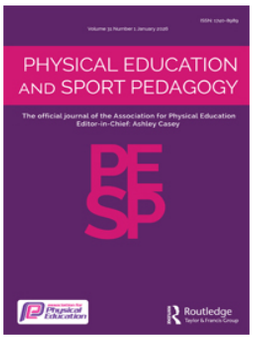

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Relationships between (de-)motivating teaching approaches with students' need-based experiences and affective outcomes in physical education: a circumplex approach

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ABSTRACT

Background: From a traditional categorical perspective, the teacher's overarching styles of autonomy support and structure have been identified as beneficial for students, while control and chaos have been considered detrimental in physical education (PE). Nevertheless, given that not all teaching practices within the same teaching style contribute equally to student learning, the circumplex approach to (de-)motivating teaching styfles, together with the distinctions between need-nurturing and need-enabling versus need-thwarting and need-depriving practices, can help teachers discern which autonomy-supportive and structuring behaviors should be maximized and prioritized, and which controlling and chaotic behaviors should be minimized or avoided. Considering that little is currently known about the distinctive role that each approach may play in PE, there is a need for further research to shed light on how each approach specifically may contribute to need-based experiences (i.e. need satisfaction and frustration) and affective outcomes (i.e. enjoyment, boredom, and Physical Activity (PA) intention) according to the students in PE lessons. *Purpose*: This study aims to examine the direct and indirect relationships between students' perceptions of the four motivating approaches (i.e. participative and attuning as autonomy-supportive, and guiding and clarifying as structuring) and the four demotivating approaches (i.e. demanding and domineering as controlling, and abandoning and awaiting as chaotic) with their need-based experiences, enjoyment, boredom and PA intention. *Method*: A convenience sample of 914 students ($M_{age} = 14.86$, $SD = 0.46$; 54% girls), divided into different school grade levels, participated in this cross-sectional study. A path analysis was conducted, such as main analysis of the study. *Results*: The path analysis model revealed that participative, attuning, guiding, demanding, and awaiting approaches had positive indirect effects on PA intention

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via need satisfaction and enjoyment. abandoning approach had negative indirect effects on PA intention via need satisfaction and enjoyment. Domineering and abandoning approaches also had negative indirect effects on PA intention via need frustration and boredom. Finally, the clarifying approach had no significant effects. *Conclusions*: Our results support the assumption that attuning and guiding approaches are more need-nurturing, whereas the participative approach is more need-enabling. Furthermore, domineering and abandoning approaches are more need-thwarting. However, the distinctive nature of clarifying, demanding, and awaiting approaches in PE requires further clarification. *Impact statement*: This study offers the first model linking eight (de-)motivating teaching approaches with students' motivational processes in PE. The findings show each approach's impact and inform teacher education programs that strengthen effective motivational strategies while limiting harmful practices.

Introduction

Among the main curricular goals of Physical Education (PE) is to promote lifelong participation in leisure-time physical activity (PA) (SHAPE America—Society of Health and Physical Educators 2014). To achieve this goal, PE should provide students with the knowledge, skills, and values needed to become autonomous, competent, and well-integrated in PE, helping them not only enjoy the classes but also trigger the intention towards leisure-time PA (González-Cutre et al. 2014; Vasconcellos et al. 2020). For students to engage in such learning-related experiences in PE, teachers hold a key position in guiding their learning and managing the classroom through their (de-)motivating teaching style (Vasconcellos et al. 2020; White et al. 2021). The (de-)motivating teaching style refers to the specific way the teacher relates, interacts, and communicates with students in learning situations (Aelterman et al. 2019).

The Self-Determination Theory (SDT) is one of the most commonly used theories in PE to understand how students' motivational and psychological experiences are shaped by the teacher's (de-)motivating styles (Vasconcellos et al. 2020; White et al. 2021). More particularly, the circumplex approach to (de)motivating teaching styles distinguishes among eight (de-)motivating teaching approaches (i.e. participative, attuning, guiding, clarifying, demanding, domineering, abandoning, and awaiting). These eight (de-)motivating teaching approaches are based on the combination of teacher need-supportiveness (i.e. the extent to which PE teachers support or thwart students' autonomy, competence, and relatedness) and directiveness (i.e. the degree to which PE teachers take the initiative and the leadership in learning interactions) (Aelterman et al. 2019). Despite growing attention to the circumplex approach to gain better insight into the interplay between teachers' (de-)motivating styles and students' outcomes in and outside of PE lessons (e.g. PE experiences, enjoyment, boredom, future intention toward PA; Cheon, Reeve, and Vansteenkiste 2020; Diloy-Peña, Abós et al. 2024; Diloy-Peña, García-Cazorla et al. 2025), little is currently known about the specific role that each of the eight (de-)motivating teaching approaches may have on students' learning-related experiences. Therefore, the present SDT-grounded research aims to examine the relationship

between students' perceptions of each of the eight (de-)motivating teaching approaches and their PA intention via their need-based and affective experiences in PE.

A circumplex model of (de-)motivating approaches in PE

Guided by SDT (Ryan and Deci 2017; Vansteenkiste, Ryan, and Soenens 2020), the circumplex model conceptualizes eight (de-)motivating teaching approaches, drawing a circular pattern according to the level of teachers' need-supportiveness and directiveness present in each of them (see Figure 1) (Aelterman et al. 2019). The horizontal axis refers to the teacher's need-supportiveness, distinguishing participative, attuning, guiding, and clarifying approaches as more need-supportive, in contrast to demanding, domineering, abandoning, and awaiting approaches, which are more need-thwarting. The vertical axis expresses the teacher's directiveness, with guiding, clarifying, demanding, and domineering approaches being more directive, and participative, attuning, abandoning, and awaiting approaches being less directive.

The teacher's styles of autonomy support and structure are conceptualized as motivating. Autonomy support is characterized by an interpersonal tone of understanding and flexibility toward the students' needs. Specifically, teachers deliver autonomy support either through participative approaches that are need-enabling or attuning approaches that are need-nurturing. A participative teacher transfers voice, decision-making power, opportunities for initiative, and choice to the students, while also welcoming their suggestions and input. An attuning teacher tailors learning content and activities to students' interests and preferences, making the activities more enjoyable (Aelterman et al. 2019; Escriva-Boulley et al. 2021). Structure, in contrast, is characterized by an interpersonal guidance tone focused on students' progress and process. Teachers provide structure through guiding approaches in a need-nurturing way and clarifying approaches in a need-enabling way. A guiding teacher provides structure through step-by-step instructions, relevant feedback for mastery, and help as needed to ensure successful

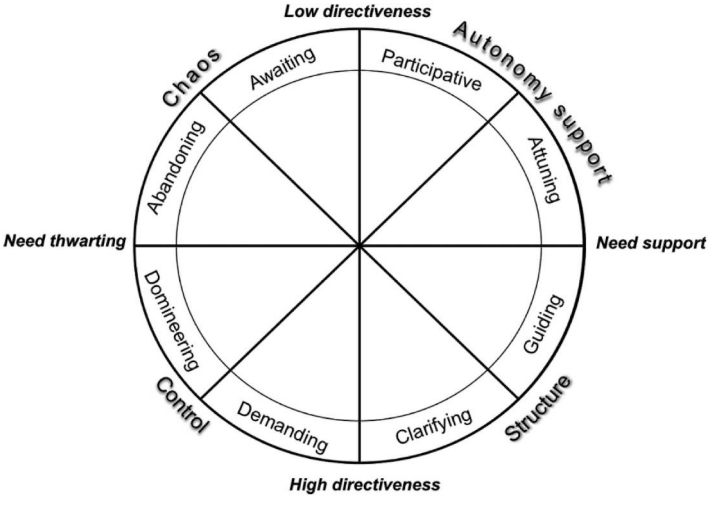

Figure 1. Circumplex approach to (de-)motivating teaching styles and approaches in physical education (Original source Aelterman et al. 2019).

activity completion. A clarifying teacher sets clear learning goals and expectations for desired behaviors, being consistent and transparent during students' progress (Aelterman et al. 2019; Escriva-Boulley et al. 2021).

In contrast, the teacher's styles of control and chaos are considered demotivating styles. Control is characterized by an interpersonal tone of pressure and coercion, pressuring students to adopt the teacher's agenda and viewpoint in the classroom. Teachers exert control through either demanding, need-depriving approaches or domineering, need-thwarting approaches. A demanding teacher pressures students through behavior-focused strategies, using strict commands to complete tasks and employing sanctions and rewards to guarantee obedience to instructions. A domineering teacher, instead, uses power-assertive tactics to control students, including guilt induction, humiliation, public shame, and personal attacks against them (Aelterman et al. 2019; Escriva-Boulley et al. 2021). Chaos is characterized by an interpersonal tone of 'laissez-faire,' leaving students alone, which makes it confusing for them to find out without help what to do and how to behave. Teachers become chaotic through abandoning approaches of a need-thwarting nature and awaiting approaches of a need-depriving nature. An abandoning teacher, after multiple interventions, gives up and leaves students to their fate. An awaiting teacher, instead, is prone to wait and see how things develop on their own during the lesson (Aelterman et al. 2019; Escriva-Boulley et al. 2021).

(De-)motivating teaching approaches and students' outcomes in PE

SDT conceptualizes a dual-process model of human functioning based on the distinction between the satisfaction and frustration of needs for autonomy, competence, and relatedness (Vansteenkiste, Ryan, and Soenens 2020). Need satisfaction describes the core of the bright motivational pathway (i.e. need-supportive environment → need satisfaction → adaptive outcomes) by contributing to growth and wellness. In contrast, need frustration symbolizes the heart of the dark motivation pathway (i.e. need-thwarting environment → need frustration → maladaptive outcomes) by increasing the likelihood of psychopathology and illness. Autonomy satisfaction refers to a sense of freedom and choice, whereas autonomy frustration concerns feelings of pressure and coercion. Competence satisfaction refers to a sense of accomplishment and effectiveness, whereas competence frustration concerns feelings of failure and inferiority. Relatedness satisfaction refers to a sense of belonging and warmth, whereas relatedness frustration involves loneliness and alienation (Vansteenkiste, Ryan, and Soenens 2020).

SDT emphasizes that need-based experiences may be primarily supported or thwarted by how individuals interpret their social environment (Vansteenkiste, Ryan, and Soenens 2020). More particularly, SDT posits that need-supportive environments would primarily energize adaptive motivational and psychological outcomes (e.g. enjoyment, participation, leisure-time PA) through the mediating role of need satisfaction. Similarly, SDT holds the premise that need-thwarting environments would largely lead to maladaptive motivational and psychological consequences through need frustration. In addition to direct paths, SDT hypothesizes the existence of cross-paths, in the sense that need-supportive environments would secondarily buffer against need frustration and support maladaptive outcomes, just as need-thwarting environments would secondarily undermine need satisfaction and adaptive consequences (Ryan and Deci 2017; Vansteenkiste, Ryan, and Soenens 2020).

In the specific context of PE, students' perceptions of their teacher's styles of autonomy support and control have been well-documented. A meaningful basis of previous research has consistently shown positive associations between teachers' autonomy support and need satisfaction (Vasconcellos et al. 2020) and adaptive outcomes, including enjoyment and PA intention (Aibar et al. 2021; Behzadnia 2021), whereas teachers' control has been positively related to need frustration (White et al. 2021) and maladaptive consequences, such as boredom (Behzadnia et al. 2018). In contrast, the students' perspectives of their teacher's styles of structure and chaos have been traditionally overlooked in PE. A growing number of studies have reported positive relationships between teacher-provided structure and need satisfaction (Vasconcellos et al. 2020), whereas chaos by the teacher has been positively associated with need frustration and negatively associated with need satisfaction (Burgueño and Medina-Casaubón 2021; Burgueño et al. 2024).

Although these SDT-based studies made a valuable contribution to the PE field by using the traditional black-and-white view – based on need-supportive versus need-thwarting teaching – they did not operationalize teaching styles using the more refined perspective offered by the circumplex model of (de-)motivating teaching styles, which distinguishes between eight more specific teaching approaches. To the best of our knowledge, to date, an initial research line has, on the one hand, focused on examining the interplay between the eight teaching approaches and students' need-based experiences in PE from their perspective. More specifically, positive associations were commonly found between the two autonomy-supportive and structuring approaches and need satisfaction, with the attuning and guiding approaches (i.e. need-nurturing approaches) displaying stronger associations with need satisfaction than the participative and clarifying approaches (i.e. need-enabling approaches) (Bouten et al. 2025; Burgueño et al. 2024; Diloy-Peña, García-González et al. 2024; Van Doren et al. 2025). Nevertheless, the cross-relationships between autonomy-supportive and structuring approaches with need frustration remain unclear. Bouten et al. (2025) reported negative correlations between participative, attuning, guiding, and clarifying approaches with need frustration, whereas Van Doren et al. (2025) found a negative association between the attuning approach and need frustration. Similarly, Burgueño et al. (2024) reported a negative relationship between the clarifying approach and need frustration. Moreover, the two controlling and chaotic approaches have been found to be positively related to need frustration, with domineering and abandoning approaches (i.e. need-thwarting approaches) showing higher relationships with need frustration than demanding and awaiting approaches (i.e. need-depriving approaches) (Bouten et al. 2025; Burgueño et al. 2024). Nonetheless, the cross-paths from controlling and chaotic teaching approaches to need satisfaction were very inconsistent. Specifically, Van Doren et al. (2025) found no relationship between the four demotivating approaches and need frustration. In contrast, Bouten et al. (2025) found that demanding and domineering approaches were positively correlated with need satisfaction, and Burgueño et al. (2024) reported a negative association only between the domineering approach and need satisfaction. Similarly, Bouten et al. (2025) revealed that both chaotic approaches were negatively correlated with need satisfaction, whereas Burgueño et al. (2024) reported a negative association between the abandoning approach and need satisfaction.

On the other hand, a second research avenue aimed to analyze the interplay between the eight (de-)motivating teaching approaches and learning-related experiences in PE from students' perspectives. More specifically, the four motivating teaching approaches were common in adaptive learning-related outcomes for students, including a stronger desire for more PE hours (García-Cazorla et al. 2024), PE choice (Ferriz-Valero et al. 2024), positive PE experiences, PA intention, higher perceived learning (Diloy-Peña, Abós et al. 2024), enjoyment (Diloy-Peña, García-Cazorla et al. 2025), more behavioral engagement (Coterón et al. 2025), and autonomous motivation (Van Doren et al. 2025). The demanding approach demonstrated a dual role, given that it was positively linked to adaptive outcomes, such as positive PE experiences, increased perceived learning, PA intention (Diloy-Peña, Abós et al. 2024), and higher in-class PA levels (Van Doren et al. 2024). However, it was also related to maladaptive outcomes, including controlled motivation and amotivation (Van Doren et al. 2024, 2025). By contrast, domineering, abandoning, and awaiting approaches were positively linked to the non-choice of PE (Ferriz-Valero et al. 2024), negative PE experiences and lower perceived learning (Diloy-Peña, Abós et al. 2024), as well as boredom (Diloy-Peña, García-Cazorla et al. 2025), and amotivation (Van Doren et al. 2025).

Taking into consideration the refreshing and insightful view of the circumplex approach to (de-)motivating teaching styles, there is a need for further research to gather additional evidence about the distinctive role that each of the teacher's (de)motivating approaches may play not only in need-based experiences but also in a variety of psychological outcomes for students in PE classes.

The present study

The purpose of the present research is to examine the relationships between students' perceptions of each of the eight (de-)motivating approaches by the PE teacher and students' PA intention, via their need-based experiences, enjoyment, and boredom in PE. Aligned with the bright and dark motivational pathways outlined by SDT (Ryan and Deci 2017; Vansteenkiste and Ryan 2013; Vansteenkiste, Ryan, and Soenens 2020) and based on previous PE studies using the circumplex approach to (de)motivating teaching styles (Burgueño et al. 2024; Diloy-Peña, García-González et al. 2024; Tilga, Vahtra, and Koka 2023; Van Doren et al. 2024, 2025), firstly, we hypothesized that students' perceptions of participative, attuning, guiding, and clarifying approaches would be positively associated with PA intention via higher need satisfaction and enjoyment. Secondly, we hypothesized that the perceived attuning and guiding approaches would be more strongly associated with need satisfaction than the participative and clarifying approaches. Thirdly, we expected that these four perceived motivating teaching approaches would be positively associated with PA intention via lower need frustration and boredom. Moreover, we formulated the fourth hypothesis that the perceived demanding, domineering, abandoning, and awaiting approaches would be negatively related to PA intention via higher need frustration and boredom. Fifthly, we expected that the perceived domineering and abandoning approaches would be more strongly associated with need frustration than the perceived demanding and awaiting approaches. Sixthly, we also expected that each of the four demotivating teaching approaches would be negatively related

to PA intention through lower need satisfaction and enjoyment. The hypothesized model is shown in Figure 2.

Methods

Participants

A convenience sample of 923 students from eight secondary schools in the north of Spain was invited to participate in this cross-sectional study. After removing invalid data (valid response rate: 99%; unanswered questionnaires, incoherent answers, or incorrectly completed questionnaires were deleted), the final sample consisted of 914 students (M_{age} = 14.86, SD = 1.46; 54% girls and 46% boys) distributed across different school grades (i.e. 8th grade = 116; 9th grade = 225; 10th grade = 241; 11th grade = 195; 12th grade = 137). Student responses regarding (de-)motivating teaching approaches were collected from 65 classes taught by 15 PE teachers, each teaching approximately 61 students from different schools.

Procedure

Prior to the study, the main researcher contacted the schools' principals to inform them about the study's objectives and to request their collaboration. Only the students whose parents signed the written informed consent participated in this research. The paper-and-pencil questionnaire was administered in a classroom environment where the potential students were informed about their voluntary and anonymous participation. No compensation was provided for participation, and there were no correct or incorrect responses, as the questionnaire only asked students about their opinions and perceptions of the PE lessons. While the research team remained in the classroom to resolve any doubts that might arise during the questionnaire's administration, the PE teachers left

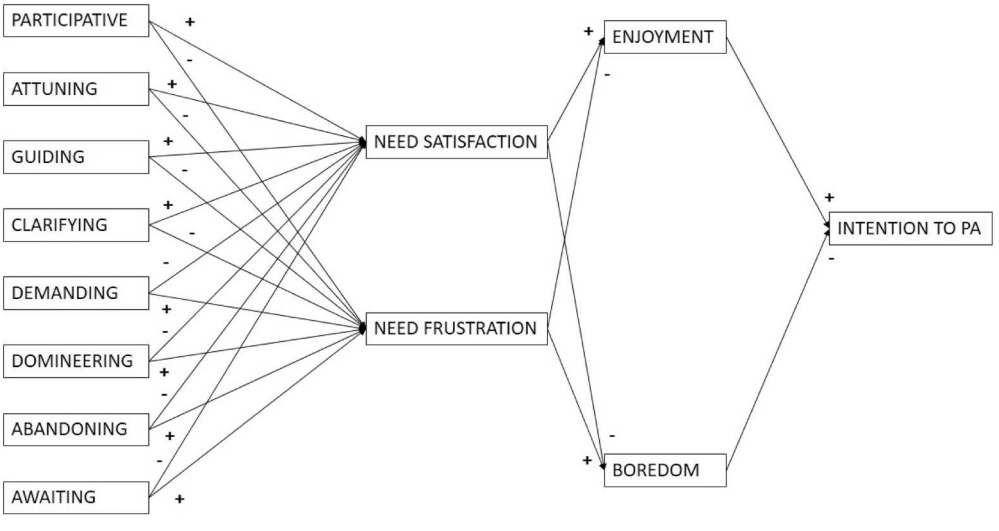

Figure 2. Theoretically hypothesized model of relationships between the study variables.

the classroom to minimize potential influence on students' responses. The average time spent completing the questionnaire was 25 min. This study was approved by the Ethics Committee of the Clinical Research of Aragon (PI22/363) and adhered to all ethical standards for human research as outlined in the Declaration of Helsinki.

Variables and Instruments

Socio-demographic variables

Variables regarding gender (i.e. boy or girl), school grade (i.e. 8th grade to 12th grade), and the class in which each student was enrolled (i.e. a total of 50 secondary classes) were collected.

Students' perceptions of (de-)motivating teaching approaches

Students' perceptions of (de-)motivating teaching approaches were assessed using the Spanish student version of the Situations-in-School Questionnaire in PE (SIS-PE; Burgueño et al. 2024). The SIS-PE questionnaire presents 12 situations with four items each, commonly occurring in PE lessons. The 48 items are divided into two motivating styles (i.e. autonomy support and structure) and two demotivating styles (i.e. control and chaos). These are, in turn, divided into two teaching approaches, resulting in a total of eight instructional approaches. Four items refer to participative, eight to attuning, seven to guiding, five to clarifying, seven to demanding, five to domineering, eight to abandoning, and four to awaiting approaches. Students were asked to indicate the extent to which each situation reflects their PE teacher's way of teaching on a seven-point Likert scale ranging from 1 (*does not describe my PE teacher at all*) to 7 (*describes my PE teacher extremely well*). In this study, McDonald's omega and Cronbach's alpha ranged from .61 to .84, respectively, for approaches. An acceptable fit was achieved with a two-factor CFA model for each (de-)motivating teaching style: autonomy support ($\chi^2(53, n = 914) = 92.82$, $p < .001$; CFI = .98; TLI = .97; SMR = .04; RMSEA = .03, 90%CI = .02–.04), structure ($\chi^2(53, n = 914) = 610.49$, $p < .001$; CFI = .98; TLI = .98; SMR = .03; RMSEA = .03, 90%CI = .03–.04), control ($\chi^2(53, n = 914) = 203.77$, $p < .001$; CFI = .90; TLI = .90; SMR = .06; RMSEA = .04, 90%CI = .03–.05), and chaos ($\chi^2(53, n = 914) = 73.29$, $p < .001$; CFI = .98; TLI = .97; SMR = .04; RMSEA = .02, 90%CI = .01–.03).

Students' need satisfaction in PE

Students' perceptions of autonomy, competence, and relatedness satisfaction in PE were assessed by the Spanish PE version (Moreno-Murcia et al. 2008) of the Basic Psychological Needs in Exercise Scale (BPNES; Vlachopoulos and Michailidou 2006). Following the stem: 'In my PE lessons … ' this scale includes 12 items (four items per basic psychological need) assessing autonomy satisfaction (e.g. 'I feel that the activities I do in PE fit in with my interests'), competence satisfaction (e.g. 'I feel that in PE, I perform the activities effectively'), and relatedness satisfaction (e.g. 'I feel that in PE lessons, I can communicate openly with my classmates'). Responses were given on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Consistent with previous SDT-based research in PE (e.g. Abós et al. 2021), a need satisfaction composite score was calculated by averaging the mean values of autonomy, competence, and relatedness satisfaction. In the current study, McDonald's omega and Cronbach's

alpha for need satisfaction were .86 and .88, respectively. A good fit was reached for the single-factor CFA model ($\chi^2(54, n = 914) = 323.44$, $p < .001$; CFI = .94; TLI = .93; SMR = .08; RMSEA = .08, 90%CI = .07–.09).

Students' need for frustration in PE

Students' perceptions of autonomy, competence, and relatedness frustration in PE were assessed by the Spanish PE version (Sicilia, Ferriz, and Sáenz-Álvarez 2013) of the Psychological Need Thwarting Scale (PNTS; Bartholomew et al. 2011). Following the stem: 'In my PE lessons … ' this scale includes 12 items (four items per basic psychological need) assessing autonomy frustration (e.g. 'I cannot make decisions in the activities I carry out in PE classes'), competence frustration (e.g. 'There are some situations in which I feel incapable'), and relatedness frustration (e.g. 'I feel rejected by my peers in PE lessons'). Responses were given on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Similar to previous SDT studies in PE (e.g. Behzadnia 2021), a need frustration composite score was calculated by averaging the mean values of autonomy, competence, and relatedness frustration. In the current study, McDonald's omega and Cronbach's alpha were .88 and 89, respectively, for need frustration. A suitable fit was reached for the single-factor CFA model ($\chi^2(27, n = 914) = 81.43$, $p < .001$; CFI = .98; TLI = .97; SMR = .06; RMSEA = .05, 90%CI = .04–.06).

Students' enjoyment and boredom in PE

Students' perceptions of enjoyment and boredom in PE were assessed by the Spanish PE version (Baena-Extremera et al. 2012) of the Sport Satisfaction Instrument (SSI; Duda and Nicholls 1992). Following the stem 'How much do you enjoy your PE classes?', This scale includes eight items, of which five items measure enjoyment (e.g. 'I usually have fun doing PE') and three items measure boredom (e.g. 'I usually get bored in PE classes'). Responses were given on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). In the current study, McDonald's omega and Cronbach's alpha, respectively, ranged from .75 to .87 for enjoyment and boredom. A suitable fit was obtained for the two-factor CFA model ($\chi^2(19, n = 914) = 29.56$, $p < .001$; CFI = .99; TLI = .99; SMR = .03; RMSEA = .02, 90%CI = .01–.04).

Students' intention to PA

Students' intention to be physically active was assessed using three items (e.g. 'I intend to do active sports and/or physical activities during my leisure time in the next 5 weeks … ') from the Theory of Planned Behavior Questionnaire (Hagger and Chatzisarantis 2009). This scale is rated on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). In the current study, McDonald's omega and Cronbach's alpha, respectively, were .92 and .94, for PA intention. An acceptable fit was achieved for the one-factor CFA model ($\chi^2(2, n = 914) = 11.25$, $p < .001$; CFI = .99; TLI = .99; SMR = .04; RMSEA = .04, 90%CI = .01–.06).

Data analysis

Regarding preliminary analyses, descriptive statistics (means and standard deviations), McDonald's omega (ω), and Cronbach's alpha (α) reliability coefficients were estimated. Pearson's correlations were calculated for all the study variables, while Spearman's

correlations were computed for students' gender. For the main analyses, a path analysis was specified using manifest variables to examine the relationships between perceived (de-)motivating teaching approaches and PA intention via need-based experiences, enjoyment, and boredom. Before the path analysis, the intraclass correlation coefficient (ICC) was calculated to evaluate the hierarchical structure of data, with students within classes. Data clustering at the class level was accounted for by specifying 'type = complex.' In addition to addressing the data's hierarchical structure, considering students' motivational processes may vary depending on gender and school grade (Vasconcellos et al. 2020), both variables were introduced as covariates in the tested model.

Path analysis was chosen because it mitigates multicollinearity effects (Devlieger and Rosseel 2017), which is common in the circumplex approach, as some (de-)motivating teaching approaches are highly correlated with each other (see, Aelterman et al. 2019; Burgueño et al. 2024). For the path analysis, factor scores for every variable were first calculated from the different confirmatory factor analyses. Then, these factor scores were used for path analysis through linear regression (Devlieger and Rosseel 2017). Path analysis was performed using the maximum likelihood robust estimator (MLR). The model's fit is considered acceptable with values up to 3 for the ratio of χ^2 and degree of freedom (χ^2/df), higher than .90 for the comparative fit index (CFI) and the Tucker-Lewis index (TLI) in conjunction with scores lower than .06 for the standardized root mean squared residual (SMSR) and the root mean square error of approximation (RMSEA) (Marsh, Hau, and Wen 2004). To examine the proposed mediation effects, Hayes' (2021) methods for multiple mediation were followed. An indirect (mediated) effect is considered significant ($p < .05$) when its 95% confidence interval (95%CI) does not include the zero value (Hayes 2021). Analyses were run using SPSS (version 29.00) and Mplus (version 8.0).

Results

Preliminary results

Table 1 presents descriptive statistics, composite reliability, and correlations among the study variables. Positive correlations were found between the participative, attuning, clarifying, guiding, and demanding approaches, need satisfaction, enjoyment, and PA intention. The abandoning, awaiting, need frustration, and boredom approaches were negatively correlated with PA intention.

In addition, taking into account that the target variables significantly differed by gender (Wilks' $\boldsymbol{\lambda} = 0.87$, $F_{(13.90)} = 10.08$, $p < .001$, $\eta^2_p = .13$) and school grade level (Wilks' $\boldsymbol{\lambda} = 0.10$, $F_{(663.10)} = 3.13$, $p < .001$, $\eta^2_p = .16$), both were included as covariates in the path analysis. After verifying that the data were hierarchically organized at the classroom level (class level variance: $\chi2(1) = 0.18–0.96$, $p < .05$; ICC>10), their multilevel nature was additionally controlled at the class level.

Path analysis of (de-)motivating approaches and student outcomes

Although some direct paths were non-significant, the hypothesized model obtained a good fit to the observed data: χ^2 (25, $n = 914$) = 65.97, $p < .001$; CFI = .97; TLI = .93; SMSR = .02; RMSEA = .04 (90%CI = .03–.05). All direct paths are shown in Table 2.

Table 1. Descriptive statistics, composite reliability, and correlations between study variables.

Variable	*M* (*SD*)	ω	α	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Participative	4.05 (1.48)	.72	.71	-	.75**	.66**	.54**	.38**	.14**	−.26**	−.11**	.44**	−.23**	.39**	−.21**	.17**	.01	−.01
2. Attuning	4.52(1.28)	.83	.84		-	.80**	.72**	.46**	.11*	−.41**	−.23**	.52**	−.29**	.51**	−.30**	.20**	.03	−.01
3. Guiding	5.13(1.25)	.83	.82			-	.70**	.49**	.05	−.48**	−.32**	.48**	−.32**	.45**	−.31**	.20**	.01	−.03
4. Clarifying	5.12(1.08)	.84	.84				-	.56**	.19**	−.36**	−.29**	.40**	−.22**	.36**	−.22**	.19**	−.01	.01
5. Demanding	4.76(0.90)	.62	.64					-	.43**	−.07*	−.06*	.29**	−.14**	.28**	−.14**	.14**	.03	−.12**
6. Domineering	3.83(1.15)	.60	.61						-	.37**	.22**	.08*	.12**	.03	.05	.08	.11**	−.14**
7. Abandoning	2.66(1.22)	.82	.83							-	.56**	−.30**	.36**	−.30**	.33**	−.14**	.08*	−.06
8. Awaiting	2.85(1.29)	.70	.70								-	−.09*	.20**	−.12**	.12**	−.11**	.02	−.10*
9. Need satisfaction	3.56(0.76)	.86	.88									-	−.48**	.68**	−.53**	.39**	.22**	−.07*
10. Need frustration	2.26(0.80)	.88	.89										-	−.42**	.42**	−.22**	−.12**	−.06
11. Enjoyment	4.01(0.87)	.85	.87											-	−.55**	.42**	.27**	−.03
12. Boredom	2.40(0.98)	.77	.75												-	−.32**	−.18**	.13**
13. Intention to PA	5.39(1.72)	.92	.94													-	.21**	−.01
14. Gender[a]	54%[b]																-	−.06*
15. School grade	12%[c]/24%[d]/ 26%[e]/22%[f]/ 16%[g]																	-

Note: Correlations were significant at the level $p < .05$* and $p < .01$**.
[a]Spearman's rho correlation.
[b]Percentage of girl students in the sample.
[c]Percentage of students in Year 8.
[d]Percentage of students in Year 9.
[e]Percentage of students in Year 10.
[f]Percentage of students in Year 11.
[g]Percentage of students in Year 12.

Table 2. Direct effects of (de-)motivating teaching approaches on motivational outcomes.

	β	SE	p	95% CI_{BC}
Direct effects on need satisfaction				
Participative	**.07***	.03	.04	(.01, .12)
Attuning	**.32****	.05	<.001	(.22, .41)
Guiding	**.10**†**	.05	.07	(.01, .19)
Clarifying	−.02	.03	.63	(−.08, .04)
Demanding	**.06***	.03	.03	(.01, .11)
Domineering	−.01	.02	.88	(−.04, .04)
Abandoning	**−.16****	.04	<.001	(−.23, −.09)
Awaiting	**.09***	.03	.01	(.02, .15)
Direct effects on need frustration				
Participative	−.05	.04	.17	(−.12, .01)
Attuning	−.02	.06	.66	(−.12, .07)
Guiding	**−.13***	.05	.01	(−.22, −.04)
Clarifying	.05	.04	.27	(−.02, .12)
Demanding	**−.09***	.03	.01	(−.14, −.03)
D				
Domineering	**.08***	.03	.03	(.02, .14)
Abandoning	**.27****	.05	<.001	(.17, .36)
Awaiting	−.02	.04	.67	(−.09, .05)
Direct effects on enjoyment				
Need satisfaction	**.90****	.90	<.001	(.81, .98)
Need frustration	.06	.05	.25	(−.02, .15)
Direct effects on boredom				
Need satisfaction	**−.42****	.04	<.001	(−.50, −.35)
Need frustration	**.21****	.04	<.001	(.14, .29)
Direct effects on intention to PA				
Enjoyment	**.33****	.04	<.001	(.26, .40)
Boredom	**−.11***	.04	.01	(−.18, −.04)

Notes: β = standardized estimates; SE = standard error; 95% CI_{BC} = 95% bias-corrected bootstrap confidence interval. *p < 0.05, **p < .01, $^{\dagger}p$ > .05 but 95%CI_{BC} do not contain 0 . Gender and school grade were introduced as covariates.

Figure 3 depicts direct paths from each of the eight (de-)motivating teaching approaches, need-based experiences, enjoyment, boredom, and PA intention. In particular, need satisfaction was positively associated with participative, attuning, guiding, demanding, and awaiting approaches (β = .07, p = .04; β = .32, p = .01; β = .06, p = .03; β = .09, p = .01, respectively), and negatively associated with abandoning approach (β = −.16, p = .01). Need frustration was positively associated with domineering and abandoning approaches (β = .09, p = .03; β = −.27, p = .01, respectively) and negatively associated with guiding and demanding approaches (β = −.13, p = .01; β = −.09, p = .01, respectively). In addition, need satisfaction was positively associated with enjoyment (β = .90, p = .01) and negatively with boredom (β = −.42, p = .01), whereas need frustration was positively associated only with boredom (β = .21, p = .01). Finally, enjoyment was positively associated with PA intention (β = .33, p = .01), while boredom negatively (β = −.11, p = .01).

Table 3 presents the indirect paths from each of the eight (de-)motivating teaching approaches to PA intention via need-based experiences, enjoyment, and boredom. More specifically, the participative, attuning, guiding, demanding, and awaiting approaches had positive indirect effects on PA intention through need satisfaction and enjoyment. The abandoning approach had negative indirect effects on PA intention via need satisfaction and enjoyment. Moreover, the demanding approach had positive indirect effects on PA intention through need frustration and boredom. The domineering and the abandoning approaches had negative indirect effects on PA intention through need frustration and boredom.

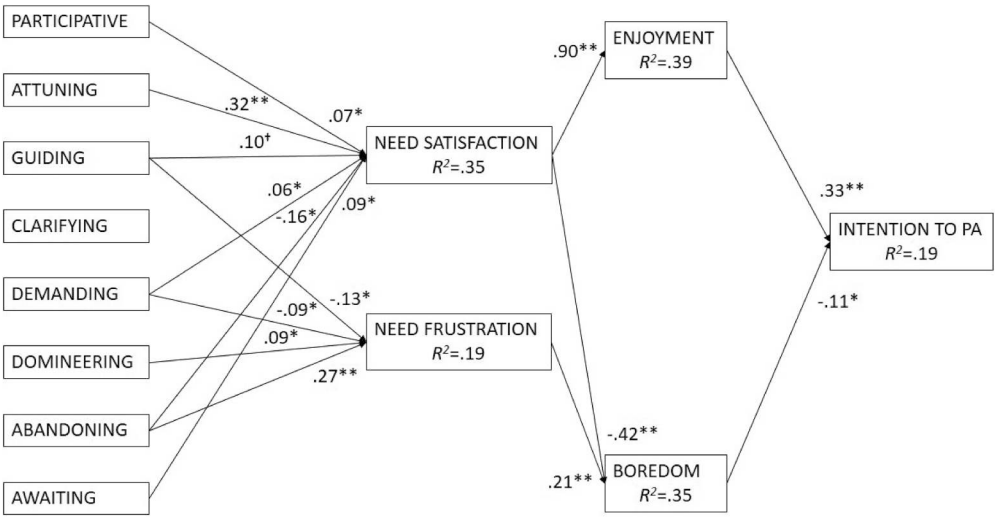

Figure 3. Path analysis model depicting direct effects between (de-)motivating teaching approaches, need-based experiences, enjoyment, boredom, and intention to PA. Gender and school grade were introduced as covariates. Note: All the relationships in the figure were significant at the level *$p <$ 0.05, **$p < .01$, †$p > .05$ but 95% CIBC do not contain 0.

Discussion

To our knowledge, this is the first study that, based on students' perceptions, analyzes the distinctive role that each of the teachers' eight (de-)motivating teaching approaches could play in PA intention, via need-based experiences, enjoyment, and boredom. Overall, the main findings highlight that: (a) students' bright side of the motivational process in PE (i.e. need satisfaction-enjoyment-higher PA intention) is more enabled when they perceive that their PE teachers use participative, attuning, and guiding approaches; (b) students' perceptions of a PE teacher's abandoning approach not only foster the dark side of their motivational process (i.e. need frustration–boredom-lower PA intention) but also slightly deprive their need satisfaction directly; (c) students' perceptions of their PE teacher's domineering approach foster the dark side of their motivational process (i.e. need frustration–boredom-lower PA intention); and (d) students' perceptions of their PE teachers' demanding and awaiting approaches slightly promote the bright side of the motivational process in PE (i.e. need satisfaction-enjoyment-higher PA intention), indicating that more research is needed to gain more refined evidence.

Impact of autonomy-supportive style: differential effects of participative vs. attuning approaches

Consistent with our hypotheses and aligned with prior circumplex-based research in PE (Tilga, Vahtra, and Koka 2023; Van Doren et al. 2024, 2025), our results uphold that the students' perceptions of autonomy-supportive approaches (i.e. participative and attuning) may facilitate adaptive outcomes in PE (i.e. enjoyment) indirectly through need satisfaction. It seems that when students feel that their PE teacher encourages choice and involvement in their learning (i.e. participative) and provides an explanation of the

Table 3. Indirect effects of (de-)motivating teaching approaches on motivational outcomes.

	β	SE	p	95% CI_{BC}
Indirect effects of participative to enjoyment				
Total indirect	**.06***	.03	.04	(.01, .11)
Specific indirect via need satisfaction	**.06***	.03	.03	(.01, .11)
Specific indirect via need frustration	−.01	.01	.41	(−.01, .01)
Indirect effects of attuning to enjoyment				
Total indirect	**.31****	.06	<.001	(.21, .41)
Specific indirect via need satisfaction	**.31****	.06	<.001	(.21, .41)
Specific indirect via need frustration	−.01	.01	.68	(−.01, .01)
Indirect effects of guiding to enjoyment				
Total indirect	**.09**†**	.05	.09	(.01, .18)
Specific indirect via need satisfaction	**.10**†**	.05	.07	(.01, .19)
Specific indirect via need frustration	−.01	.01	.29	(−.02, .01)
Indirect effects of clarifying to enjoyment				
Total indirect	−.01	.03	.68	(−.07, .04)
Specific indirect via need satisfaction	−.01	.03	.63	(−.08, .04)
Specific indirect via need frustration	.01	.01	.41	(−.01, .01)
Indirect effects of demanding to enjoyment				
Total indirect	**.05**†**	.03	.05	(.01, .10)
Specific indirect via need satisfaction	**.06***	.03	.04	(.01, .11)
Specific indirect via need frustration	−.01	.01	.30	(−.01, .01)
Indirect effects of domineering to enjoyment				
Total indirect	.01	.02	.95	(−.04, .04)
Specific indirect via need satisfaction	−.01	.02	.88	(−.04, .04)
Specific indirect via need frustration	.01	.01	.33	(−.01, .01)
Indirect effects of abandoning to enjoyment				
Total indirect	**−.14****	.04	<.001	(−.21, −.07)
Specific indirect via need satisfaction	**−.16****	.04	<.001	(−.23, −.08)
Specific indirect via need frustration	.01	.01	.26	(−.01, .01)
Indirect effects of awaiting to enjoyment				
Total indirect	**.08***	.03	.01	(.02, .14)
Specific indirect via need satisfaction	**.08***	.03	.01	(.02, .15)
Specific indirect via need frustration	−.01	.01	.70	(−.01, .01)
Indirect effects of participative to boredom				
Total indirect	**−.04***	.01	.02	(−.07, −.01)
Specific indirect via need satisfaction	**−.03***	.01	.03	(−.05, −.01)
Specific indirect via need frustration	−.01	.01	.19	(−.02, .01)
Indirect effects of attuning to boredom				
Total indirect	**−.14****	.03	<.001	(−.20, −.08)
Specific indirect via need satisfaction	**−.13****	.03	<.001	(−.18, −.08)
Specific indirect via need frustration	−.01	.01	.66	(−.02, .01)
Indirect effects of guiding to boredom				
Total indirect	**−.07***	.03	.01	(−.12, −.01)
Specific indirect via need satisfaction	**−.04**†**	.02	.06	(−.08, −.01)
Specific indirect via need frustration	**−.03***	.01	.02	(−.05, −.01)
Indirect effects of clarifying to boredom				
Total indirect	.01	.02	.39	(−.01, .05)
Specific indirect via need satisfaction	.01	.01	.63	(−.02, .01)
Specific indirect via need frustration	.01	.01	.26	(−.01, .02)
Indirect effects of demanding to boredom				
Total indirect	**−.04***	.01	.01	(−.07, −.02)
Specific indirect via need satisfaction	**−.02***	.01	.04	(−.05, −.01)
Specific indirect via need frustration	**−.02***	.01	.01	(−.03, −.01)
Indirect effects of domineering to boredom				
Total indirect	.02	.02	.26	(−.01, .05)
Specific indirect via need satisfaction	.01	.01	.88	(−.01, .02)
Specific indirect via need frustration	**.01**†**	.01	.05	(.01, .03)
Indirect effects of abandoning to boredom				
Total indirect	**.13****	.02	<.001	(.08, .17)
Specific indirect via need satisfaction	**.07***	.02	.01	(.03, .10)
Specific indirect via need frustration	**.05***	.02	.01	(.02, .09)
Indirect effects of awaiting to boredom				

(*Continued*)

Table 3. Continued.

	β	SE	p	95% CI_{BC}
Total indirect	−.04†	.02	.07	(−.08, −.01)
Specific indirect via need satisfaction	−.03*	.02	.02	(−.06, −.01)
Specific indirect via need frustration	−.01	.01	.67	(−.02, .01)
Indirect effects of participative on intention to PA				
Total indirect	.02*	.01	.03	(.01, .04)
Specific indirect via need satisfaction and enjoyment	.02*	.01	.04	(.01, .04)
Specific indirect via need frustration and enjoyment	−.01	.01	.40	(−.01, .01)
Specific indirect via need satisfaction and boredom	.01†	.01	.07	(.01, .02)
Specific indirect via need frustration and boredom	.01	.01	.23	(−.01, .01)
Indirect effects of attuning on intention to PA				
Total indirect	.12**	.02	<.001	(.07, .16)
Specific indirect via need satisfaction and enjoyment	.10**	.02	<.001	(.06, .14)
Specific indirect via need frustration and enjoyment	−.01	.01	.68	(−.01, .01)
Specific indirect via need satisfaction and boredom	.01*	.01	.03	(.01, .02)
Specific indirect via need frustration and boredom	.01	.01	.67	(−.01, .01)
Indirect effects of guiding on intention to PA				
Total indirect	.03†	.02	.08	(.01, .07)
Specific indirect via need satisfaction and enjoyment	.03†	.02	.10	(.01, .06)
Specific indirect via need frustration and enjoyment	−.01	.01	.28	(−.01, .01)
Specific indirect via need satisfaction and boredom	.01	.01	.10	(−.01, .01)
Specific indirect via need frustration and boredom	.01†	.01	.07	(.00, .01)
Indirect effects of clarifying on intention to PA				
Total indirect	−.01	.01	.62	(−.03, .01)
Specific indirect via need satisfaction and enjoyment	−.01	.01	.63	(−.02, .01)
Specific indirect via need frustration and enjoyment	.01	.01	.40	(−.01, .01)
Specific indirect via need satisfaction and boredom	−.01	.01	.64	(−.01, .01)
Specific indirect via need frustration and boredom	−.01	.01	.32	(−.01, .01)
Indirect effects of demanding on intention to PA				
Total indirect	.02*	.01	.02	(.01, .04)
Specific indirect via need satisfaction and enjoyment	.02*	.01	.04	(.01, .03)
Specific indirect via need frustration and enjoyment	−.01	.01	.28	(−.01, .01)
Specific indirect via need satisfaction and boredom	.01	.01	.10	(−.01, .01)
Specific indirect via need frustration and boredom	.01*	.01	.04	(.00, .01)
Indirect effects of domineering on intention to PA				
Total indirect	−.01	.01	.85	(−.01, .01)
Specific indirect via need satisfaction and enjoyment	−.01	.01	.88	(−.01, .01)
Specific indirect via need frustration and enjoyment	.01	.01	.32	(−.01, .01)
Specific indirect via need satisfaction and boredom	.01	.01	.88	(−.01, .01)
Specific indirect via need frustration and boredom	−.01*	.01	.07	(−.01, .00)
Indirect effects of abandoning on intention to PA				
Total indirect	−.06**	.01	<.001	(−.09, −.03)
Specific indirect via need satisfaction and enjoyment	−.05**	.01	<.001	(−.07, −.03)
Specific indirect via need frustration and enjoyment	.01	.01	.24	(−.01, .01)
Specific indirect via need satisfaction and boredom	−.01†	.01	.07	(−.02, −.01)
Specific indirect via need frustration and boredom	−.01*	.01	.04	(−.01, .00)
Indirect effects of awaiting on intention to PA				
Total indirect	.03*	.01	.01	(.01, .05)
Specific indirect via need satisfaction and enjoyment	.03*	.01	.01	(.01, .05)
Specific indirect via need frustration and enjoyment	.01	.01	.70	(−.01, .01)
Specific indirect via need satisfaction and boredom	.01	.01	.10	(−.01, .01)
Specific indirect via need frustration and boredom	.01	.01	.67	(−.01, .01)

Notes: β = standardized estimates; SE = standard error; 95% CI_{BC} = 95% bias-corrected bootstrap confidence interval. *$p < 0.05$, **$p < .01$, †$p > .05$ but 95%CI_{BC} do not contain 0 . Gender and school grade were introduced as covariates.

usefulness of the tasks (i.e. attuning), they can voluntarily engage in classroom learning activities. This, in turn, leads to the possibility of fulfilling the students' need satisfaction experiences, giving rise to a more adaptive motivational process in PE (Burgueño et al. 2024; Diloy-Peña, García-González et al. 2024; Tilga, Vahtra, and Koka 2023; Van Doren et al. 2025).

Although both approaches directly predict need satisfaction, attuning is more effective because it is need-nurturing, whereas a participative approach is less effective, as it is more need-enabling (Aelterman et al. 2019; Vansteenkiste et al. 2019). If these autonomy-supportive results seem remarkable, they become even more relevant when considering the positive indirect association between students' perception of their PE teachers' participative and attuning approaches and their PA intention in leisure time, via need satisfaction and enjoyment in PE. These findings support the tenets of the trans-contextual model of motivation (TCCM; Majeed and Hagger 2025) and suggest that providing students with need satisfaction and positive motivational experiences during PE lessons via autonomy-supportive approaches could increase their leisure-time PA intentions (González-Cutre et al. 2014; Hagger and Chatzisarantis 2016). Furthermore, our results showed a remarkable negative indirect association between students' perceptions of their PE teachers' participative and attuning approaches with boredom via need satisfaction. These results further highlight the importance of teachers providing autonomy-supportive approaches, which could not only help to boost the students' bright side of motivation but could also buffer against their maladaptive outcomes (Diloy-Peña, García-González et al. 2024; Tilga, Vahtra, and Koka 2023; Van Doren et al. 2024, 2025).

The structuring style in action: the guiding approach as a driver of adaptive outcomes

Regarding students' perceptions of their PE teachers' structuring approaches, while non-significant predictions were found for the clarifying approach, stronger predictions were observed for the guiding approach regarding students' needs. Our results partially align with the hypotheses and previous research on the circumplex approach in PE (Burgueño et al. 2024; Diloy-Peña, García-González et al. 2024; Diloy-Peña, García-González et al. 2025; Van Doren et al. 2025), indicating that the guiding approach enhances students' need satisfaction and mitigates their need frustration in PE. Linking these findings with the tenets of the circumplex model, the guiding approach directly supports need satisfaction, whereas the clarifying approach facilitates need-enabling practices (Aelterman et al. 2019; Vansteenkiste et al. 2019). Consequently, while the clarifying approach does not directly relate to need satisfaction, it establishes conditions for students to fulfill their needs (e.g. setting goals and expectations for PE lessons), which alone may not significantly predict relationships in our study.

Our findings support the initial hypothesis, indicating that the guiding approach, indirectly through students' need satisfaction, not only enhanced adaptive outcomes in PE (i.e. enjoyment), but also decreased maladaptive experiences (i.e. boredom). Consequently, appropriately challenging tasks may facilitate need fulfillment and transform PE lessons into motivating and adaptive environments (Tilga, Vahtra, and Koka 2023; Van Doren et al. 2024, 2025). These findings underscore once again the principles of the TCCM: that fostering need satisfaction through a guiding approach in PE may boost students' leisure-time PA intentions (González-Cutre et al. 2014; Hagger and Chatzisarantis 2016).

Revisiting the controlling style and the ambiguous role of the demanding approach

Regarding controlling approaches, we postulated that students' perceptions of their PE teachers' demanding and domineering approaches would indirectly and positively

impact the students' dark side of the motivational process in PE. Our findings partially support this initial hypothesis, as the domineering approach directly and positively predicts need frustration, aligning with prior circumplex-approach-based research in PE (Burgueño et al. 2024; Diloy-Peña, García-González et al. 2025; Van Doren et al. 2025). This approach involves PE teachers exerting power over students through coercive language, potentially leading to negative emotional experiences such as guilt, a sense of inferiority, and disappointment, which can affect their outcomes in PE (Diloy-Peña, Abós et al. 2024; Van Doren et al. 2024). If these domineering results are noteworthy, they gain further significance when considering the indirect negative association between students' perceptions of their PE teachers' domineering approach and their PA intentions through need frustration and boredom in PE. These results also support the principles of the TCCM and suggest that frustrating students' needs and their negative motivational experiences during PE lessons via a domineering approach could decrease their leisure-time PA intentions (Koka et al. 2019, 2020).

Surprisingly, we also found an unexpected association that does not support our initial hypothesis between students' perceptions of the demanding approach and both the bright and dark sides of motivational processes in PE. The demanding approach was positively associated with need satisfaction and negatively associated with need frustration. This suggests that while the domineering approach is clearly need-thwarting, the demanding approach, characterized by need-deprivation, creates conditions that may either hinder or support need satisfaction in PE lessons (Aelterman et al. 2019; Vansteenkiste et al. 2019). This nuanced relationship may stem from students perceiving the demanding approach as necessary for effective lesson management rather than as overtly threatening behavior.

These unexpected associations might be better understood when considering that a demanding approach shows a stronger correlation with clarifying than with domineering. This suggests that, although high expectations may sometimes be perceived as pressuring, they can also be experienced as a form of structure that provides guidance and clarity. In this sense, the demanding approach may foster both positive and negative outcomes depending on how it is enacted and interpreted. For instance, aspects of the demanding approach, such as setting clear goals and monitoring progress, may be perceived by students as similar to the clarifying teaching approach (Escriva-Boulley et al. 2021). However, caution is warranted due to its potential to foster students' need frustration, amotivation, and maladaptive outcomes over the long term (Van Doren et al. 2024, 2025).

The complexity of the chaotic style: abandoning is harmful; awaiting is confusing

Finally, we also hypothesized that students' perceptions of their PE teachers' abandoning and awaiting approaches would indirectly influence the dark side of their motivational processes in PE. Consistent with prior research in the circumplex approach in PE (Burgueño et al. 2024; Diloy-Peña, García-González et al. 2025; Van Doren et al. 2025), we found that students' perceptions of the abandoning approach not only led directly to need frustration but also slightly reduced their experiences of need satisfaction in PE. Following the circumplex model, the abandoning approach, characterized by need-

thwarting, contributes directly to students' need frustration (Aelterman et al. 2019; Vansteenkiste et al. 2019). These results support the TCCM, highlighting the fundamental role of PE teachers in shaping students' long-term leisure-time PA intentions by avoiding abandoning approaches (González-Cutre et al. 2014; Hagger and Chatzisarantis 2016).

In addition to these circumplex approach-aligned results, we unexpectedly found an association that does not support our initial hypothesis regarding the relationship between students' perceptions of their PE teachers' awaiting approach and the bright side of motivational processes in PE. The awaiting approach positively predicted need satisfaction. This suggests that while the abandoning approach is clearly need-thwarting, the awaiting approach could be perceived as need-depriving or need-enabling in this study, with unexpected and changing effects on need satisfaction (Aelterman et al. 2019; Vansteenkiste et al. 2019). This close connection should be explained by the need of the students to have some autonomy during the lessons as an effective management strategy. The positive link between awaiting and need satisfaction could indicate that, in some situations, this approach is not necessarily perceived as neglect or a lack of involvement, but rather as offering space for students to act autonomously. Another complementary argument is that when PE teachers use the awaiting approach, students may feel that they have greater opportunities to make decisions during the class. Consequently, students might feel a sense of responsibility for their learning, which could positively influence their engagement. However, further research is needed to clarify the potential effects of the awaiting approach on students' motivational processes in PE.

Limitations and future directions

The present study has several limitations that warrant consideration. First, the use of convenience sampling restricts the generalizability of our findings to the broader population. Future research should include samples with more diverse characteristics, such as varying educational levels or types of school, to enhance the external validity of the results. Second, the cross-sectional design employed in this study limits our ability to draw causal inferences regarding the relationships among the target variables. While path analysis allows us to test theoretically driven associations and examine potential mediating mechanisms, the data were collected at a single time point, which prevents us from confirming the temporal ordering of variables. Thus, future longitudinal research should examine the relationships between the eight (de-)motivating teaching approaches and motivational and psychological outcomes in the eyes of students in PE. This will, on the one hand, allow us to explore the potential reciprocal effects between teachers' behavior and motivational processes reported in previous SDT-based research with pre-service PE teachers (Granero-Gallegos, López-García, and Burgueño 2024), in the sense that students with higher-quality motivation are more likely to perceive their teachers as using more motivating than demotivating teaching approaches to manage the PE classroom. On the other hand, it will shed light on the longitudinal role of demanding and awaiting approaches in the eyes of students in PE lessons, more specifically, whether both approaches continue to be perceived as more motivating than demotivating over time or they, in contrast, turn into more demotivating, consistent with SDT. Third, (de-)motivating teaching approaches were exclusively assessed by students' perceptions. Mixed-methods studies are needed to gain a deeper insight into the distinctive role

that each (de-)motivating teaching approach plays in PE in the eyes of students, teachers, and researchers. Finally, our study was limited to predicting self-reported PA intentions. Future studies would benefit from incorporating an additional behavioral component into the tested model to examine the intention-behavior link and provide a more comprehensive understanding of students' PA engagement in leisure time. Furthermore, using device-measured PA levels would offer more robust data on the interplay between students' perceptions of teaching approaches in PE and their actual leisure-time PA.

Practical implications

The findings of this study offer valuable guidance for the design and implementation of professional development and teacher education programs in PE. Specifically, the results underscore the importance of promoting autonomy-supportive (e.g. participative, attuning) and structuring (e.g. guiding) approaches in PE. Teachers can operationalize these approaches by offering meaningful choices, connecting activities to students' interests, setting clear expectations, and providing constructive feedback. At the same time, the study cautions against the consistent use of controlling (e.g. domineering) and chaotic (e.g. abandoning) teaching approaches. These demotivating practices can be reflected when a PE teacher regularly singles out students for mistakes, speaks in a condescending tone, disregards student feedback, fails to intervene when students are off-task in PE, and does not explain instructions or offer assistance when students struggle. PE teacher training should therefore include modules that help educators recognize and avoid these demotivating approaches and replace them with supportive alternatives that match students' needs and interests.

Interestingly, the demanding and awaiting approaches showed mixed or unexpected effects, suggesting that their impact may be context-dependent or interpreted differently by students based on how they are delivered. These findings highlight the need for teachers to reflect critically on their communication styles and classroom management strategies, ensuring that even directive or less structured practices are framed within a climate of support, clarity, and respect for students.

Conclusion

Our results highlight that, from the students' perspectives, the way in which PE teachers provide autonomy support, structure, control, and manage chaos significantly affects their need-based experiences and learning-related outcomes. More specifically, attuning and guiding approaches play a greater role than participative and clarifying approaches in promoting need satisfaction, enjoyment, and PA intention. This confirms that while attuning and guiding approaches could be considered as more need-nurturing, participative and clarifying approaches could be seen as more need-enabling. Additionally, domineering and abandoning approaches play a greater role than demanding and awaiting approaches in leading to need frustration, boredom, and PA intention. Thus, domineering and abandoning approaches are evidenced as need-thwarting, while demanding and awaiting approaches are identified as need-depriving. In practice, these findings are instrumental in developing PE teacher education programs, as they emphasize the

importance of promoting effective autonomy-supportive and structuring practices while cautioning against detrimental controlling and chaotic practices. By focusing on these distinctions, educators can better support students' motivational mechanisms and overall well-being in PE.

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Appendix

(De-)motivating teaching approaches (SIS-PE)

(Burgueño et al. 2024)

1. **Class rules**

   SITUATION: At the beginning of the school year, the PE teacher introduces the class rules:
   Announces expectations and the necessary rules for good cooperation.
   Does not pay much attention to rules and their enforcement; intervenes only when a problem arises.
   Establishes the rules expected to be followed and explains the consequences or punishments for breaking them.
   Invites us to suggest a set of rules that would help us feel comfortable in class.

2. **Session planning**

   SITUATION: When the PE teacher prepares a lesson, their main priority is to …
   Propose challenging tasks for the most capable students and provide adequate help to those who struggle throughout their learning process.
   Do not plan the session much in advance; instead, the lesson unfolds spontaneously.
   Offer pleasant, interesting, and highly engaging activities.
   Design a session that all students can participate in, with no exceptions or excuses.

3. **Starting the class**

SITUATION: At the beginning of class, the PE teacher …
Designs a simple and clearly structured organization.
Starts the lesson without explaining anything and lets it unfold on its own.
Firmly insists that students put into practice everything taught: their job is to teach, and ours is to learn.
Asks students what topics they are most interested in exploring during the upcoming unit.

4. **Motivating students**

SITUATION: When the PE teacher wants to motivate students …
Generally does not worry about unmotivated students, believing their motivation cannot be improved.
Blows a whistle and loudly says, 'Now let's focus and get active.'
Offers positive feedback while providing help and guidance when needed.
Provides several activity options for students to choose from in the upcoming unit.

5. **Students complain**

SITUATION: During a difficult task, students begin to complain. The PE teacher then …
Takes our complaints into account and explains the importance of the task.
Insists we pay attention, believing we must learn for our own benefit.
Demonstrates the task step-by-step and teaches strategies to help us succeed.
Ignores our complaints, believing we need to learn to overcome obstacles on our own.

6. **When extra effort is required**

SITUATION: The PE teacher introduces a session or task that requires significant student effort. The PE teacher …
Do not worry much, thinking students must figure out on their own how much effort is needed.
Tries to make the session or task more interesting and enjoyable for students.
Firmly insists that 'break time' is over and that we must show what we're capable of.
Provides practical advice to help students complete the task.

7. **Signs of anxiety**

SITUATION: During a task, the teacher notices that some students appear anxious or nervous. Upon noticing this, the PE teacher …
Talks to the students and offers an alternative task that seems less intimidating.
Insists we overcome our fears and act more maturely.
Breaks down the necessary steps to complete the task so we feel more capable.
Doesn't worry much, thinking the anxiety will go away on its own.

8. **Disruptive student behavior**

SITUATION: Some students misbehave or disrupt the class. The PE teacher …
Orders them to continue with the task immediately or face serious consequences.
Explains why appropriate behavior is expected, then speaks with them privately and listens to their perspective.
Emphasizes the importance of effort and attitude in class.
Ignores it, thinking it's too much effort to intervene and prevent such behavior.

9. **Practice time**

SITUATION: Some students misbehave or disrupt the class. The PE teacher …
Suggests different levels of difficulty and asks us which level we'd like to try.
Demands that it's time to work, whether we like it or not, believing we must practice even the things we don't enjoy.
Doesn't plan much and adjusts as the session progresses.
Explains key points step-by-step to guide our progress during learning.

10. **Students arguing**

SITUATION: At the end of class, the PE teacher notices two students arguing and insulting each other.
Asks both students to stay after class, explains what was observed, and asks for their input on possible solutions.
Separately reminds each student of expectations and how they should behave in class.
Does not intervene, allowing them to resolve it themselves.
Says they should be ashamed of their behavior and warns that continued misconduct will lead to sanctions.

11. **Evaluation results**

SITUATION: The PE teacher has just finished an assessment. Several students performed poorly, despite receiving extra help in recent sessions. The PE teacher …
Tells the students that failing is unacceptable and that they must do better next time.
Helps students understand what went wrong and how they can improve.
Listens to the students and tries to understand their perspective on their performance.
Thinks it's not worth spending time talking to students who performed poorly.

12. **A student is repeatedly late**

SITUATION: A student leaves the locker room late for the second class in a row and avoids eye contact. The PE teacher …
Tells the whole class how disappointed they are that the student is late again.
Repeats the rules about punctuality.
After class, the teacher privately asks the student if something happened.
Says nothing, thinking it's not feasible to intervene with every student and focuses on running the session.

Basic psychological need satisfaction

(Moreno-Murcia et al. 2008)

1. I feel that I have the freedom and opportunity to choose the lesson activities.
2. I feel that I can do the activities well.
3. I feel that I matter to the classmates who matter to me.
4. I feel that the way of doing the exercises perfectly matches the way I want to do them.
5. I feel skilled in the activities I do.
6. I feel connected to classmates who care about me and whom I care about.
7. I feel that the way the exercises are done reflects my own preferences.
8. I feel capable of achieving the proposed goals.
9. I feel close and connected to other classmates who are important to me.
10. I feel that the exercises I do align with my interests.
11. I feel that I can successfully complete difficult activities.
12. I feel integrated and close when I am with the classmates with whom I spend time with.

Basic psychological need frustration

(Sicilia, Ferriz, and Sáenz-Álvarez 2013)

1. I feel that I do most of the activities/exercises because I have to do them.
2. I have serious doubts about whether I can do the activities/exercises well.
3. I feel excluded from the group I want to be part of.
4. I feel forced to do many of the activities/exercises I perform.
5. I feel disappointed with how I performed the proposed activities.
6. I feel that the classmates who are important to me are cold and distant toward me.
7. I feel pressured to do many of the activities/exercises.
8. I feel insecure about my abilities.
9. I get the impression that the classmates I spend time with don't like me.
10. I feel obligated to do many of the exercises/activities.
11. I feel frustrated/incompetent because of the mistakes I make.
12. I feel that my relationship with my classmates is superficial.

Enjoyment and boredom

(Baena-Extremera et al. 2012)

1. I usually have fun in PE lessons.
2. In PE lessons, I often get distracted instead of focusing on what I'm actually doing.
3. I usually feel bored in PE lessons.
4. In PE, I wish the lesson would end quickly.
5. I usually find PE interesting.
6. When I do PE, time seems to fly.
7. I usually participate actively in PE lessons.
8. I usually enjoy doing PE.

Intention to engage in physical activity

(Hagger and Chatzisarantis 2009)

1. I intend to do sports or physical activity during my free time over the next 5 weeks.
2. I plan to do sports or physical activity during my free time over the next 5 weeks.
3. I hope to be able to do sports or physical activity during my free time over the next 5 weeks.