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The role of teachers (de-)motivational styles on students' autonomous motivation in physical education and leisure time

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Abstract

Introduction: The aim of this research was to examine the relationships of four perceived teaching styles (i.e., autonomy support, structure, control, and chaos) of physical education (PE) teachers with students' satisfaction of psychological needs as well as autonomous and controlled motivation towards physical activity in PE and leisure time context. **Materials and Methods:** 320 students (166 boys and 154 girls) aged from 12 to 18 years old ($M = 14.13$, $SD = 1.6$) participated in the study. In this cross-sectional study, participants filled in a questionnaire of study variables. A variance-based structural equation model was employed to test the study hypotheses. **Results:** Autonomy support is indirectly related to students' autonomous motivation towards physical activity in leisure time via satisfaction of a psychological need and autonomous motivation for PE ($\beta = 0.18$, $p < 0.01$). Structuring the teaching style is indirectly related to students' autonomous motivation towards physical activity in leisure time via satisfaction of a psychological need and autonomous motivation for PE ($\beta = 0.21$, $p < 0.01$). **Conclusions:** When a PE teacher employs an autonomy-supportive and structuring teaching style, it is likely to satisfy students' psychological needs and increase autonomous motivation towards physical activity in PE, which, in turn, may enhance autonomous motivation towards physical activity during leisure time.

Keywords

autonomy support, structure, chaos, controlled behavior, basic psychological needs, motivation, physical education, leisure time, adolescents, self-determination theory.

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Article

The role of teachers (de-)motivational styles on students' autonomous motivation in physical education and leisure time

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Abstract: Introduction: The aim of this research was to examine the relationships of four perceived teaching styles (i.e., autonomy support, structure, control, and chaos) of physical education (PE) teachers with students' satisfaction of psychological needs as well as autonomous and controlled motivation towards physical activity in PE and leisure time context. Materials and Methods: 320 students (166 boys and 154 girls) aged from 12 to 18 years old ($M = 14.13$, $SD = 1.6$) participated in the study. In this cross-sectional study, participants filled in a questionnaire of study variables. A variance-based structural equation model was employed to test the study hypotheses. Results: Autonomy support is indirectly related to students' autonomous motivation towards physical activity in leisure time via satisfaction of a psychological need and autonomous motivation for PE ($\beta = 0.18$, $p < 0.01$). Structuring the teaching style is indirectly related to students' autonomous motivation towards physical activity in leisure time via satisfaction of a psychological need and autonomous motivation for PE ($\beta = 0.21$, $p < 0.01$). Conclusions: When a PE teacher employs an autonomy-supportive and structuring teaching style, it is likely to satisfy students' psychological needs and increase autonomous motivation towards physical activity in PE, which, in turn, may enhance autonomous motivation towards physical activity during leisure time.

Keywords: autonomy support, structure, chaos, controlled behavior, basic psychological needs, motivation, physical education, leisure time, adolescents, self-determination theory.

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1. Introduction

In physical education (PE), the Self-Determination Theory [SDT; 1–2] has gained wide-spread use as a motivation theory. According to this theory, motivation is determined by the satisfaction of basic psychological needs for autonomy (i.e., to feel self-determined in one's actions rather than feel being controlled), competence (i.e., to feel competent in interactions with the environment and experience opportunities in which to express one's capabilities), and relatedness (i.e., to feel a secure sense of belongingness and connectedness to others). Based on SDT, every individual strives to have their three basic psychological needs satisfied [3]. Previous studies have shown that satisfying these basic needs is associated with various adaptive outcomes such as engagement and well-being, while thwarting these needs may lead to feelings of discomfort and mental disorders [2, 4, 5, 6].

Individuals participate in activities for various reasons, driven by factors such as personal desire, a sense of achievement, or external rewards. In other words, different forms of motivation may drive individuals' actions. According to SDT [3], there are intrinsic and extrinsic forms of motivation. Intrinsic motivation is associated with engaging in activities

for the sake of the activities themselves which provide interest, pleasure, and satisfaction [3]. Intrinsically motivated students enjoy physical activity due to their personal desire and the joy derived from the activity, which may lead to an active lifestyle. Recent studies have shown that the autonomy-supportive behavior of PE teacher is related to students' intrinsic motivation [7], and intrinsic values [8,9]. Extrinsic motivation is further divided into four regulations: external regulation, introjected regulation, identified regulation, and integrated regulation. External regulation is driven by various forms of recognition, such as receiving an award (diploma, medal), praise from the teacher, or a fear of punishment. With introjected regulation, students perform activities to avoid negative emotions and consequences. For example, a student may engage in PE solely to prevent feelings of guilt that may arise if they do not participate. In identified regulation, students perform activities to achieve specific results. For instance, a student may participate in a PE class to do well but may not enjoy the process. In integrated regulation, students engage in activities because they hold personal importance. For example, a student may participate in PE because they enjoy the class [10]. Recent studies have shown that the controlling behavior of a PE teacher is related to students' extrinsic types of, or in other words, controlled forms of motivation [11–14].

Teachers play a crucial role in forming students' motivation to learn and their overall development [15]. In this process, the motivational style of teachers is particularly important [16]. When a teacher's motivational style is well-structured and supports student autonomy, it is associated with positive learning outcomes such as intrinsic motivation, engagement, learning, and overall well-being [17, 18]. Conversely, a controlled teaching style is linked to a wide range of negative learning outcomes [19,20]. It is possible to further train teachers to adopt an autonomy-supportive style [21–24] with long-term effects [25], which benefits both students and the teacher themselves [26, 27]. Although teachers generally believe that an autonomy-supportive teaching style is beneficial for students' sustainable motivation, engagement, and learning, they might fear that too much independence may undermine structure and lead to demotivating chaos [28, 29]. At the same time, teachers sometimes express uncertainty about whether excessive structure may lead to demotivating control.

A recently published study proposed a comprehensive model addressing teacher behavior of autonomy-supportive, structuring, chaotic and controlled styles [30]. A study was recently conducted by Escriva-Boulley et al. [31], with the primary goal of adapting the Situations-in-School Questionnaire (SIS) in the context of PE. The objective was to investigate the relationships between the four teaching styles (including eight subcategories) and how they relate to the satisfaction of adolescents' psychological needs. It was found that autonomy-supportive and structuring behaviors are associated with need satisfaction, while controlling and chaotic behaviors are related to the thwarting of needs [31]. The study revealed that PE teachers' experience of autonomous motivation (i.e., intrinsic motivation and identified regulation) is associated with autonomy-supportive and structuring behavior. On the other hand, it was found that PE teachers' experience of controlled motivation is related to controlling teaching styles and three out of four subcategories of needs-thwarting styles, including dominating, demanding, and abandoning styles. The current study adds by further investigating the role of (de-)motivational styles from teachers in students' motivation towards physical activity in PE and leisure time contexts via satisfaction of psychological needs in PE.

The aim of this research was to examine the relationships of the four broadly-perceived teaching styles (i.e., autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style) of physical education (PE) teachers with students' satisfaction of basic psychological needs as well as autonomous and controlled motivation towards physical activity in PE and leisure time contexts. Based on the aim of this study, four specific aims are proposed:

(1) To examine the role of autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style from teachers in satisfaction of students' basic psychological needs in PE.

(2) To examine the role of students' basic psychological needs satisfaction in their autonomous and controlled motivation in PE.

(3) To examine the role of students' autonomous and controlled motivation in PE in their autonomous and controlled motivation towards physical activity in leisure time.

(4) To examine the indirect effects of perceived autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style on students' autonomous and controlled motivation towards physical activity in leisure time via satisfaction of basic psychological needs and students' autonomous and controlled motivation in PE.

2. Materials and methods

A total of 320 students (166 boys and 154 girls) participated in the study. The students were aged between 12 and 18 years ($M = 14.13$; $SD = 1.6$). All participants were invited to the study on a voluntary basis. Prior to the study, a brief overview of the research objectives was sent to the school administrations, detailing the goals of the study. The students were informed about the objectives of the study, a voluntary nature of their involvement, and a possibility to withdraw from the study at any time. The students and their legal representatives signed an informed consent form.

The University of Tartu's Research Ethics Committee granted permission for the study, under approval number 332/T-28, issued on December 21, 2020.

2.1. Measures

2.1.1. Perceived teachers' teaching styles

Perceived autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style of PE teacher's behavior was evaluated by using an adapted version of Situations-in-School Questionnaire developed by Aelterman et al. [30]. This questionnaire presents 15 situations alongside with four different reactions to each situation (i.e., in total 60) that commonly occur in a PE class. Each presented situation corresponds to one of the four teaching styles (i.e., autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style), each of which, in turn, is divided into two teaching approaches (i.e., in total eight teaching approaches). Students were asked to indicate the extent to which each response reflects their PE teacher's way of teaching on a 7-point Likert scale ranging from one "does not describe my PE teacher at all" to seven "describes my PE teacher extremely well". This questionnaire has been previously used in the Estonian context by Diloy et al. [32].

2.1.2. Satisfaction of students' basic psychological needs

Satisfaction of the students' basic psychological needs was assessed using the Basic Psychological Need Satisfaction and Need Frustration scale [33], adapted to the context of PE [20]. Participants were asked to provide ratings on a Likert-type 7-point scale: from '1 – strongly disagree' to '7 – strongly agree'. Each subscale consisted of four items and was presented with a common stem ("During a PE lesson...") followed by the items of respective subscales: need satisfaction for autonomy (e.g., "...I felt that the exercises reflect what I really want"), competence (e.g., "...I felt capable at what I did"), and relatedness (e.g., "...I felt that the class members I care about also cared about me"). This questionnaire has been previously used in the Estonian context [34–37].

2.1.3. Students' motivation in physical education classes

To assess students' motivation in PE, the Perceived Locus of Causality Questionnaire [38] was used. Participants were required to provide ratings on a 7-point Likert-type scale:

from '1 – strongly disagree' to '7 – strongly agree'. All statements began with the stem: "I do PE...", followed by various statements: external regulation (e.g., "... so that the teacher won't yell at me"), introjected regulation (e.g., "... because I would feel bad if the teacher thought that I was not good at PE"), identified regulation (e.g., "...because it is important to me to do well in PE"), and intrinsic motivation (e.g., "... because PE is fun"). Previous research has demonstrated the questionnaire's validity and reliability (Standage et al., 2012), and it has been previously used among Estonian students [39–40].

2.1.4. Students' motivation towards physical activity during leisure time

To assess students' motivation for physical activity during leisure time, the Perceived Locus of Causality Questionnaire for Leisure-Time [41] was used. Participants were required to provide ratings on a 7-point Likert-type scale: from '1 – strongly disagree' to '7 – strongly agree'. All statements began with the stem: "I do physical activity during my free time...", followed by various statements: intrinsic motivation (e.g., "...because I enjoy doing physical activity"), identified regulation (e.g., "...because I value the benefits of physical activity"), introjected regulation (e.g., "...because I feel bad about myself if I don't do physical activity"), and external regulation (e.g., "...because I feel under pressure from people I know to do physical activity"). Previous research has demonstrated the questionnaire's validity and reliability [42], and it has been previously used involving Estonian school students [43–45].

2.2. Statistical analysis of data

For the analysis of data in the present study, IBM SPSS 26 software was used. First, data normality was assessed, wherein skewness values must fall within the range of -2 to +2, and kurtosis values must fall within the range of -7 to +7 [46]. The reliability of the employed questionnaires was checked based on Cronbach's alpha. Spearman's correlation analysis was used to assess the relationships between variables. A statistical significance level of $p < 0.05$ was adopted.

The study model was tested using variance-based structural equation modeling (VB-SEM), also known as Partial Least Squares (PLS) analysis, employing Warp PLS v7.0 software [47]. VB-SEM is a distribution-free analytical method that has been utilized in previous studies, demonstrating that model complexity, abnormality, and smaller sample sizes have less impact on research findings [48]. In the VB-SEM analysis, several criteria were assessed: Goodness of Fit (GoF) values for model fit with small ≥ 0.100 , medium ≥ 0.250 , and large ≥ 0.360 [49], Average Variance Inflation Factor (AVIF) values for model parameters, which are expected to be below 5000 [47], Average Path Coefficient (APC), and Average R² (ARS), which are anticipated to be significantly different from zero.

3. Results

3.1. Descriptive statistics and internal reliability coefficients

Table 1 presents the mean values, standard deviations, and normal distribution of the study variables, based on the values of the skewness and kurtosis coefficients. Additionally, the internal reliability coefficients for all subscales of the questionnaire employed in this research are also provided.

Table 1. Descriptive statistics of study variables.

Variable	M ± SD	Skewness	Kurtosis	Cronbach α
Autonomy-supportive teaching style	4.39 ± 1.24	-0.31	-0.39	0.91
Structuring teaching style	4.99 ± 1.08	-0.58	0.18	0.92
Controlling teaching style	4.01 ± 1.22	-0.03	-0.61	0.91
Chaotic teaching style	4.58 ± 1.80	0.32	-0.09	0.89
Basic psychological needs satisfaction	4.70 ± 1.31	-0.59	0.31	0.94
Autonomous motivation in PE	4.99 ± 1.58	-0.75	0.05	0.90

Variable	M ± SD	Skewness	Kurtosis	Cronbach α
Autonomous motivation in LT	4.07 ± 1.36	-0.69	-0.08	0.90
Controlled motivation in PE	5.02 ± 1.54	-0.04	-0.23	0.64
Controlled motivation in LT	3.90 ± 1.48	-0.14	-0.74	0.76

Note. PE – physical education, LT – leisure time.

In all study variables, the skewness values fall between -2 to +2, and the kurtosis values fall between -7 to +7. Consequently, all study variables are within an acceptable range concerning normal distribution. The questionnaires can be considered reliable as the Cronbach’s alpha values for the variables are above the acceptable level of 0.7. The controlled motivation in PE questionnaire yielded a Cronbach’s alpha result of 0.64, which is within the acceptable range of 0.6 to 0.7 [50].

3.2. Correlations among study variables

Table 2 presents the correlational relationships between the study variables.

Table 2. Correlational relationships between the study variables.

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Autonomy-supportive teaching style								
2. Structuring teaching style	.85**							
3. Controlling teaching style	.13*	.13*						
4. Chaotic teaching style	.23**	.07	.48**					
5. Basic psychological needs satisfaction	.67**	.71**	.17**	.14*				
6. Autonomous motivation in PE	.53**	.62**	.21**	.05	.74**			
7. Autonomous motivation in LT	.40**	.48**	.22**	.04	.65**	.67**		
8. Controlled motivation in PE	.01	.01	.45**	.38**	.04	.12**	.00	
9. Controlled motivation in LT	.14**	.04	.44**	.31**	.17**	.20**	.34**	.33**

Note. PE – physical education; LT – leisure time; *p < 0.05; **p < 0.01

3.3. Results of the variance-based structural equation modeling

The results of the variance-based structural model are presented in Figure 1. The fit indices for the variance-based structural model are at a very good level: APC = 0.374, $p < 0.001$; ARS = 0.534, $p < 0.001$; AVIF = 2.698; GoF = 0.731.

Figure 1 also presents the direct relationships in the model. The results showed that autonomy-supportive teaching style ($\beta = 0.34, p < 0.01$) and structuring teaching style ($\beta = 0.40, p < 0.01$) were statistically significantly associated with the satisfaction of psychological needs. Satisfaction of psychological needs was statistically significantly associated with autonomous motivation in PE ($\beta = 0.78, p < 0.001$). Autonomous motivation in PE was statistically significantly associated with autonomous motivation during leisure time ($\beta = 0.68, p < 0.001$) and controlled motivation during leisure time ($\beta = 0.26, p < 0.01$). Perceived controlling teaching style was statistically significantly associated with controlled motivation in PE ($\beta = 0.43, p < 0.01$). The results demonstrated that autonomy-supportive teaching style is directly related to autonomous motivation in PE ($\beta = 0.26, p < 0.01$). Structuring teaching style is directly related to autonomous motivation in physical education ($\beta = 0.32, p < 0.01$).

The results indicated that perceived autonomy-supportive teaching style is indirectly related to students’ autonomous motivation towards physical activity in leisure time via basic psychological need satisfaction and autonomous motivation in PE ($\beta = 0.18, p < 0.01$). Perceived structuring teaching style is indirectly related to students’ autonomous motivation in leisure time via basic psychological need satisfaction and autonomous motivation in PE ($\beta = 0.21, p < 0.01$). The model explained 46% and 7% of variance in autonomous motivation and controlled motivation towards physical activity in leisure time, respectively.

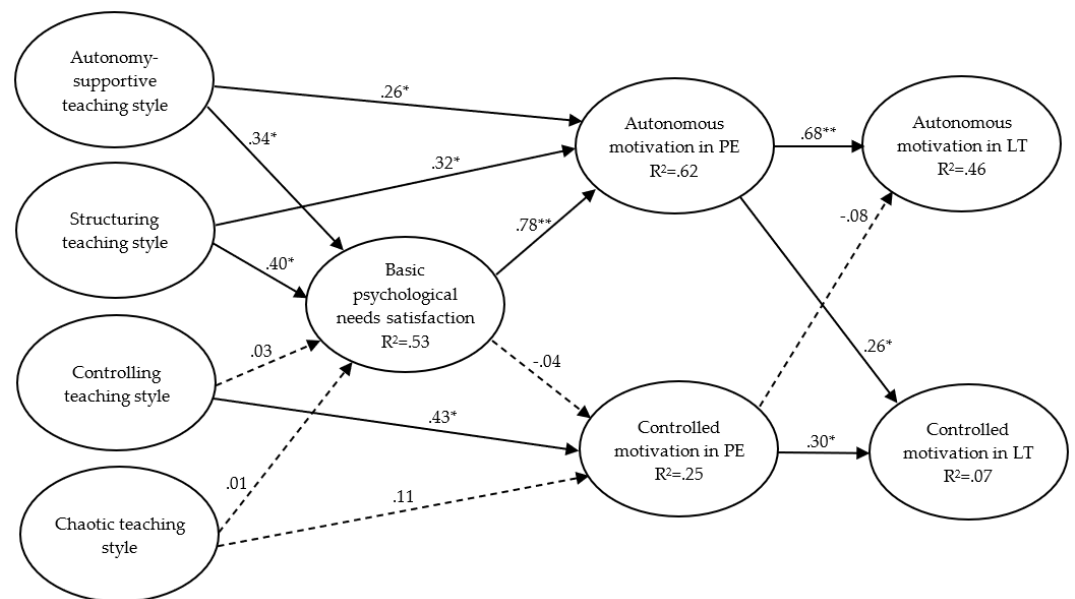


Figure 1. The structural model measuring the relationships of students' perceived autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style to autonomous motivation and controlled motivation towards physical activity in LT via the sequence of basic psychological need satisfaction, autonomous motivation in PE and controlled motivation in PE.

Note. Statistically non-significant direct relationships are presented in the figure with dashed lines; statistically significant direct relationships are presented in the figure with solid lines; PE – physical education; LT – leisure-time; R² – explained variance; * $p < 0.01$; ** $p < 0.001$.

4. Discussion

The aim of this study was to examine how PE teachers' autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style are related to students' basic psychological needs satisfaction, students' autonomous and controlled motivation in PE as well as in the leisure time context. Based on the aim of the study, four research questions were examined.

Firstly, we aimed to examine the role of perceived autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style from PE teachers in satisfaction of students' basic psychological needs. As expected, we found that perceived autonomy-supportive teaching style predicts satisfaction of students' basic psychological needs, a finding similar to previous studies [20, 36]. In other words, when students experience that PE teacher offers them choices and opportunities (i.e., provides autonomy support), then it is likely that the students also perceive the activities they do in PE fit their interests (i.e., psychological need for autonomy is satisfied). We also found that perceived structuring style predicts satisfaction of students' basic psychological needs, which is also in line with previous studies [51]. In other words, when students experience that PE teacher provides them with assignments suitable to the level of their abilities to facilitate their perceived competence in classroom (i.e., structuring behavior), then it is more likely that students feel that they perform activities in PE effectively (i.e., the psychological need for competence is satisfied). In this study, perceived chaos and controlling teaching style did not predict satisfaction of students' basic psychological needs in PE. The possible reason for this might be that chaos and controlling styles are related to students' outcomes via separate pathways, specifically, via basic psychological need frustration. In previous studies, it has been found that autonomy support is only related to satisfaction of basic psychological needs, and controlling behavior is only related to basic psychological needs frustration and not vice versa [20, 36]. However, there is also research demonstrating that perceived controlling behaviors could negatively and

significantly predict satisfaction of basic psychological need among adolescents [52]. Future studies should test how chaos and controlling styles covered in this circumplex approach to the (de)motivating teaching styles, proposed by Aelterman et al. [30], predict students' basic psychological needs frustration in PE.

Secondly, we aimed to examine the role of satisfaction of students' basic psychological needs on their autonomous and controlled motivation in PE. As expected, we found that satisfaction of students' basic psychological needs predicted their autonomous motivation in PE, a finding similar to previous studies [20, 36, 53]. In other words, when students experience a sense of choice and freedom in the things they undertake in PE (i.e., autonomy need satisfaction), confident that they could do the exercises well (i.e., competence need satisfaction) and experienced warm feelings from other class members they spend time with (i.e., relatedness need satisfaction), then students are most likely to do PE because they feel that PE is fun and they value that it is important for them to do well in PE. However, students' basic psychological needs satisfaction did not predict their controlled motivation in PE. A possible reason for this might be that basic psychological needs frustration, but not basic psychological needs satisfaction, is a more proximal predictor of controlled motivation in PE as both of these represent 'the dark side' of students' psychological experiences.

Thirdly, we aimed to examine the role of students' autonomous and controlled motivation in PE in their autonomous and controlled motivation towards physical activity in leisure time. We found that students' experiences of autonomous motivation in PE lessons strongly predicted their experiences of autonomous motivation towards physical activity in leisure time. This finding is similar with previous studies [54–55] indicating that experiences of motivation in one context may transfer to experiences of motivation to another context. In other words, when students experience that they do PE because they enjoy it, then these students are most likely to be physically active in leisure time because they find physical activity fun. This is in line with the tenets of the trans-contextual model of motivation [55], namely that autonomous motivation in one context is likely to transfer to autonomous motivation in another context. We also found that students' experiences of autonomous motivation in PE predicted their experiences of controlled motivation in leisure time; however, this association was clearly much weaker compared to relationship between autonomous motivation in PE and autonomous motivation in leisure time. This finding is partly supported by previous research in which it was found that 'bright' experiences of need satisfaction positively predicted controlled motivation [37].

Fourthly, we aimed to examine the indirect effects of perceived autonomy-supportive teaching style, structuring teaching style, controlling teaching style, and chaotic teaching style on students' autonomous and controlled motivation towards physical activity in leisure time via the sequence of basic psychological needs satisfaction and students' autonomous and controlled motivation in PE. As expected, we found that perceived autonomy-supportive and structuring style predicted students' autonomous motivation towards physical activity in leisure time via basic psychological needs satisfaction and autonomous motivation in PE. This finding is in line with previous research in which it was found that perceived autonomy support predicts autonomous motivation in PE, which, in turn, predicts autonomous motivation in leisure time [39–40]. In other words, when students' experience that their PE teacher tries to identify their personal interests by engaging in a dialogue with them and inviting them to provide input and suggestions (i.e., the participative facet of autonomy support), accepts students' negative affect and tries to understand how students see things (i.e., the attuning facet of autonomy support), goes through the steps that are necessary to complete a task (i.e., the guiding facet of structure-behavior), and communicates expectations to students in a clear and transparent way (i.e., the clarifying facet of structure-behavior), then students are likely to enjoy doing physical activity during their free time. The possible mechanism behind this process is that students' basic psychological needs in PE are fulfilled, which, in turn, enables students to enjoy physical activities in a PE lesson. On the other hand, we did not find a relationship

between perceived chaos and controlling styles and students' leisure time autonomous motivation via satisfaction of basic psychological needs and autonomous motivation in PE. The possible reason for this might be that perceived chaos and controlling styles are likely to frustrate students' basic psychological needs [20–36]. However, in this study basic psychological need frustration of students was not measured.

Practical implications

In this study, perceived autonomy-supportive (i.e., participative and attuning), structuring (i.e., guiding and clarifying), chaotic (i.e., abandoning and awaiting) and controlling behavior (i.e., demanding and domineering) of PE teachers were measured. Considering the importance of all these behaviors and current findings, we suggest some specific implications for practicing PE teachers to promote autonomous motivation towards physical activity in PE and leisure time contexts in their students. First, PE teachers are encouraged to offer meaningful choices and nurture students' personal interests by making exercises more enjoyable (i.e., autonomy-supportive style). Participative and attuning forms of autonomy support have been related to students' experiences of basic psychological needs satisfaction in PE and may further enhance students' experiences of autonomous motivation in PE and leisure time. Secondly, PE teachers are recommended to nurture students' progress by providing help when needed and offer an overview of what students can expect from the lesson (i.e., structuring style). Guiding and clarifying forms structuring behavior may facilitate students' experiences of confidence and competence of achieving their goals and may enhance their feelings of enjoyment in PE. Thirdly, PE teachers should avoid giving up on students and letting things to take their course in lessons (i.e., chaotic style). Abandoning and awaiting forms of chaotic behaviors are possibly related to higher levels of controlled motivation in PE. Fourthly, PE teachers should reduce their using commanding language and suppressing students by including feelings of guilt and shame (i.e., controlling style). Demanding and domineering forms of controlling behaviors might further develop higher experiences of pressure in doing too many exercises and feelings of insecurity in students' abilities. Importantly, previous research has shown that higher levels of autonomy support do not dampen the negative effect of controlling behaviors [56]. Thus, it is important to focus on minimizing controlling behaviors.

Drawn from the above, PE teachers should be aware that students' perceptions of autonomy-supportive and structuring styles that they display in PE possibly have a positive effect on their students' autonomous motivation towards physical activity in both PE and leisure time contexts. The mechanism behind this relationship is that autonomy-supportive and structuring style is likely to fulfill students' basic psychological needs in PE lessons. More importantly, PE teachers should acknowledge that students' perceptions of chaotic and controlling styles in PE possibly have a positive effect on their students' controlled motivation in PE and leisure time. The possible mechanism behind this relationship is that perceived chaotic and controlling styles hinder students' basic psychological need satisfaction. Future research is recommended to implement need-supportive interventions in PE teachers training with the aim to enhance students' autonomous motivation towards physical activity in PE and leisure time contexts [57]. The reason for this is that the levels of physical activity among children is low [58], and such interventions might possibly increase the physical activity behavior of youngsters.

Limitations and future research

There are several limitations related to this research that should be acknowledged. Firstly, participants of the current research were recruited from a relatively narrow age-group (i.e., students aged from 12 to 18 years old). Future studies should aim to employ younger students to examine these study variables among younger age groups. Secondly, students of this study were from a single cultural group. Future studies are warranted to examine the equivalence of the tested model in other cultural groups. Thirdly, only a

cross-sectional data was collected in this study. Future studies are recommended to examine longitudinal processes among study variables in the tested model. Fourthly, students' experiences were examined only in relation to one social agent, i.e., their PE teacher. Future research could also include examining the role of parents in supporting their children's basic psychological needs and autonomous forms of motivation [59–60]. Finally, in future research, an online video annotation tool could be used for optimizing secondary teachers' motivating style [61].

5. Conclusions

In conclusion, current findings suggest that PE teachers should not only adopt the autonomy-supportive and structuring styles when teaching their students, but simultaneously they should also focus on minimizing their use of chaotic and controlling styles. Together, these adjustments to PE teacher behavior may enhance the potential for students' basic psychological needs to be fulfilled and, in turn, facilitate students' experiences of autonomous motivation towards physical activity in PE and leisure time.

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