



Research paper

Exploring (de-)motivating teaching profiles from a fine-grained directiveness approach: Differences in students' need-based experiences

Sergio Diloy-Peña^{a,*}, Luis García-González^b, Leen Haerens^c, Katrien De Cocker^c, Rafael Burgueño^d, Ángel Abós^b^a Faculty of Health Sciences, Public University of Navarra, Spain^b Faculty of Health and Sport Sciences, University of Zaragoza, Spain^c Department of Movement and Sports Sciences, Ghent University, Belgium^d Department of Didactics in Languages, Arts and Sport, University of Malaga, Spain

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ABSTRACT

The aim was to examine how structuring and controlling approaches (high directiveness), and autonomy-supportive and chaotic approaches (low directiveness) were combined and related to students' needs in physical education. In a sample of 1124 secondary school students, this cross-sectional study conducted two sets of profile analyses, respectively for high and low directiveness, were conducted. The latent profile analyses (LPA) revealed four high-directiveness profiles, with "very high structure-very high control" being the most adaptive and "low structure-low control" the most maladaptive in terms of need-based experiences. Four low directiveness profiles were identified, with "very high autonomy support-very low chaos" being the most adaptive and "low autonomy support-moderate chaos" the most maladaptive.

1. Introduction

According to Self-Determination Theory (SDT; Ryan & Deci, 2017), students' perceptions of their Physical Education (PE) teacher behavior in the classroom may influence their experiences of autonomy, competence, and relatedness (Curran & Standage, 2017; Vasconcellos et al., 2020). Grounded in SDT, Aelterman et al. (2019) developed a circumplex model to (de-)motivating teaching styles adapted to the education context. This integrative and fine-grained conceptualization relies on the intersection of teacher directiveness (y-axis) with need-supportiveness (x-axis) introducing the teachers' styles of autonomy support (i.e., understanding and nurturing students in their learning), structure (i.e., providing guidance toward students' skill development), control (i.e., exerting pressure toward students' learning), and chaos (i.e., laissez-faire attitudes toward students' progress) within a circular structure. Through variable- and person-centered approaches, much of the PE research to date have analyzed teachers' styles in a 'black-white' manner (i.e., need-supportive *versus* need-thwarting) and showed that students' perceptions of predominantly need-supportive teaching (i.e., autonomy support and structure) was positively associated with the satisfaction of their need for

autonomy, competence, and relatedness, while a perceived mainly need-thwarting teaching (i.e., control and chaos) was positively associated with their needs frustration (Burgueño et al., 2022; Haerens et al., 2018; Vasconcellos et al., 2020). More particularly, a few variable-centered studies based on the circumplex model of (de-)motivating teaching revealed that while the two autonomy-supportive and structuring approaches from teachers were positively associated with students' need satisfaction, they did so in different ways. Attuning and guiding approaches showed stronger relationships with need satisfaction than participative and clarifying approaches (Burgueño et al., 2024; Diloy-Peña, García-González et al., 2024; Tilga et al., 2023; Van Doren et al., 2023; Wang et al., 2024). Similarly, the controlling and chaotic teaching approaches were positively related to students' need frustration, with domineering and abandoning approaches showing a stronger association with need frustration than demanding and awaiting approaches (Burgueño et al., 2024; Diloy-Peña, García-González et al., 2024; Tilga et al., 2023; Van Doren et al., 2023; Wang et al., 2024). These studies have significantly contributed to the PE field by highlighting that differences between the (de-)motivating teaching approaches are smaller and more progressive in classroom practice. However, there are no studies that have examined in depth the

* Corresponding author. Campus Arrosadia, Pamplona, Spain.

E-mail address: sergio.diloy@unavarra.es (S. Diloy-Peña).

combination of all approaches and how PE teachers combine them in their lessons. From the premise that perceived (de-)motivating styles can be simultaneously used by PE teachers for optimal classroom management, it seems important to explore whether teachers can do so through distinct configurations of structure and control, and whether they combine autonomy support and chaos when allowing student input. One can wonder whether maximized autonomy support is only effective in the absence of chaos? And whether directions are only need-supportive when provided in a structuring rather than controlling way? To answer these questions, the present research adds to the literature by adopting a person-centered approach to shed light on how students' perceptions of different combinations of high teacher directiveness (i.e., structuring and controlling approaches) and of low teacher directiveness (i.e., autonomy-supportive and chaotic approaches) may differ in their need-based experiences in the PE lesson.

1.1. Teachers' level of directiveness within the circumplex model of (de-)motivating styles

Building upon SDT, the circumplex model (or teaching wheel) operationalizes PE teachers' styles of autonomy support, structure, control, and chaos in terms of directiveness (i.e., the degree to which teacher takes the initiative or leaves students room to lead learning interactions) and need-supportiveness (i.e., the degree to which teacher supports or thwarts students' needs) providing a more integrative and fine-grained vision (Aelterman et al., 2019; Escrivá-Boulley et al., 2021). This more fine-grained view implies a refinement of each (de-)motivating style into two more specific teaching approaches, while a more integrative perspective entails a more progressive distinction among styles (Aelterman et al., 2019; Escrivá-Boulley et al., 2021) (Fig. 1).

Focusing on teacher directiveness, PE teachers can take the lead in learning interactions (i.e., high directiveness) using structuring and controlling styles, with the structure being need-supportive and control being need-thwarting in nature (Burgueño et al., 2024; Escrivá-Boulley et al., 2021). When being structuring, a PE teacher provides students with instructions adjusted to their ability levels, positive informative feedback, and assistance when needed for task accomplishment (i.e., guiding approach), and clearly communicates about the learning expectations and goals, and consistently monitors students' progress (i.e., clarifying approach). When being controlling, a PE teacher, instead, exerts pressure on students to strictly follow the classroom agenda using explicit and behavior-centered strategies based on coercive language, powerful commands, threats of contingent punishment, and rewards (i.e., demanding approach), or by using intrusive and power-assertive practices based on guilt-induction, intimidation, personal attacks, and

public shame (i.e., domineering approach).

When PE teachers give opportunities for students to take the initiative in learning interactions (i.e., low directiveness), they can do it using autonomy-supportive and chaotic styles (Burgueño et al., 2024; Escrivá-Boulley et al., 2021). Although both are low in directiveness, autonomy support is theoretically need-supportive and chaos is need-thwarting (Burgueño et al., 2024; Escrivá-Boulley et al., 2021). When being autonomy-supportive, a PE teacher provides students with opportunities for choice, invitations for suggestions, and decisive power to get involved in the learning process (i.e., participative approach), as well as offers meaningful rationales for tasks and validates students' preferences and interests (i.e., attuning approach). When being chaotic, a PE teacher fails to intervene when instructions are required and leaves students on their own (i.e., abandoning approach), as well as awaits to see how the lesson evolves and if students can take the lead themselves (i.e., awaiting approach).

Many PE teachers decide to assume the leadership as an optimal classroom management strategy, they wonder how to avoid confusing structure with control in the instructional practice, since if teachers intervene with clear and transparent instructions for successful task completion, these may be perceived by certain students as coercive and strict commands, whereas others may interpret them as helpful and accomplishment-oriented guidelines. On the other hand, PE teachers do fear that providing high autonomy support might lead to chaos when transferring responsibilities and initiative for the learning process to students (Aelterman et al., 2016). This is because some students may perceive the freedom given to them as being too open, thereby contributing to confusion and uncertainty, while other students may understand it as an opportunity for self-realization and active classroom participation.

1.2. (De-)motivating teaching styles and students' need-based experiences

SDT recognizes autonomy, competence, and relatedness as the three basic psychological needs for human functioning (Vansteenkiste et al., 2020). SDT makes a clear distinction between the satisfaction and frustration of these needs, such that need satisfaction contributes to wellness, proactivity, and integration (i.e., the bright side of functioning), while need frustration is prone to illness, passivity, and defensiveness (i.e., the dark side of functioning) (Vansteenkiste et al., 2020). Autonomy satisfaction refers to a sense of initiative and ownership in behaviors, whereas autonomy frustration involves perceptions of being forced to act in predetermined ways. Competence satisfaction refers to a sense of ability, mastery, and efficacy for expected goals, whereas competence frustration involves perceived inefficacy and inability toward desired challenges. Relatedness satisfaction refers to a sense of meaningful connections with valued people, while relatedness frustration involves perceptions of loneliness and social exclusion by significant others (Vansteenkiste et al., 2020).

The students' perception of how the PE teacher leads the classroom has been identified as a key determinant of their need-based experiences in PE lessons (Curran & Standage, 2017; Vasconcellos et al., 2020). Previous PE research has demonstrated that, despite being a highly directive style, the students' perception of teacher-provided structure was positively associated with their need satisfaction, while perceived control from their teacher was positively related to their need frustration (Curran & Standage, 2017; Vasconcellos et al., 2020). Further, negative relationships were consistently found between perceived PE teachers' structure and need frustration (Behzadnia et al., 2018; Burgueño & Medina-Casabón, 2021; Curran & Standage, 2017), while the relationship between PE teachers' perceived control and need satisfaction should be a negative association according to theory, it has not yet been consistently evidenced in empirical research (Burgueño et al., 2022; García-González et al., 2023; Leo, Behzadnia, et al., 2022).

On the other hand, previous studies showed that, although both are common in low directiveness, the students' perception of autonomy

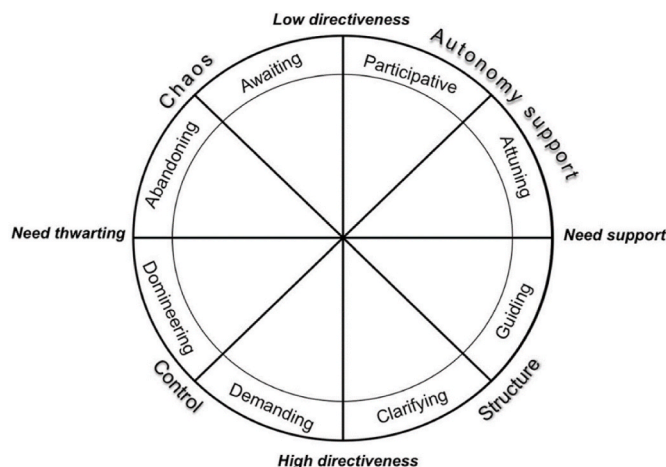


Fig. 1. Graphical representation of the circumplex model (Aelterman et al., 2019).

support from the PE teacher was positively associated with their need satisfaction (Curran & Standage, 2017; Vasconcellos et al., 2020), whereas perceived chaos from their teacher was positively related to their need frustration (Burgueño & Medina-Casaubón, 2021; Leo, Behzadnia, et al., 2022; Van Doren et al., 2023). Further, while inconclusive associations were observed between perceived PE teachers' autonomy support and need frustration (Behzadnia et al., 2018; Haerens et al., 2015; Van Doren et al., 2023), perceived chaos from the teacher was unrelated to need satisfaction among students in PE lessons (Burgueño & Medina-Casaubón, 2021; Leo, Behzadnia, et al., 2022; Van Doren et al., 2023).

These variable-centered studies meaningfully contributed to the study of how PE teachers' (de-)motivating styles are associated with need-based experiences. However, variable-centered analyses fail to ascertain whether students can simultaneously perceive their PE teacher as when engaging in structuring and controlling styles when taking the initiative in the PE lessons, and when using autonomy-supportive and chaotic styles when offering room for students to lead learning interactions. Further, variable-centered approaches do not allow one to explore how distinct configurations of autonomy support and chaos (low directiveness), and of structure and control (high directiveness) may yield specific need-based experiences in students.

1.3. The merits of person-centered approaches to study (de-)motivating teaching styles

In an effort to overcome the limitations of variable-centered analyses, person-centered approaches allow for the identification of qualitatively distinct subgroups within populations (i.e., profiles) that share certain outward features (Weller et al., 2020). To date, much of the person-centered research has focused almost exclusively on examining the combination of the PE teachers' styles, operationalizing them as need-supportive versus need-thwarting in nature, and comparing these combinations in terms of students' learning-related outcomes (i.e., need-supportiveness) (Burgueño et al., 2022; Fierro-Suero et al., 2024; Haerens et al., 2018; Leo, Pulido, et al., 2022). Previous studies commonly identified a high need-support and low need-thwarting profile with more adaptive patterns in students' outcomes, as well as a low need-support and high need-thwarting profile linked to more maladaptive patterns. Additional profiles characterized by varying levels of need-support and need-thwarting were also identified, with those exhibiting higher need-support being more adaptive in terms of student outcomes (Burgueño et al., 2022; Fierro-Suero et al., 2024; Haerens et al., 2018; Leo, Pulido, et al., 2022).

Apart from these studies focusing on need-supportive *versus* need-thwarting teaching profiles, Coterón et al. (2024) and García-González et al. (2023) analyzed different combinations of perceived competence support/structure and control (i.e., high directiveness) provided by PE teachers during lessons. García-González et al. (2023) identified four profiles, while Coterón et al. (2024) found three distinct profiles. Both studies found a "high structure (or competence support) – low control" profile, which achieved the highest levels of need satisfaction and autonomous motivation, alongside the lowest levels of need frustration and amotivation. In addition to this high structure–low control profile, García-González et al. (2023) also identified three other profiles the "low structure–high control" profile, which exhibited the highest levels of need frustration and the lowest levels of need satisfaction; the "moderate structure–moderate control" profile, which was slightly more adaptive than the "moderate structure–high control" profile. Coterón et al. (2024) additionally identified a profile characterized by "high structure – high control" and a profile with "low structure – low control", which were both generally less adaptive, with the "high structure–high control" profile yielding slightly better relatedness satisfaction outcomes. Despite the foundational contributions by Coterón et al. (2024) and García-González et al. (2023) in understanding directiveness in PE teaching, their studies overlooked autonomy-supportive and chaotic

approaches as low-directiveness teaching styles and failed to operationalize structure and control using the more refined circumplex model of (de-)motivating styles. This limits a deeper understanding of the dynamic interplay between teachers' use of structure and control during lessons.

To the best of our knowledge, little attention has been paid to how students' perceptions of specific teaching styles may influence their experiences of autonomy, competence, and relatedness in PE lessons. Although some studies have shed light on the motivational outcomes associated with combinations of structure and control (high directiveness) (Coterón et al., 2024; García-González et al., 2023), further research is needed to explore the two specific structuring (guiding and clarifying) and controlling (demanding and domineering) approaches distinguished within the circumplex model. This refined perspective provides a nuanced view of how PE teachers can combine these approaches to effectively manage lessons while fostering students' autonomy, competence, and relatedness. For instance, the fine line between the clarifying and demanding approaches may reveal how teachers can be sufficiently clear without being perceived as overly demanding, thus minimizing motivational costs for students. On the other hand, no studies have examined low directiveness in PE by examining combinations of autonomy-supportive and chaotic approaches. The circumplex model provides a framework to investigate which combinations of participative and attuning (autonomy-supportive) and abandoning and awaiting (chaotic) approaches are most beneficial or detrimental to students' experiences of autonomy, competence, and relatedness. It also allows for a clear distinction between participative and awaiting approaches, helping to determine how much space teachers can provide for student decision-making without causing confusion or uncertainty. For example, understanding how much space teachers should provide for student decision-making without causing confusion or uncertainty can help calibrate teaching strategies. Gathering evidence on the optimal balance of teacher involvement can support PE teachers in selecting teaching approaches that best align with their students' characteristics and situational learning needs, ensuring effective and engaging lessons.

1.4. The present study

Due to specific characteristics, the subject of PE emerges as one of the most relevant areas for promoting an active and healthy lifestyle among students. Several studies have identified PE teachers as a key educational agent in promoting students' levels of physical activity (Behzadnia et al., 2019). In view of these specific characteristics around this subject, one of the priorities for PE teachers is to provide students with the necessary knowledge, skills and attitudes to ensure that they practice physical activity in their free time (Hagger & Chatzisarantis, 2012). Along the same lines, research within the educational context of PE has indicated how classroom experiences during the early academic years can influence the intention to engage in physical activity (Ladwig et al., 2018). In contrast, accumulated negative experiences in PE classes may generate a greater sense of incompetence among young people and gradually decrease physical activity practice (Beltrán-Carrillo et al., 2012). In order to achieve these adaptive experiences, it seems important that PE teachers can implement motivating teaching style that trigger an adaptive motivational process in PE and, consequently, promoting physical activity levels both inside and outside the classroom (Ahmadi et al., 2023; Vasconcellos et al., 2020).

Guided by the SDT-based circumplex model (Aelterman et al., 2019; Burgueño et al., 2024; Escrivá-Bouley et al., 2021), the aim of this research was twofold. The first aim was to separately identify the optimal number of profiles with varying levels respectively of high teacher directiveness (i.e., two structuring approaches, being guiding and clarifying; two controlling approaches, being demanding and domineering) and low teacher directiveness (i.e., two autonomy-supportive approaches, being participative and attuning; two

chaotic approaches, being abandoning and awaiting) perceived by students in PE. Considering previous SDT-based research in PE (Coterón et al., 2024; Burgueño et al., 2022; Fiero-Suerro et al., 2024; García-González et al., 2023; Haerens et al., 2018; Leo, Pulido, et al., 2022), we expected to identify up to four different profiles for each level of directiveness. For high teacher directiveness, the first profile would be characterized by high levels of structure (i.e., guiding and clarifying approaches) in conjunction with low levels of control (i.e., demanding and domineering approaches), while the second one would show the opposite. The third and fourth profiles would simultaneously show low-to-high levels of the four more directive approaches. For low directiveness, we also hypothesized four profiles with one characterized by high levels of autonomy support (i.e. participative and attuning approaches) paired with low levels of chaos (i.e., abandoning and awaiting approaches), and another obtaining opposite scores. The remaining two profiles would concurrently display low-to-high scores for the four low directive approaches.

The second objective was to examine the differences in students' satisfaction and frustration of the need for autonomy, competence, and relatedness across the previously retained profiles based both on the four high directive approaches and on the four low directive approaches. Consistent with previous SDT-based studies in PE (Burgueño et al., 2022; García-González et al., 2023; Haerens et al., 2018; Leo, Pulido, et al., 2022), we hypothesized that both the profile characterized by high guiding and clarifying and low demanding and domineering approaches and the profile with high participative and attuning and low abandoning and awaiting approaches would report the highest levels of satisfaction of the three needs and the lowest levels of needs frustration. The exact opposite profiles were expected to show the lowest scores on need satisfaction and the highest on need frustration. No hypothesis were formulated about the differences in need-based experiences for the remaining retained profiles.

2. Method

2.1. Participants and procedures

A non-probabilistic convenience sample of 1132 students from eight secondary schools in a small city in the northeast of Spain participated in this cross-sectional study. After removing invalid data (valid response rate: 99.3 %), the final sample comprised 1124 secondary school students ($M_{age} = 14.60$, $SD = 1.51$; 52 % girls) distributed across 65 classes in five course levels (i.e., Year-8 $n = 299$; Year-9 $n = 236$; Year-10 $n = 257$; Year-11 $n = 195$; Year-12 $n = 137$). Fourteen PE teachers ($M_{age} = 36.81$, $SD = 6.79$; 20 % female) taught these students, with three schools employing three teachers each and five schools employing one teacher each. In all participating schools, PE consisted of two coeducational, compulsory 60-min classes per week.

To collect data, researchers obtained all authorizations from schools' boards and PE teachers and written informed consent from parents or legal guardians of each student and the students themselves. Participants were informed that the data was confidential and anonymous and would only be used for research purposes. The paper-and-pencil questionnaires were completed in a quiet classroom in the absence of the PE teachers so as not to influence the students' responses. Completing the questionnaire took on average 25 min. The questionnaires were distributed in May, which is near the end of the school year in Spain. In this sense, students had enough time to get to know their PE teacher's motivating teaching style. The study was approved by the Ethics Committee of the [omitted for peer review].

2.2. Variables and instruments

2.2.1. (De-)motivating teaching approaches

Students' perceptions of their PE teacher's (de-)motivating teaching approaches were assessed using the Spanish version of the Situations-in-

School in Physical Education Questionnaire (SIS-PE; Burgueño et al., 2024). The SIS-PE outlines 12 PE classroom situations followed by the description of four items describing potential behaviors corresponding to each one of the four autonomy-supportive, structuring, controlling, and chaotic styles (i.e., in total 48 items). To capture the teacher's high directiveness, five items are classified as clarifying, seven as guiding, seven as demanding, and five as domineering teaching approaches. Meanwhile, four items are categorized as participative, eight as attuning, eight as abandoning, and four as awaiting teaching approaches, to capture the teacher's low directiveness. Students' responses were provided on a 7-point Likert scale ranging from 1 ('does not describe my PE teacher at all') to 7 ('describes my PE teacher extremely well'). In the present study, confirmatory factor analysis (CFA) showed a good fit to the data for the four-factor correlated models specified in terms of highly directive approaches ($\chi^2/df = 6.13$, $p < .001$; Comparative Fit Index (CFI) = 0.91; Tucker-Lewis Index (TLI) = 0.90; Root Mean Square Error of Approximation (RMSEA) = 0.068; 90 % Confidence Interval (CI) = 0.064–0.071) and low directive approaches ($\chi^2/df = 4.12$, $p < .001$; CFI = 0.95; TLI = 0.95; RMSEA = 0.053, 90 % CI = 0.049–0.056).

2.2.2. Need satisfaction

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 & Michailidou, 2006). Following the stem: "In my PE lessons ...", this scale includes 12 items (four items per factor) assessing autonomy (e.g., "I feel that the activities I do in PE fit in with my interests"), competence (e.g., "I feel I can successfully complete difficult tasks"), and relatedness satisfaction (e.g., "I feel very comfortable when participating in activities with my classmates"). Items were rated on a 5-point scale from 1 ('strongly disagree') to 5 ('strongly agree'). In this study, the three-factor CFA showed a reasonable fit to the data ($\chi^2/df = 9.87$, $p < .001$; CFI = 0.92; TLI = 0.90; RMSEA = 0.089, 90 % CI = 0.082–0.096).

2.2.3. Need frustration

Students' perceptions of autonomy, competence, and relatedness frustration in PE were assessed by the Spanish PE version (Sicilia et al., 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 factor) assessing autonomy (e.g., "I feel pressured to behave in certain way"), competence (e.g., "There are some situations in which I feel unable"), and relatedness frustration (e.g., "I feel that other people do not like me"). Items were rated on a 5-point scale ranging from 1 ('strongly disagree') to 5 ('strongly agree'). In this research, the three-factor CFA obtained an acceptable fit to the data ($\chi^2/df = 4.41$, $p < .001$; CFI = 0.96; TLI = 0.95; RMSEA = 0.063, 90 % CI = 0.056–0.070).

2.3. Data analysis

Descriptive statistics, McDonald's omega (ω) reliability coefficients, and Pearson's correlations were estimated for all study variables using SPSS v28.00. To estimate the indices of the CFA models, the model achieves an acceptable fit with values up to 5 for the ratio between χ^2 and degree of freedom (χ^2/df), higher than 0.90 for CFI and TLI in conjunction with scores lower than 0.08 of RMSEA (Marsh et al., 2004). For person-centered approaches, standardized scores for each perceived teaching approach were computed. Next, we performed two sets of latent profile analyses (LPA) using MPlus v8.4 (Muthén & Muthén, 1998–2017) to identify different combinations of respectively high teacher directiveness (i.e., guiding, clarifying, demanding, and domineering approaches) and low teacher directiveness (i.e., participative, attuning, abandoning and awaiting approaches). In the high teacher directiveness LPA, the four low directiveness approaches were included as covariates and vice-versa (see supplementary materials, Tables 7 and

8). Additionally, as students' perceptions of (de-)motivating teaching behavior could be affected by students' gender, grade, and the teacher who delivered the PE lessons (Vasconcellos et al., 2020), these variables were also introduced as covariates in both high- and low-directiveness LPAs. LPAs were run using a robust maximum-likelihood estimator (MLR) with 5000 random star values, 1000 iterations, and 200 final optimizations to guarantee convergence on a true maximum likelihood (Muthén & Muthén, 1998–2017). Starting with a two-profile model, additional profiles were iteratively added up to $k = 6$ (Weller et al., 2020). Best-fitting profile-model selection was taken based on substantial meaningfulness, theoretical congruity, and recommended statistical practices (Weller et al., 2020). For the LPAs assessment, different indicators were used. Firstly, Akaike information criterion (AIC), Bayesian information criterion (BIC), and sample-size adjusted BIC (SSA-BIC), in which, lower scores express a better model fit (Weller et al., 2020). Secondly, a significant p -value from Lo-Mendell-Rubin likelihood ratio (LRT) test indicates a better model fit compared to the model with one fewer profile (Weller et al., 2020). Thirdly, entropy with value scores above 0.80 reports a good profile separation (Weller et al., 2020). Finally, a profile size of at least 5 % of the participating sample was also required to avoid a potential over-extraction (Weller et al., 2020).

To examine the extent to which the retained profiles were similar (versus different) in terms of students' need-based experiences (i.e., satisfaction and need frustration of the three needs), chi-square mean equality tests based on the Bolck-Croon-Hagenaars (BCH) method were conducted in Mplus v8.4 (Muthén & Muthén, 1998–2017). Students' gender, grade and the teacher in question were introduced as covariate (Diloy-Peña, Abós et al., 2024). This approach additionally involves conducting post-hoc pairwise comparisons of profile means on the target need-based experiences. These comparisons were carried out using Wald chi-square tests to identify the specific profiles that exhibit significant differences between them. The statistical significance level was $p < .05$.

3. Results

3.1. Preliminary results

Table 1 reports descriptive, reliability, and Pearson correlations of the study variables.

3.2. Identification and interpretation of high directiveness profiles and low directiveness profiles

Table 2 shows fit statistics for the profile models based, respectively, on high and low teacher directiveness. Regarding high teacher directiveness, the four-profile model was considered the most appropriate given that it did not significantly differ from the five-profile model and, in turn, was lower than two-profile and three-profile models on values of AIC, BIC, and SSA-BIC. Further, the four-profile model obtained a good value in entropy. Concerning low teacher directiveness, the four-profile and five-profile models seemed to represent good choices for the data. Both profile models did not significantly differ from the six-profile solution, while they were significantly different from the two-profile and three-profile and scored lower on AIC, BIC, and SS-BIC. Considering the interpretability of both profile models, the addition of a new profile (i.e., five-profile model) did not add a theoretically meaningful contribution compared to the four-profile model when examining the dynamic interplay between autonomy-supportive and chaotic approaches in the eyes of students. Thus, the four-profile model was finally retained for parsimony reasons.

The four-profile high-directiveness model (i.e., combinations of guiding, clarifying, demanding, and domineering approaches) is depicted in Fig. 2 and described in Table 3. Taking into consideration the raw scores, profile 1 ($n = 286$, 25.44 %) was labelled as “very high structure-very high control” as students in this profile were scoring respectively 6.46/7 and 6.25/7 in guiding and clarifying approaches (i.e., very high

Table 1
Descriptives, composite reliability, and correlations among study variables.

Variables	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
High-directiveness approaches															
1.Guiding	0.83	-	0.70**	0.51**	0.11**	0.66**	0.80**	-0.41**	-0.23**	0.53**	0.35**	0.33**	-0.39**	-0.20**	-0.13**
2.Clarifying	0.84		-	0.58*	0.23**	0.53**	0.72**	-0.29**	-0.20**	0.44**	0.27**	0.27**	-0.30**	-0.12**	-0.07**
3.Demanding	0.59			-	0.46**	0.41**	0.49**	-0.02	0.01	0.30**	0.22**	0.18**	-0.15**	-0.11**	-0.03
4.Domineering	0.57				-	0.20**	0.16**	0.38**	0.24**	0.08**	0.08**	0.07**	0.14**	0.10	0.14**
Low-directiveness approaches															
5.Participative	0.72					-	0.75**	-0.17**	-0.03	0.53**	0.29**	0.25**	-0.30**	-0.14**	-0.02
6.Attuning	0.83						-	-0.33**	-0.14**	0.60**	0.38**	0.32**	-0.37**	-0.18**	-0.07*
7.Abandoning	0.82							-	0.57**	-0.21**	-0.21**	-0.18**	0.37**	0.29**	0.27**
8.Awaiting	0.67								-	-0.05	-0.05	-0.06*	0.21	0.14**	0.17**
Need-based experiences															
9.Autonomy Satisfaction	0.78									-	0.55**	0.44**	-0.44**	-0.24**	-0.08**
10.Competence Satisfaction	0.84										-	0.56**	-0.34**	-0.44**	-0.22**
11.Relatedness Satisfaction	0.82											-	-0.30**	-0.25**	-0.40**
12.Autonomy Frustration	0.84												-	0.61**	0.49**
13.Competence Frustration	0.81													-	0.63**
14.Relatedness Frustration	0.81														-

Note: Correlations were significant at the level $p < .05^*$ and $p < .01^{**}$.

Table 2
Fit indexes, entropy, and model comparisons for models from high and low teacher directiveness LPAs.

High teacher directiveness							
Model	AIC	BIC	SSA-BIC	LMRT(p)	Entropy	Participants for profile	Np<5 %
2 profiles	11140.80	11241.29	11177.77	<0.001	0.842	391; 733	0
3 profiles	10475.84	10636.63	10534.99	0.010	0.851	532; 139; 453	0
4 profiles	10027.35	10348.44	10208.68	.001	0.841	86; 295; 457; 286	0
5 profiles	9932.32	10213.74	10035.87	0.098	0.804	87; 295; 263; 227; 252	0
6 profiles	9745.88	10087.56	9871.57	0.002	0.814	256; 87; 306; 173; 169; 133	0
Low teacher directiveness							
Model	AIC	BIC	SSA-BIC	LMRT(p)	Entropy	Participants for profile	Np<5 %
2 profiles	11276.19	11376.68	11313.16	<0.001	0.827	529; 595	0
3 profiles	10647.33	10808.12	10706.48	<0.001	0.868	469; 523; 132	0
4 profiles	10091.80	10312.88	10173.13	.001	0.871	389; 471; 158; 106	0
5 profiles	9825.19	10106.57	9928.70	0.009	0.854	332; 92; 209; 378; 113	0
6 profiles	9591.37	9933.04	9717.06	0.578	0.835	209; 326; 114; 191; 205; 79	0

Note: AIC = Akaike information criterion; BIC = Bayesian information criterion; SSA-BIC = sample-size adjusted BIC; LMRT = Lo-Mendell–Rubin likelihood test; Np < 5 %: number of profiles with <5 % of participants. Analyses were controlled for gender, grade, and teacher for both latent profiles. Participative, attuning, abandoning, and awaiting approaches were included as covariates in high-directiveness LPA, whereas guiding, clarifying, demanding, and domineering approaches were included as covariates in low-directiveness LPA.

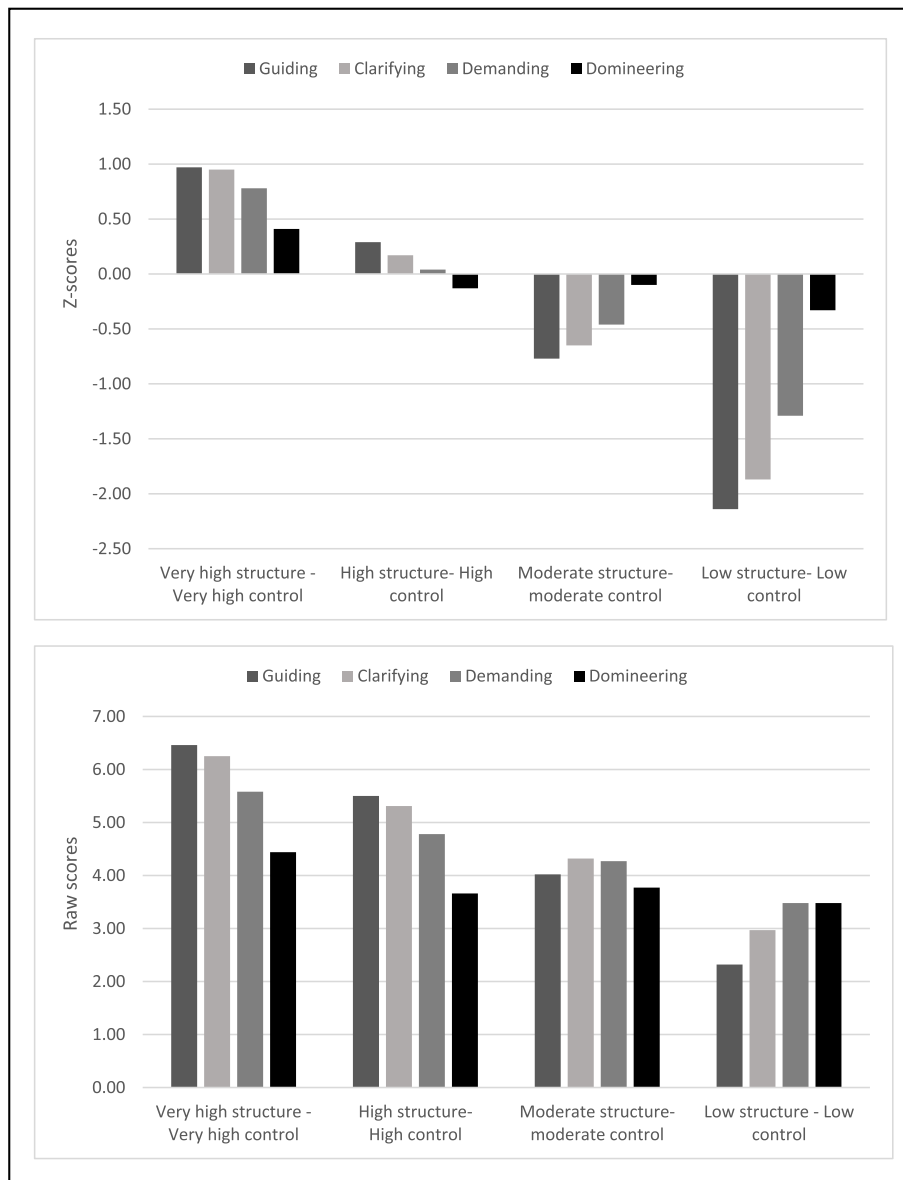


Fig. 2. Description of the high directiveness latent profiles based on standardized (upper side) and raw (lower side) scores of teaching approaches.

structure), and 5.58/7 and 4.44/7 in demanding and domineering approaches (i.e., very high control). Profile 2 (n = 457, 40.65 %) was labelled as “high structure-high control” as students in this profile were scoring respectively 5.50/7 and 5.31/7 in guiding and clarifying approaches (i.e., high structure), and 4.78/7 and 3.66/7 in demanding and domineering approaches (i.e., high control). Profile 3 (n = 295, 26.25 %) was labelled as “moderate structure-moderate control” as students in this profile scored 4.02/7 and 4.32/7 in guiding and clarifying approaches (i.e., moderate structure), and 4.27/7 and 3.77/7 in demanding and domineering approaches (i.e., moderate control). Finally, profile 4 (n = 86, 7.66 %) was denominated “low structure-low control” as it had raw scores of 2.32/7 and 2.97/7 in guiding and clarifying approaches (i.e., low structure), and 3.48/7 in demanding and domineering approaches (i.e., low control).

Regarding the four-profile low-directiveness model (i.e., combinations of guiding, clarifying, demanding, and domineering approaches), it can be observed in Fig. 3 and Table 4. Taking into consideration the raw scores, profile 1 (n = 389, 34.60 %) was named “very high autonomy support-very low chaos” by scoring 5.28/7 and 5.78/7 in participative and attuning approaches (i.e., very high autonomy support), and 1.73/7 and 2.05/7 in abandoning and awaiting approaches (i.e., very low chaos). Profile 2 (n = 158, 14.05 %) was labelled as “high autonomy support-high chaos” since it had raw scores of 5.40/7 and 5.50/7 in

participative and attuning approaches (i.e., high autonomy support), and 4.78/7 and 5.09/7 in abandoning and awaiting approaches (i.e., high chaos). Profile 3 (n = 471, 41.91 %) was named “moderate autonomy support-low chaos” by scoring 3.37/7 and 4.01/7 in participative and attuning approaches (i.e., moderate autonomy support), and 2.66/7 and 2.79/7 in abandoning and awaiting approaches (i.e., low chaos). Profile 4 (n = 106, 9.44 %) was denominated “low autonomy support-moderate chaos” as it was characterized by raw scores of 1.87/7 and 2.26/7 in participative and attuning approaches (i.e., low autonomy support), and of 3.74/7 and 3.45/7 in abandoning and awaiting approaches (i.e., moderate chaos).

3.3. Differences in students’ need-based experiences across high directiveness profiles and low directiveness profiles

Differences in students’ need-based experiences for the high- and low-directiveness four-profile solutions are shown in Tables 3 and 4, respectively. Prior to the main analysis, preliminary mean equality tests found significant profiles differences in gender (high-directiveness four-profile solution: $\chi^2 = 9.64, p = .002$; low-directiveness four-profile solution: $\chi^2 = 9.08, p = .002$), grade (high-directiveness four-profile solution: $\chi^2 = 73.42, p < .001$; low-directiveness four-profile solution: $\chi^2 = 50.19, p < .001$), and teacher (high-directiveness four-profile solution:

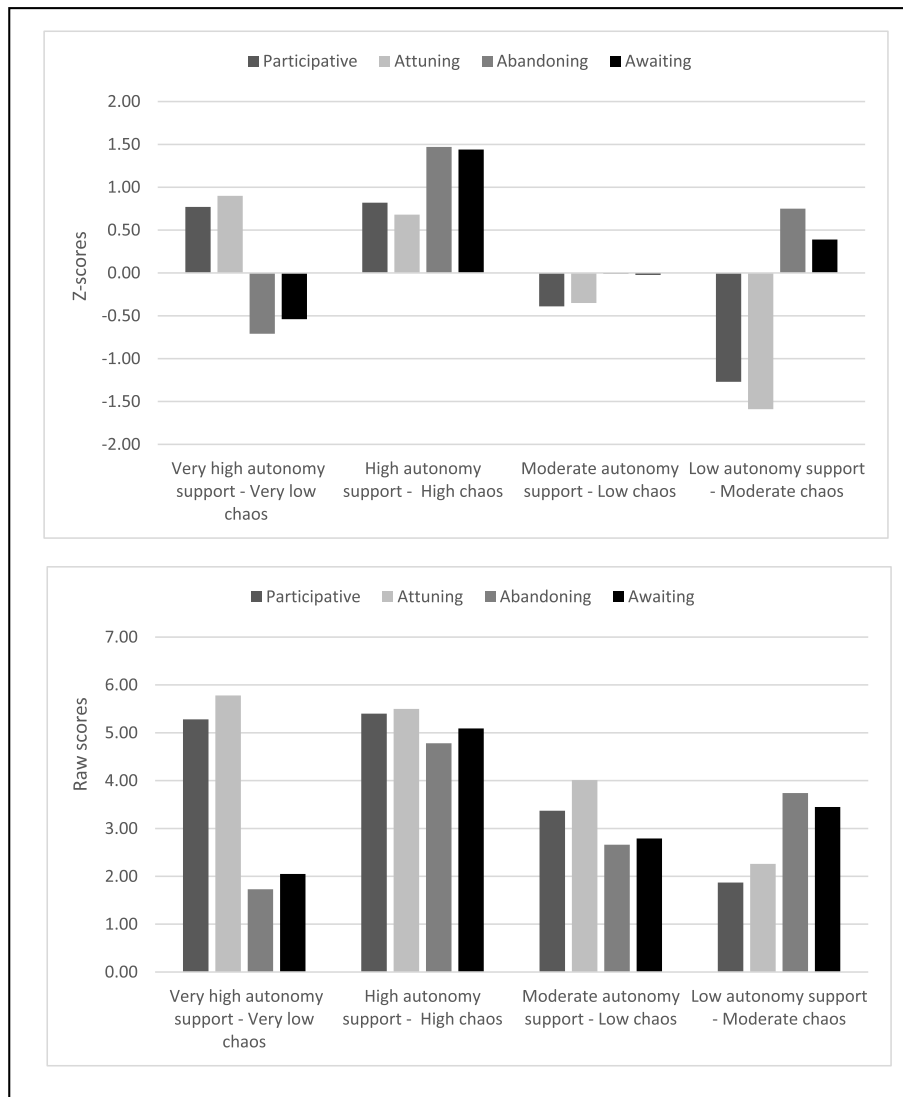


Fig. 3. Description of the low directiveness latent profiles based on standardized (upper side) and raw (lower side) scores of teaching approaches.

$\chi^2 = 38.17, p < .001$; low-directiveness four-profile solution: $\chi^2 = 70.53, p < .001$). Consequently, these variables were included as covariates when examining differences in need-based experiences across the profiles in both sets of LPAs (see [supplementary materials, Tables 5 and 6](#)).

Regarding students' need-based experiences, as observed in [Table 3](#), the mean equality test conducted in the high-directiveness four-profile solution was significant for autonomy satisfaction ($\chi^2 = 492.74, p < .001$), competence satisfaction ($\chi^2 = 135.35, p < .001$), relatedness satisfaction ($\chi^2 = 110.88, p < .001$), autonomy frustration ($\chi^2 = 161.48, p < .001$), and competence frustration ($\chi^2 = 29.03, p < .001$), whereas it was not significant for relatedness frustration ($\chi^2 = 5.89, p > .05$). The post-hoc pairwise comparisons reported that the "very high structure-very high control" profile scored highest on autonomy, competence, and relatedness satisfaction, followed by the "high structure-high control" profile scoring significantly higher on each need satisfaction than the "moderate structure-moderate control" and the "low structure-low control" profile, with the latter displaying the lowest need-satisfaction

levels. Concerning need frustration, the "very high structure-very high control" profile scored lowest on autonomy frustration, followed by the "high structure-high control" profile scoring significantly lower on autonomy and competence frustration than the "moderate structure-moderate control" profile and the "low structure-low control" profile that scored highest on autonomy, competence, and relatedness frustration.

Concerning the low-directiveness four-profile solution (see [Table 4](#)), mean equality test was significant for autonomy satisfaction ($\chi^2 = 576.47, p < .001$), competence satisfaction ($\chi^2 = 134.97, p < .001$), relatedness satisfaction ($\chi^2 = 98.76, p < .001$), autonomy frustration ($\chi^2 = 273.73, p < .001$), competence frustration ($\chi^2 = 70.27, p < .001$), and relatedness frustration ($\chi^2 = 63.88, p < .001$). More precisely, the post-hoc pairwise comparisons revealed that the "very high autonomy support-very low chaos" profile scored highest on competence and relatedness satisfaction, followed by the "high autonomy support-high

Table 3

Latent differences in students' need-based experiences in PE between profiles based on high directiveness teaching approaches.

	Profile 1 (n = 286) (25.44 %)	Profile 2 (n = 457) (40.65 %)	Profile 3 (n = 295) (26.25 %)	Profile 4 (n = 86) (7.66 %)
	Very high structure – very high control	High structure - high control	Moderate structure – moderate control	Low structure - low control
High-directiveness approaches				
Guiding approach				
Raw scores	6.46	5.50	4.02	2.32
(1–7)	(0.09) ^{2a,3a,4a}	(0.03) ^{1a,3a,4a}	(0.04) ^{1a,2a,4a}	(0.08) ^{1a,2a,3a}
Z-scores	0.97	0.29	-0.77	-2.14
	(0.05) ^{2a,3a,4a}	(0.08) ^{1a,3a,4a}	(0.07) ^{1a,2a,4a}	(0.08) ^{1a,2a,3a}
Clarifying approach				
Raw scores	6.25	5.31	4.32 (0.47)	2.97
(1–7)	(0.03) ^{2a,3a,4a}	(0.03) ^{1a,3a,4a}	^{1a,2a,4a}	(0.18) ^{1a,2a,3a}
Z-scores	0.95	0.17	-0.65 (0.07)	-1.87
	(0.05) ^{2a,3a,4a}	(0.08) ^{1a,3a,4a}	^{1a,2a,4a}	(0.10) ^{1a,2a,3a}
Demanding approach				
Raw scores	5.58	4.78	4.27	3.48
(1–7)	(0.04) ^{2a,3a,4a}	(0.04) ^{1a,3a,4a}	(0.04) ^{1a,2a,4a}	(0.09) ^{1a,2a,3a}
Z-scores	0.78	0.04	-0.46	-1.29
	(0.08) ^{2a,3a,4a}	(0.07) ^{1a,3a,4a}	(0.06) ^{1a,2a,4a}	(0.10) ^{1a,2a,3a}
Domineering approach				
Raw scores	4.44	3.66 (0.05) ^{1a}	3.77 (0.06) ^{1a}	3.48 (0.13) ^{1a}
(1–7)	(0.08) ^{2a,3a,4a}			
Z-scores	0.41	-0.13	-0.10	-0.33
	(0.06) ^{2a,3a,4a}	(0.07) ^{1a}	(0.06) ^{1a}	(0.11) ^{1a}
Need-based experiences				
Autonomy satisfaction	3.87	3.22	2.74	2.01
(1–5)	(0.06) ^{2a,3a,4a}	(0.05) ^{1a,3a,4a}	(0.05) ^{1a,2a,4a}	(0.08) ^{1a,2a,3a}
Competence satisfaction	4.23	3.81	3.48	3.04
(1–5)	(0.05) ^{2a,3a,4a}	(0.04) ^{1a,3a,4a}	(0.06) ^{1a,2a,4b}	(0.12) ^{1a,2a,3b}
Relatedness satisfaction	4.23	3.86	3.54	3.17
(1–5)	(0.05) ^{2c,3a,4a}	(0.04) ^{1c,3a,4a}	(0.05) ^{1a,2a,4a}	(0.12) ^{1a,2a,3a}
Autonomy frustration	2.12	2.37	2.89	3.51
(1–5)	(0.06) ^{2a,3a,4b}	(0.05) ^{1a,3a,4b}	(0.05) ^{1a,2a,4a}	(0.12) ^{1a,2a,3a}
Competence frustration	2.20	2.34	2.55	2.81
(1–5)	(0.06) ^{3b,4b}	(0.07) ^{3a,4a}	(0.05) ^{1b,2a}	(0.12) ^{1b,2a}
Relatedness frustration	1.89 (0.06) ^{4c}	1.97 (0.04)	2.04 (0.05)	2.16 (0.11) ^{1c}
(1–5)				

Note: Numbers in superscript indicate significant group differences: ^a $p < .001$, ^b $p < .010$, ^c $p < .050$. Analyses were controlled for gender, grade, and teacher. Analyses controlled for participative, attuning, abandoning, and awaiting approaches in high directiveness.

Table 4

Latent differences in students' need-based experiences in PE between profiles based on low directiveness teaching approaches.

	Profile 1 (n = 389) (34.60 %)	Profile 2 (n = 158) (14.05 %)	Profile 3 (n = 471) (41.91 %)	Profile 4 (n = 106) (9.44 %)
	Very High autonomy support – very low chaos	High autonomy support - high chaos	Moderate autonomy support – low chaos	Low autonomy support - moderate chaos
Low-directiveness approaches				
Participative approach				
Raw scores	5.28	5.40	3.37	1.87
(1–7)	(0.05) ^{3a,4a}	(0.10) ^{3a,4a}	(0.05) ^{1a,2a,4c}	(0.06) ^{1a,2a,3c}
Z-scores	0.77	0.82	-0.39	-1.27
	(0.05) ^{3a,4a}	(0.11) ^{3a,4a}	(0.07) ^{1a,2a,4c}	(0.08) ^{1ba,2a,3c}
Attuning approach				
Raw scores	5.78	5.50	4.01	2.26
(1–7)	(0.03) ^{2a,3a,4a}	(0.06) ^{1a,3a,4a}	(0.03) ^{1a,2a,4a}	(0.06) ^{1a,2a,3a}
Z-scores	0.90	0.68	-0.35	-1.59
	(0.04) ^{2a,3a,4a}	(0.12) ^{1a,3a,4a}	(0.08) ^{1a,2a,4a}	(0.11) ^{1a,2a,3a}
Abandoning approach				
Raw scores	1.73	4.78	2.66	3.74
(1–7)	(0.03) ^{2a,3a,4a}	(0.10) ^{1a,3a,4a}	(0.05) ^{1a,2a,4a}	(0.09) ^{1a,2a,3a}
Z-scores	-0.71	1.47	-0.01	0.75
	(0.03) ^{2a,3a,4a}	(0.13) ^{1a,3a,4a}	(0.07) ^{1a,2a,4a}	(0.18) ^{1a,2a,3a}
Awaiting approach				
Raw scores	2.05	5.09	2.79	3.45
(1–7)	(0.05) ^{2a,3a,4a}	(0.11) ^{1a,3a,4a}	(0.05) ^{1a,2a,4a}	(0.11) ^{1a,2a,3a}
Z-scores	-0.54	1.44	-0.02	0.39
	(0.04) ^{2a,3a,4a}	(0.12) ^{1a,3a,4a}	(0.07) ^{1a,2a,4a}	(0.1) ^{1a,2a,3a}
Need-based experiences				
Autonomy satisfaction	3.72	3.81	2.91	2.17
(1–5)	(0.04) ^{3a,4a}	(0.07) ^{3a,4a}	(0.04) ^{1a,2a,4a}	(0.07) ^{1a,2a,3a}
Competence satisfaction	4.13	4.07	3.62	3.16
(1–5)	(0.04) ^{2b,3a,4a}	(0.07) ^{1b,3b,4a}	(0.05) ^{1a,2b,4a}	(0.11) ^{1a,2a,3a}
Relatedness satisfaction	4.18	3.98	3.64	3.34
(1–5)	(0.05) ^{2a,3a,4a}	(0.08) ^{1a,3c,4a}	(0.05) ^{1a,2c,4b}	(0.10) ^{1a,2a,3b}
Autonomy frustration	1.96	2.84	2.65	3.44
(1–5)	(0.05) ^{2a,3a,4a}	(0.09) ^{1a,4a}	(0.05) ^{1a,4a}	(0.10) ^{1a,2a,3a}
Competence frustration	2.06	2.76	2.48	2.71
(1–5)	(0.05) ^{2a,3a,4a}	(0.09) ^{1a,3a}	(0.05) ^{1a,2c,4b}	(0.10) ^{1a,3b}
Relatedness frustration	1.71	2.59	2.04	2.05
(1–5)	(0.05) ^{2a,3a,4a}	(0.10) ^{1a,3a,4b}	(0.05) ^{1a,2a}	(0.09) ^{1a,2b}

Note: Numbers in superscript indicate significant group differences: ^a $p < .001$, ^b $p < .010$, ^c $p < .050$. Analyses were controlled for gender, grade, and teacher. Analyses controlled for guiding, clarifying, demanding, and domineering approaches in low directiveness.

chaos” profile scoring significantly higher on each need satisfaction than the “moderate autonomy support-low chaos” profile and the “low autonomy support-moderate chaos” profile with the latter having the lowest levels of autonomy, competence, and relatedness satisfaction. Concerning autonomy frustration, the “very high autonomy support-very low chaos” profile reported the lowest values, whereas the “low autonomy support-moderate chaos” profile showed the highest. No differences were found between “high autonomy support-high chaos” and “moderate autonomy support-low chaos” profiles. For competence frustration, the “very high autonomy support-very low chaos” profile reported the lowest values while the “high autonomy support-high chaos” profile and the “low autonomy support-moderate chaos” profile showed the highest scores. Finally, the “very high autonomy support-very low chaos” profile reported the lowest values for relatedness frustration, while the “high autonomy support-high chaos” profile showed the highest. No differences were found between “moderate autonomy support-low chaos” and “low autonomy support-moderate chaos” profiles.

4. Discussion

A small body of person-centered research in PE (Burgueño et al., 2022; García-González et al., 2023; Haerens et al., 2018; Leo, Pulido, et al., 2022), suggests that students can simultaneously perceive their PE teacher to provide directions combining a structured and controlling way (i.e., high directiveness). Similarly, it can be assumed that teachers can be perceived as combining autonomy-supportive and chaotic approaches (i.e., low directiveness) when providing students with opportunities to lead learning interactions or take initiative. The present study aimed to contribute to this literature by examining students’ perceptions of different combinations of high teacher directiveness (i.e., structuring and controlling approaches) and low (i.e., autonomy-supportive and chaotic approaches) (first aim) and investigate how these profiles differ in their need-based experiences in PE lessons (second aim).

4.1. High directiveness profiles and students’ need-based experiences

The results for the first aim indicated that PE teachers’ (de-)motivating teaching styles were best fit with four-profile solutions based on varying levels of high and low teacher directiveness respectively. The four high directiveness profiles showed that according to the students in this sample, PE teachers combine both high directive styles in their lessons, but with distinct levels of use (i.e., both very high, both high, both moderate, or both low). Theoretically, a highly structuring with lowly controlling profile would be expected to emerge and be considered the best in terms of need-based experience. Yet in the current study, we did not find such a profile given the high averages of perceived controlling teaching. Students did not perceive their PE teachers as combining “high structure-low control” or “low structure-high control” as prior research had shown (García-González et al., 2023). The retained profiles are therefore only partially in line with the study of García-González et al. (2023), who also showed that PE teachers may combine moderate levels of structure and control. In the eyes of students, it seems that PE teachers who put great emphasis on guiding the students’ progress and on transparently communicating their expectations, simultaneously, also use highly controlling behaviors such as using pressuring language and demanding students to behave in a prescribed manner. This might be attributed to certain lesson scenarios where teachers enforce discipline and display a firm demeanor to manage disruptive students effectively, thereby creating a conducive environment for other students to engage in lesson activities (Vansteenkiste et al., 2019). Likewise, although this only occurred less often, when PE teachers give less value to guiding learning and providing clear goals, it seems that they also become less demanding in their verbal and nonverbal language. That is, the level of structure and control seem to go hand-in-hand in PE teachers, especially for demanding approaches,

defining control. A theoretical explanation could be rooted in the concept of a “tunnel-perspective” which is often associated with control (Vansteenkiste et al., 2019). This occurs when the teacher initiates an interaction with instructions that gradually evolve into strict commands, all in an effort to prioritize their own agenda. Consequently, when PE teachers decide to take the leadership in the lesson, they have the potential to blend a style that incorporates both structuring and controlling strategies, adapting it according to the students’ characteristics and situational class circumstances because they are convinced this is needed to achieve an optimal classroom management.

Regarding the second aim of the study, when comparing the students’ need-based experiences between the four high-directiveness profiles, the results displayed that students who perceived teachers as being very structuring and controlling (i.e., the “very high structure-very high control” profile), reported the highest and lowest levels of autonomy, competence, and relatedness satisfaction and frustration, respectively. These results suggest that students triggered the most adaptive motivational outcomes when their PE teachers provided highly need-supportive guidance as frequently offering feedback, assistance and encouragement (i.e., guiding), along with providing helpful strategies for accomplishing tasks and communicating lesson goals and expectations (i.e., clarifying). Yet, contrary to the circumplex model tenets and prior SDT-based research in PE (Burgueño et al., 2024; Tilga et al., 2023; Wang et al., 2024; García-González et al., 2023) these positive associations were also found when teachers were simultaneously perceived as highly demanding or domineering. Such findings are in contrast with all prior research, for example Reynders et al. (2020) and Van Doren et al. (2024) showed that the addition of only controlling teaching practices was detrimental to students’ motivational processes. A potential explanation could be that the most positive findings in this group are due to the close alignment between high levels of structure and control. We have not found a group that is highly structuring and lowly controlling to compare the “very high structure-very high control” profile with. Another explanation may lie in the relationship and transfer existing between PE lessons and the sports context (Vallerand & Ratelle, 2002), in which players have the perception that control can be positive because at least the coach cares about their learning (Abós et al., 2021). So, it could be that students perceive that a high amount of directivity from their PE teachers is supportive for feeling their autonomy, competence and relatedness as satisfied, even though some amount of directivity comes from controlling in addition to structuring approaches.

Also surprising is that the “high structure-high control” profile displayed higher levels of autonomy frustration when compared to the “very high structure-very high control” profile. In this way, it seems that although the PE teacher’s control slightly decreases, if the structure also decreases, the students’ motivational process is negatively affected. More precisely, these results highlight that the presence of very high structure and control unexpectedly decreases autonomy frustration. A potential explanation could be found in the covariates of “very high structure-very high control” profile, which showed significantly higher values of autonomy-supportive approaches compared to “high structure-high control” profile (see Table 7, supplementary material).

In addition, a possible theoretical rationale for interpreting these findings could be that high teacher directiveness theoretically focuses on the need for competence. This is because clear instructions provide students with information about what exactly they have to do. Lastly, in accordance with prior based-SDT research (Haerens et al., 2018; Leo, Pulido, et al., 2022), students in a “low structure-low control” profile reported the lowest scores in each need satisfaction and the highest in the frustration of three needs. It appears that the overall perception of the absence of any form of guidance or directions from PE teachers, whether it is in terms of structuring or controlling, somewhat negatively impacts the need-based experiences of this group of students. In addition, if we compare this group of students with the group who perceived their PE teacher as “moderate structure-moderate control”, they

generally had a more maladaptive profile of need-based experiences. Although our findings suggest that it could be more beneficial for the PE teacher to adopt a teaching style that combines higher levels of directiveness, encompassing both structuring and controlling styles, rather than providing minimal directions or guidance, prior work has revealed contrasting findings. Specifically, [García-González et al. \(2023\)](#), [Reynders et al. \(2020\)](#), and [Van Doren et al. \(2024\)](#) observed that the addition of control from the teacher had a greater negative effect on the motivational process for students because the moderate presence of structure could not mitigate such detrimental effects.

4.2. Low directiveness profiles and students' need-based experiences

Results regarding low teacher directiveness profiles are more in line with previous SDT-based research in PE ([Burgueño et al., 2022](#); [Haerens et al., 2018](#); [Leo, Pulido, et al., 2022](#)). The profile characterized by “very high autonomy support-very low chaos” suggests that at least some students would barely perceived a chaotic style when they perceive very high levels of autonomy-supportive approaches from their PE teachers. Yet, this profile represents only one third of the students participating in this study (34.60 %). The above (not perceiving chaos) appeared to also be true for students perceiving their teacher as moderately autonomy supportive (i.e., “moderate autonomy support-low chaos” profile), which was the case in over four in ten students. Unlike previous research on PE ([Burgueño et al., 2022](#); [Leo, Pulido, et al., 2022](#)), the present study also displayed a profile characterized by “high autonomy support-high chaos”. This entails that this specific group of students (14.05 %) perceived their PE teachers as fostering an environment where they had an overwhelming amount of responsibility. A potential explanation could be that, although the PE teachers largely support the autonomy of the students, perhaps, if the students are not prepared to make many decisions about their learning, they may perceive support of their autonomy while simultaneously experiencing the involvement of the teacher as chaotic. This finding suggests that there may be some dependency between autonomy support and chaos, but to a lesser extent compared to high teacher directiveness, despite the average negative correlation between perceived autonomy support and chaos (see [Table 1](#)). The profiles characterized by “moderate autonomy support-low chaos”, and “low autonomy support-moderate chaos” are in line with previous studies in PE ([Burgueño et al., 2022](#); [Leo, Pulido, et al., 2022](#)) indicating profiles with a mix of (de-)motivating teaching styles. A possible explanation might be that in the profiles characterized by “moderate autonomy support-low chaos” and “low autonomy support-moderate chaos”, covariates based on high directiveness approaches (i.e., structure and control) played a more significant role in explaining student needs (see [Table 8, supplementary material](#)).

Regarding the comparisons of students' need-based experiences between low teacher directiveness profiles, similar to prior research in PE ([Burgueño et al., 2022](#); [Haerens et al., 2018](#); [Leo, Pulido, et al., 2022](#)), the results showed that students who perceived that their PE teachers as “very high autonomy support-very low chaos” displayed the most optimal pattern of need-based experiences. That is consistent with previous circumplex model research ([Diloy-Peña, García-González et al., 2024](#); [Tilga et al., 2023](#); [Van Doren et al., 2023](#); [Wang et al., 2024](#)), stating that autonomy support in the absence of chaos yields not only the highest need satisfaction level, but also the lowest need frustration. These findings suggest that when students perceived that they participate in making decisions (i.e., participative) and find explanations and reasons behind what they do in class (i.e., attuning), without feeling that they lose control of the activity and learning (i.e., chaos), they may develop a more adaptive motivational process. Instead, similar to SDT-based research in PE ([Burgueño et al., 2022](#); [Leo, Pulido, et al., 2022](#)), the group that perceived their PE teachers as “low autonomy support-moderate chaos” showed an opposite pattern, displaying the lowest need-satisfaction values and the highest need frustration. These results underpin SDT tenets on the bright and dark pathways, suggesting

that when PE teachers predominantly use a chaotic style, despite students having the opportunity to make decisions, they may not have sufficient resources to do so (i.e., less autonomy satisfaction and more autonomy frustration) and may be unable to deal with the objective of the task (i.e., less competence satisfaction and more competence frustration).

The group who perceived their PE teachers as “high autonomy support-high chaos” showed higher scores in the satisfaction of the three needs and in the frustration of competence and relatedness, when compared to the “moderate autonomy support-low chaos”. These findings potentially indicate the activation of two distinct pathways (i.e., bright and dark) within this “high autonomy support-high chaos” profile. The first pathway leads to positive outcomes, including increased satisfaction in autonomy, competence, and relatedness, which can be attributed to the higher presence of autonomy support. Conversely, the second pathway leads to negative outcomes, such as higher competence and relatedness frustration, stemming from the high presence of chaos ([Haerens et al., 2022](#)). In this sense, the comparison between these two profiles seems to indicate that, at similar levels of autonomy support (i.e., high vs. moderate), any addition of chaos (i.e., high vs. low) is definitely negative for the students' motivational process. This implies that while PE teachers may allow students to make decisions and care about their interests enabling need satisfaction ([Vasconcellos et al., 2020](#)), if they simultaneously give excessive responsibility to their students without resources (i.e., abandoning) and do not plan the task and the aim of the lessons (i.e., awaiting), students would also feel greater need frustration, which may trigger maladaptive outcomes (i.e., amotivation, oppositional defiance, among others) ([Diloy-Peña, Abós et al., 2024](#); [Tilga et al., 2023](#); [Van Doren et al., 2023, 2024](#)). The group who perceived their PE teachers as “moderate autonomy support-low chaos” reported moderated levels of each need frustration, while their feelings of need satisfaction were to some degree safeguarded compared to the profile with “low autonomy support-moderate chaos”. This would imply that a reduction in the perception of teacher-provided autonomy support, as well as a decrease in chaos compared to the profiles characterized by high autonomy support, has a certain motivational cost, leading to a moderate increase in need frustration for this group of students. This suggests that a progressive reduction in perceived teacher-provided autonomy support, irrespective of perceived chaos, involves in an increased motivational effects for this student group, namely, lower level of need satisfaction and higher levels of autonomy frustration. Overall, it seems crucial to reinforce the idea that the way in which the PE teacher allocate opportunities for students to take initiative in the classroom matters as students' need-based experiences fluctuate according to their perceptions of autonomy support from their PE teachers.

4.3. Limitations and future directions

The current study has its own limitations. First, our findings are based on a cross-sectional design. While this approach provides a snapshot of several combinations of low and high teachers' directiveness in PE lessons, it does not allow for establishing causal relationships between teaching profiles and need-based experiences. Therefore, longitudinal or experimental research is required to explore the dynamic interplay between varying levels of teacher directiveness and students' learning-related outcomes in the PE lessons. Second, we relied on self-reported data from students that can be influenced by self-reported bias and social desirability. Thus, future studies are needed to complement the self-reports with additional tools (i.e., observations by external researchers, and teachers' perceptions of their own teaching approaches) for optimizing data triangulation. Third, we used a purposive sampling method for the participants' recruitment and selection processes, suggesting that the obtained results should be interpreted with caution. Further studies should consider samples of PE students with more heterogeneous characteristics based on their school level (i.e., primary school), type of school (i.e., private), or social, economic and

cultural background. Fourth, consistent with previous research using the SIS-PE questionnaire with secondary school students in PE (Burgueño et al., 2024), this study found relatively low reliability scores for the demanding and domineering approaches. While our values exceeded 0.50 McDonald's omega, indicating a fair level of reliability for these two controlling approaches (Cicchetti, 1994, p. 286), they should still be interpreted with caution. Finally, we only deemed need-based experiences as outcome variables. There is a need for additional research to examine the relationships between different high and low teacher directiveness profiles with a myriad of students' other motivational, behavioral and learning-related outcomes in the PE lesson.

5. Conclusions

Different profiles with distinct combinations of structuring and controlling approaches, and autonomy supportive and chaotic approaches were found in respectively high and low directive teachers. Regarding high directiveness, it is relevant to highlight that students who perceived their PE teachers as highly structuring also perceived the teacher to be highly controlling, and vice versa. Thus, it seems that control and structure go hand-in-hand in the eyes of the students. Teacher training should enable teachers to be able to provide structure without being controlling, which would enhance the students' motivational process. Concerning low directiveness, it seems that teachers can be highly autonomy-supportive without providing chaos, which was also the most optimal pattern for students' needs. In this direction, teacher training should focus on the importance of providing autonomy support without chaos, which is a challenge that can greatly improve the students' motivational process.

CRedit authorship contribution statement

Sergio Diloy-Peña: Writing – review & editing, Writing – original draft, Formal analysis. **Luis García-González:** Writing – review & editing, Methodology, Conceptualization. **Leen Haerens:** Writing – review & editing, Methodology, Conceptualization. **Katrien De Cocker:** Writing – review & editing, Methodology, Conceptualization. **Rafael Burgueño:** Writing – review & editing, Writing – original draft, Formal analysis. **Ángel Abós:** Writing – review & editing, Supervision, Formal analysis.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tate.2025.105003>.

Data availability

The data that has been used is confidential.

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