analyses were the same as in Study 1. No statistically significant changes were found for perceived controlling teaching (π_{10} [time-

linear] = -0.15, $SE = 0.08$, $p > .05$), need frustration ($\pi_{10 \text{ [time-linear]}} = -0.05$, $SE = 0.03$, $p > .05$), and contingent self-worth ($\pi_{10 \text{ [time-linear]}} = -0.02$, $SE = 0.04$, $p > .05$). On the other hand, a linear, but marginally significant decrease was found for fear of failure ($\pi_{10 \text{ [time-linear]}} = -0.04$, $SE = 0.02$, $p = .05$), whereas there was a linear increase in challenge avoidance ($\pi_{10 \text{ [time-linear]}} = 0.14$, $SE = 0.03$, $p < .05$). Nevertheless, in accordance with Study 1, the changes in scores of the measured variables significantly varied across time from person to person for perceived teaching control ($\epsilon_{ij} = 0.12$, $p < .01$; 95%- CI : -0.39 – 0.09), need frustration ($\epsilon_{ij} = 0.11$, $p < .01$; 95%- CI : -0.27 – 0.17), fear of failure ($\epsilon_{ij} = 0.06$, $p < .01$; 95%- CI : -0.16 - .08), contingent self-worth ($\epsilon_{ij} = 0.15$, $p < .01$; 95%- CI : -0.31 – 0.27), and challenge avoidance ($\epsilon_{ij} = 0.13$, $p < .01$; 95%- CI : -0.11 – 0.39). Again, these findings suggest that the observed changes across time varied from student to student.

8.2. Main Analyses

The final model is displayed in Figure 2. At the within-person level, perceived controlling teaching positively related to need frustration ($\beta = .42$, $p < .01$; 95% CI : .28 - .56) which, in turn, positively related to challenge avoidance ($\beta = .29$, $p < .01$; 95% CI : -.18 - .76), contingent self-worth ($\beta = .16$, $p < .01$; 95% CI : -.09 - .41), and fear of failure ($\beta = .42$, $p < .01$; 95% CI : .24 - .60) across time. Perceived teacher control and need frustration explained, 27.0%, 12.8%, and 40.0% of the intrapersonal variance in fear of failure, contingent self-worth, and challenge avoidance, respectively.

A test of the indirect effects revealed that the paths between perceived controlling teaching and challenge avoidance ($B = 0.11$, $SE = 0.03$, $z = 3.59$, $p < .01$), contingent self-worth ($B = 0.05$, $SE = 0.03$, $z = 2.44$, $p = .015$), and fear of failure ($B = 0.17$, $SE = 0.03$, $z = 5.89$, $p < .01$) were all statistically significant. As in Study1, this finding suggests that need frustration mediated the relations between perceived controlling teaching and challenge avoidance, contingent self-worth, and fear of failure.

At the between-student level, females compared with males, reported, on average, less psychological control from the teacher ($\beta = -.33, p < .01$) and, although only marginally significant ($\beta = -.12, p = .05$), less need thwarting. Similar to Study 1, these findings suggest that regardless of the patterns of associations among perceived controlling teaching, need frustration, and the three types of motivation, females perceived their teachers as less controlling, and tended to report less need frustration, than males. Finally, students who participated in organized out of school sport activities reported more contingent self-worth ($\beta = .18, p < .01$) and less challenge avoidance ($\beta = -.14, p < .01$) than students who did not participate in such sport activities. Gender and out-of-schools sport activities explained, approximately, 2.2%, and 3.3% of between-student differences in contingent self-worth and challenge avoidance, respectively.

9. Summary of Study 2

Contrary to hypothesis 1, only linear increases were observed for challenge avoidance across the school year. Perceptions of controlling teaching, need frustration, and contingent self-worth all remained stable across the year and there was actually a decrease in fear of failure. In line with hypothesis 2 and the findings from Study 1, perceptions of controlling teaching were positively related to feelings of need frustration across the school year, which in turn, predicted fear of failure, contingent self-worth, and challenge avoidance. As in Study 1, the mediating role of need frustration was also supported. In support of hypothesis 3, students who engaged in sport outside of school displayed less challenge avoidance and more contingent self-worth. Similarly to Study 1, females reported lower levels of controlling teacher behavior and need frustration. Overall, these findings replicate those observed in Study 1 and provide further support for the utility of examining the proposed non-optimal motivational pathway.

10. General Discussion

The two studies reported in the present manuscript are the first in the context of PE to examine the maladaptive motivational pathway outlined by SDT from a longitudinal perspective. To better understand the mechanisms via which perceived teacher behavior relates to student experience, we examined how students' perceptions of controlling teaching behavior and experiences of psychological need frustration related to a number of motivation-related outcomes across one school year. The hypothesized maladaptive motivational process was supported in both Study 1 and Study 2. Specifically, perceived controlling teaching related positively to need frustration across both studies which, in turn, negatively related to autonomous motivation and positively related to controlled motivation and amotivation in Study 1; and was positively related to fear of failure, contingent self-worth, and challenge avoidance in Study 2. The mediating role of need thwarting was also supported across both studies. As such, the findings make a valuable addition to the small body of cross-sectional research on this topic (i.e., De Meyer et al., 2014; Haerens et al., 2015; Soenens et al., 2012) and help to delineate the processes that could explain links between students' perceptions of teaching behavior and motivation (Wentzel, 1999). Together, these findings indicate that the negative motivational pathway outlined by SDT must be examined in its own right (i.e., independently from autonomy-support and need satisfaction), and over time, if we are to more accurately capture the relations between controlling teaching and student motivation and experience.

10.1 Effects of Controlling Teaching and Need Frustration on Motivation-Related Outcomes

The present findings provide novel information regarding the maladaptive social-psychological factors that catalyze within-person changes in negative motivational outcomes. In particular, the findings emphasize the importance of assessing perceptions of interpersonal control and experiences of psychological need frustration if we are to understand why some students have negative experiences in PE. The findings from Study 1 and Study 2 indicated that exposure to

teaching environments which are perceived to be controlling is associated with experiences of need frustration which, in turn, undermine student motivation and relate to maladaptive cognitive, affective, and behavioral outcomes.

The results of Study 1 are largely in agreement with previous work which has revealed decreases in students' adaptive motivation over time (Ntoumanis et al., 2009; Gottfried et al., 2001). However, the decreases in autonomous motivation observed in the present study are particularly worrying given the corresponding linear increase in controlled motivation. Interestingly, the form of motivation most strongly predicted by need frustration was amotivation. In addition, the increase in amotivation, which seemed to accelerate between T2 and T3, suggest that long-term exposure to need thwarting teaching environments can lead students to motivationally disengage and simply 'give up'. This finding implies that certain aversive outcomes, such as amotivation, are more likely to occur with prolonged experiences of need frustration (De Meyer et al., 2014). This interpretation is further supported by the linear increase in challenge avoidance which was observed in Study 2. Perhaps chronic exposure to controlling environments leads to students fearing failure and, therefore, increasingly avoiding challenges which, over time, may manifest in a complete lack of intention to actively participate in the lesson (Assor & Tal, 2012; De Castella et al., 2013). Future research should examine relations among these variables in the same study (i.e., perceived controlling environments, need frustration, motivational regulations, and motivation-related outcomes). Interestingly, whilst contingent self-worth remained stable across the school year, students reported an increase in challenge avoidance and a decrease in their fear of failure. The fact that we observed a corresponding decrease in fear of failure across the school year may indicate that challenge avoidance represented a rather effective behavioral accommodation in that it protected students from these concerns (Crocker, 2002). Such findings could suggest that pupils became less

worried about failing because they began to avoid challenging situations in environments in which they experienced need frustration. This would also be an interesting avenue for future research.

The mean occurrence of perceived controlling interpersonal behavior from teachers was relatively low and, whilst it increased in Study 1, it remained stable across time in Study 2. Thus, the findings from Study 1 suggest that maladaptive changes in student motivation appear to be associated with increases in perceived controlling teaching across the school year. Contrastingly, the findings from Study 2 suggest that once students have experienced controlling teaching in the context of PE, controlling behaviors do not need to increase in order for challenge avoidance behaviors to rise over time. Furthermore, interpersonal control consistently predicted need frustration at each time point and across both studies. Therefore, in line with previous research (e.g., Author et al., 2011; De Meyer, 2014; Haerens et al., 2015), it would seem that even when the incidence of controlling teaching behavior is infrequent, such behavior can still predict students' negative experiences, engagement, and motivation in PE.

The present findings imply that experiences of need frustration could be an important mechanism via which maladaptive aspects of teacher behavior are linked to negative student outcomes (Author et al., 2011; Author et al., 2011; Vansteenkiste & Ryan, 2013). It is, however, important to note that perceptions of need frustration remained stable across time in both Study 1 and Study 2. This suggests that experiences of need frustration do not have to increase or, indeed, be particularly high in order to have a negative association with some aspects of student motivation over time.

10.2 Effects of Gender and Sport Participation

In contrast to our third hypothesis, female students appeared to be more resilient to the maladaptive motivational pathway examined in the present studies and perceived less controlling teaching behavior and reported lower levels of need frustration as well as less amotivation in Study 1. It

could be that female students are more resilient because, in comparison to boys, girls are socialized to respond in more accommodative ways to controlling behavior (Maccoby, 1998). Whilst SDT suggests that the three psychological needs are universal, the means through which they are satisfied or thwarted may vary in different groups. Yet, this post-hoc explanation should be considered with caution as most SDT-based research has suggested that controlling teaching behaviors are as harmful for girls as they are for boys (Assor et al., 2005). An alternative explanation could be that teachers actually treat their female students differently. For example, observational research by Duffy, Warren, & Walsh (2002) showed that teachers interact more with male students than with female students and that this tendency is independent of the number of interactions initiated by the students themselves. Overall, the present findings suggest that the interplay between gender, interpersonal control, and resilience might be an interesting topic for future research.

As expected, students who engaged in sport outside of school displayed more autonomous motivation for PE and less amotivation in Study 1. Students who choose to engage in physical activity outside of PE are likely to enjoy it and recognize the benefits of physical activity and, therefore, actively engage in the lesson as opposed to ‘just going through the motions’ (Prochaska, Sallis, Slymen, & McKenzie, 2003). Interestingly, in the second study, students who engaged in sport outside of school displayed less challenge avoidance than those who did not participate in such sport activities, perhaps because they felt more confident in the physical activity domain, but more contingent self-worth. The latter finding is unexpected but could be explained in terms of the relative importance students place on their identity as an ‘athlete’ (Crocker, 2002). Individuals will seek out situations and engage in activities that provide opportunities for them to achieve success in domains in which their self-worth is contingent.

10.3 Implications for Teaching in PE

The present findings suggest that when teachers' interpersonal behavior is perceived to be controlling, students are less likely to internalize the expectations and goals that are valued by their teacher and are more likely to develop poor quality motivation and become overly concerned about failure. Therefore, instead of actively engaging in learning activities because they value the learning process, students may simply do so to avoid getting into trouble. Students may also come to avoid challenges in order to protect themselves from failure and maintain feelings of self-worth. It is, therefore, imperative that teachers understand the way in which students' may perceive their behavior and the potential effects that these judgments can have on their subsequent motivation. To avoid these non-optimal student outcomes, which have been negatively associated with classroom engagement and academic achievement (Barkoukis et al., 2014; Caraway et al., 2003; Crocker et al., 2002; Ntoumanis, 2001; Shim & Ryan, 2005), teachers must be equipped with the skills to identify and avoid the use of controlling and need thwarting interpersonal strategies (e.g., Cheon & Reeve, 2014). However, the context in which PE is taught must also be considered if research in this area is to have practical import. Issues to do with organization and discipline may be more pertinent in this environment and, therefore, PE classes may involve a greater provision of rules, instructions, monitoring, and continuous feedback compared to the teaching of regular academic classes (De Meyer et al., 2014). As such, it is important to note that beyond looking at highly-structured instructions, which might actually be necessary and suitable for use in this context (see Mosston & Ashworth 1994), the present studies focused specifically on controlling strategies which are not required for effective teaching (e.g., intimidation and negative conditional regard). Such externally or internally controlling strategies attempt to direct student behavior by overtly manipulating or exploiting the teacher-student relationship and are, therefore, likely to be particularly damaging to feelings of relatedness (e.g., Assor, Roth, & Deci, 2004). Furthermore, students who are subjected to behaviors which are designed to intimidate or are exposed to negative

conditional regard may be left feeling humiliated, incompetent, and questioning their own self-worth (Barber, 2001). In the end, these strategies leave students with little choice but to relinquish their autonomy and comply with advocated behaviors in order to avoid getting into trouble and maintain a satisfactory relationship with their teacher. It is, therefore, easy to see how such behaviors might thwart students' psychological needs for relatedness, autonomy, and competence..

Teachers should not engage in power-assertive strategies to maintain discipline (e.g., the threat of punishment). Instead, student co-operation should be facilitated through more autonomy-supportive motivational strategies such as providing a rationale for a given request and emphasizing the value or fun in each activity (Chatzisarantis & Hagger, 2009; Reeve & Halusic, 2009; Haerens et al., 2011). Similarly, teachers should be careful to avoid more subtle, but equally damaging, internally controlling behaviors (Soenens & Vansteenkiste, 2010). It is particularly important that teachers pay attention to their body language and the non-verbal behaviors which underpin these strategies (e.g., a look of disappointment; Pianta et al., 2002). Furthermore, the current findings highlight the importance of teaching contexts in which students feel able to make and learn from their mistakes without fearing criticism or disapproval from their teacher. Challenge avoidance and fear of failure were positively related to each other at each time point and the temporal patterning of these variables suggests that students will begin to avoid challenging situations in order to manage their concerns about failing. Providing structure in order to scaffold students' learning and developing warm interpersonal relationships should help create an environment where students feel confident enough to engage in challenging activities without being overly concerned about failure. Implications from these findings are not only relevant to classrooms in Greece, but can also be extrapolated to many other European countries and to North America where PE is organized in a similar way. Furthermore, these findings should also have practical import for teaching subjects

beyond PE and could, therefore, be explored explicitly in other classroom settings (e.g., mathematics, science, and literacy classes).

10.4 Limitations and Future Directions

Although the present findings have a number of important implications for teachers and the way in which they interact with their students, it is important to recognize that classrooms are dynamic and transactional. Therefore, future studies will need to undertake a more dynamic approach to examine the teacher-student interactions on a lesson-to-lesson basis (Tsai, Kunter, Lüdtke, Trautwein, & Ryan, 2008) or even within lessons (Pennings et al., 2014). Moreover, whilst beyond the scope of the current paper, future research should assess a wider range of teaching behaviors (e.g., those identified in the circumplex model; Gurtman, 2009) as well as the reciprocal effects between these and student behavior (e.g., Curby, Rudasill, Edwards, & Pérez-Edgar, 2011; Skinner & Belmont, 1993). Students who initially demonstrate low levels of motivation may be most at risk of experiencing controlling teaching behavior, and therefore, early intervention might help prevent further deterioration of disengaged students in this context. Furthermore, whilst it is likely that interpersonal experiences have their most direct and powerful influence via the way in which they are perceived and interpreted by the students themselves, observations of teaching behavior and objective outcome measures in future longitudinal work would also add value to the current research which relied on self-reported measures only.

Future research may also wish to examine other between-student factors which make some students more resilient to need thwarting teaching environments. For example, it may be that students with greater mental toughness (e.g., Mahoney, Gucciardi, Ntoumanis, & Mallet, 2014), or those who have a strong sense of relatedness to the teacher, may interpret behaviors perceived to be controlling by other students as more informational rather than pressuring. In addition, there may be

instances where more controlling instruction is necessary and accepted by students in PE classes (e.g., instructions concerning safety matters).

Finally, it would be interesting for future longitudinal research to assess both maladaptive and adaptive pathways simultaneously. Given that teachers may engage in both autonomy-supportive and controlling behaviors to different extents, it would be interesting to examine how teachers who combine autonomy-supportive and controlling behaviors affect student motivation over time compared to teachers who predominantly rely on either autonomy-supportive or controlling strategies (e.g., latent profile analysis). For example, the use of controlling strategies may not be as detrimental to experiences of autonomy, competence, and relatedness if they are used alongside more autonomy-supportive behaviors.

10.5 Conclusion

The present longitudinal studies extended the small body of work which has explicitly addressed the dynamics involved in controlling teaching (e.g., Assor et al., 2005; De Meyer et al., 2014; Haerens et al., 2015; Soenens et al., 2012). Specifically, the findings support a negative motivational pathway from controlling teaching toward need frustration and maladaptive motivational outcomes over time. This type of research is important if we are to more accurately understand the detrimental effects of controlling teaching on motivation and engagement in curriculum subjects such as PE and the process via which these negative effects occur. Overall, our findings imply that future interventions aiming to facilitate optimal student motivation and engagement in PE should focus on avoiding internally and externally controlling teaching behaviors which manipulate the teacher-student relationship. Effective teacher training will, therefore, involve training teachers to become *more* autonomy-supportive and *less* controlling.

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Table 1

Means, Standard Deviations, Cronbach's alphas and Bivariate Correlations of the Measured Variables of Study 1

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Time 1															
1. Perceived control	-														
2. Need frustration	.70	-													
3. Autonomous motivation	-.23	-.24	-												
4. Controlled motivation	.33	.40	.02	-											
5. Amotivation	.48	.45	-.48	.35	-										
Time 2															
6. Perceived control	.54	.48	-.25	.28	.39	-									
7. Need frustration	.49	.60	-.24	.31	.41	.64	-								
8. Autonomous motivation	-.19	-.20	.57	-.10	-.40	-.30	-.34	-							
9. Controlled motivation	.19	.22	.08	.48	.13	.24	.26	.20	-						
10. Amotivation	.28	.26	-.27	.18	.46	.43	.46	-.36	.41	-					
Time 3															
11. Perceived control	.42	.39	-.15	.19	.27	.52	.43	-.26	.10	.32	-				
12. Need frustration	.39	.41	-.15	.20	.29	.51	.58	-.28	.23	.38	.66	-			
13. Autonomous motivation	-.22	-.23	.45	-.09	-.38	-.33	-.36	.66	.07	-.35	-.25	-.31	-		
14. Controlled motivation	.01	.03	-.05	.27	-.05	.04	.04	.21	.40	.13	.14	.18	.41	-	
15. Amotivation	.17	.10	.42	.10	.21	.22	.18	-.20	.19	.48	.31	.36	-.12	.54	-
Cronbach alphas	.81	.83	.89	.78	.80	.87	.88	.92	.78	.84	.92	.93	.93	.85	.85
<i>M</i>	2.07	2.12	5.37	3.36	1.84	2.12	2.09	5.18	3.57	2.12	2.24	2.19	4.95	3.87	2.74
<i>SD</i>	1.09	0.98	1.35	1.29	1.28	1.21	1.10	1.54	1.27	1.50	1.41	1.29	1.69	1.49	1.81

Note. Correlations equal or greater than $|\cdot10|$ and $|\cdot13|$ are statistically significant at the $\cdot05$ and $\cdot01$ level, respectively

Table 2

Means, Standard Deviations, Cronbach's alphas and Bivariate Correlations of the Measured Variables of Study 2

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Time 1															
1. Perceived control	-														
2. Need frustration	.58	-													
3. Fear of failure	.39	.57	-												
4. Contingent self-worth	.22	.32	.36	-											
5. Challenge avoidance	.38	.39	.25	.10	-										
Time 2															
6. Perceived control	.65	.49	.38	.15	.42	-									
7. Need frustration	.51	.57	.49	.18	.39	.68	-								
8. Fear of failure	.42	.49	.57	.33	.32	.50	.65	-							
9. Contingent self-worth	.12	.21	.32	.45	.04	.13	.20	.30	-						
10. Challenge avoidance	.30	.35	.25	.09	.53	.49	.55	.53	.18	-					
Time 3															
11. Perceived control	.56	.40	.30	.13	.32	.68	.61	.45	.13	.43	-				
12. Need frustration	.51	.53	.42	.15	.34	.59	.72	.55	.20	.46	.74	-			
13. Fear of failure	.39	.39	.43	.22	.27	.41	.43	.57	.21	.36	.51	.64	-		
14. Contingent self-worth	.03	.06	.12	.39	.00	.00	.05	.11	.52	.01	.11	.15	.20	-	
15. Challenge avoidance	.25	.27	.17	.01	.42	.34	.39	.35	.07	.58	.55	.54	.55	.09	-
Cronbach alphas	.83	.82	.66	.66	.84	.89	.88	.73	.60	.85	.91	.90	.81	.70	.90
<i>M</i>	2.13	2.22	1.76	3.35	1.52	2.05	2.13	1.67	3.24	1.70	2.11	2.14	1.68	3.26	1.81
<i>SD</i>	1.13	1.00	0.73	0.99	0.93	1.19	1.09	0.77	1.09	1.08	1.30	1.21	0.83	1.29	1.26

Note. Correlations equal or greater than |.10| and |.13| are statistically significant at the .05 and .01 level, respectively

Between-person level

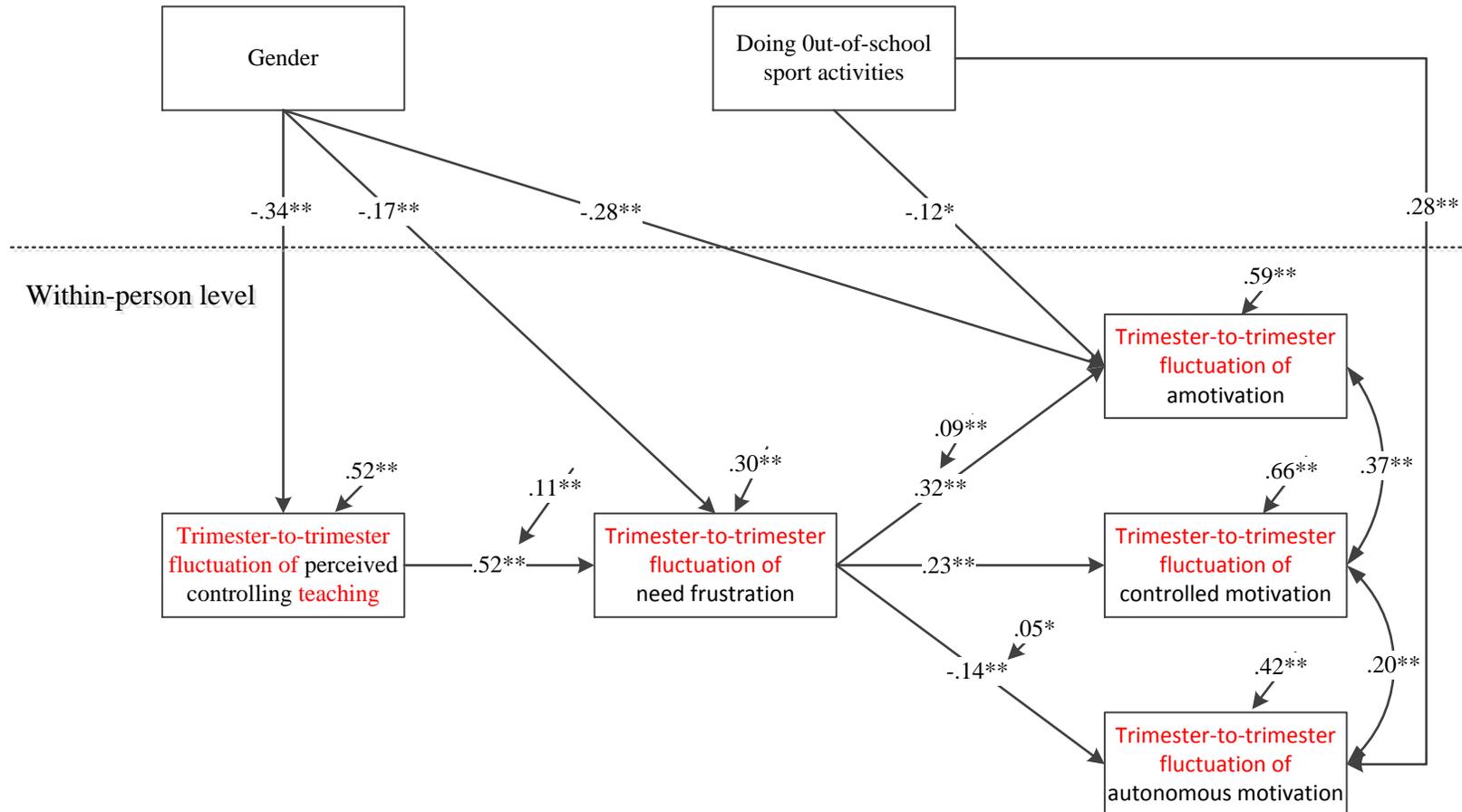


Figure 1. Autonomous motivation, controlled motivation, and amotivation, predicted by perceived teaching control and student need frustration (at the within-person level), and by gender and out-of-school sport activities (at the between-person level) (Study 1). Parameter coefficients at the within-person level represent associations between variables within each trimester, which have been averaged across the whole school year. Note. $* p < .05$. $** p < .01$. Paths represent standardized relations. Arrows over the within-person variables represent their residual variances.

Between-person level

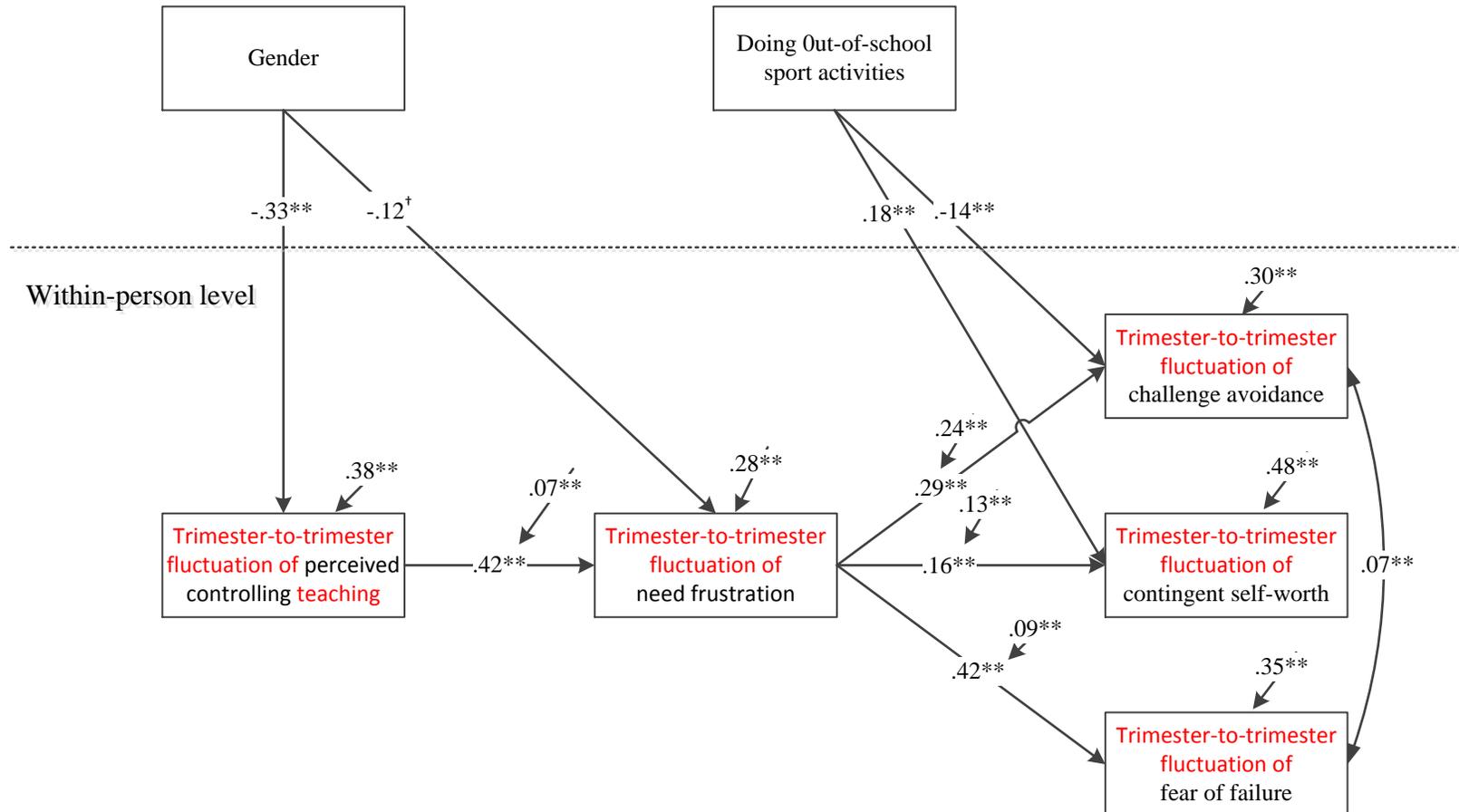


Figure 2. Challenge avoidance, contingent self-worth, and fear of failure predicted by perceived teaching control and student need frustration (at the within-person level), and by gender and out-of-school sport activities (at the between-person level) (Study 2). Parameter coefficients at the within-person level represent associations between variables within each trimester, which have been averaged across the whole school year. Note. † $p = .06$. * $p < .05$. ** $p < .01$. Paths represent standardized relations. Arrows over the within-person variables represent their residual variances.