

HOW DOES PERCEIVED AUTONOMY-SUPPORTIVE AND CONTROLLING BEHAVIOUR IN PHYSICAL EDUCATION RELATE TO ADOLESCENTS' LEISURE-TIME PHYSICAL ACTIVITY PARTICIPATION?

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Abstract:

In line with the tenets of self-determination theory, the current study tested associations of perceived autonomy-supportive and controlling behaviour of PE teachers with adolescents' leisure-time physical activity (LT PA) participation, and the role of need satisfaction and need frustration, autonomous motivation and controlled motivation in PE, and perceived effort towards LT PA as mediators of these associations. Adolescents (N=381) aged between 12 and 15 years completed self-reported measures of respective constructs. Results of the structural equation modelling demonstrated that perceived autonomy-supportive behaviour of PE teachers was related to adolescents' LT PA participation only via experiences of need satisfaction and autonomous motivation in PE, and perceived effort towards LT PA. Perceived controlling behaviour of PE teachers was found to be related to adolescents' LT PA participation only via experiences of need frustration and controlled motivation in PE, and perceived effort towards LT PA. The current study provided evidence that perceived autonomy-supportive behaviour and perceived controlling behaviour of PE teachers contributes to adolescents' LT PA participation through unique pathways. Findings highlight the facilitative role of autonomy-supportive behaviour of teachers in a PE context on adolescents' LT PA participation. In addition, the beneficial role of controlled motivation in PE, although instigated by students' perceptions of controlling behaviour of teachers and experiences of need frustration in PE, in adolescents' LT PA participation was supported.

Key words: *autonomy-supportive behaviour, controlling behaviour, psychological needs, autonomous motivation, controlled motivation, leisure-time physical activity*

Introduction

A considerable amount of evidence suggests that the level of subjectively and objectively measured physical activity (PA) is in constant decline among adolescents (Van Hecke, et al., 2016). Considering that low levels of PA are related to several health risks in adulthood (Janssen & LeBlanc, 2010), it is a public health priority to identify the antecedents of PA participation among adolescents. As adolescents spend majority of their daytime in school, it is potentially a forum in which young people can experience a variety of physical activities. More specifically, it is a physical education (PE) in which health-related messages can be communicated to adolescents (Shephard & Trudeau, 2000). As PE is a compulsory subject in school, PE teachers have a crucial role in favouring adolescents' health-related behaviour such as physical activity participation (Abildsnes, Stea, Berntsen, Omfjord, & Rohde,

2015; Gu & Zhang, 2016; Hagger, Biddle, Chow, Stambulova, & Kavussanu, 2003).

Previous research (e.g. Daley & Duda, 2006; Wilson, Rodgers, Fraser, & Murray, 2004) has highlighted the need to identify the motivation linked to PA participation. Self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2017) is a framework of humans' motivation that offers an explanatory mechanism between the antecedents of human behaviour (e.g. PA participation) and its motivational correlates. SDT (Ryan & Deci, 2017) distinguishes between autonomous (i.e. intrinsic motivation and identified regulation) and controlled (i.e. introjected and external regulation) forms of motivation. Based on SDT (Ryan & Deci, 2017), the antecedents of autonomous and controlled motivation are perceived autonomy-supportive and controlling behaviour, respectively. Previous research has found that perceived autonomy-supportive behav-

behaviour of PE teachers is related via satisfaction of psychological needs and intrinsic motivation to adolescents' daily moderate-to-vigorous physical activity (MVPA; Kalajas-Tilga, Koka, Hein, Tilga, & Raudsepp, 2020). On the contrary, research has demonstrated that perceived controlling behaviour of PE teachers is related via thwarting of psychological needs and external regulation to adolescents' objective MVPA (Koka, Tilga, Kalajas-Tilga, Hein, & Raudsepp, 2019). However, the amount of the variance in objective PA explained by motivational correlates in these studies was relatively low, ranging between 6% (Kalajas-Tilga, et al., 2020) and 14% (Koka, et al., 2019), suggesting that other possible factors determining PA have not been measured. Previous research has suggested that it might be perceived effort that is associated with students' motivational regulations and physical activity (e.g. Hagger, Chatzisarantis, Barkoukis, Wang, & Baranowski, 2005; Ntoumanis, 2001; Standage, Duda, & Ntoumanis, 2003). Based on this we assume that it might be perceived effort for leisure-time physical activity (LT PA) that provides the explanatory mechanism between different forms of motivation experienced in PE and LT PA participation among adolescents.

Another intriguing possibility is that autonomy-supportive and controlling behaviours might relate to adolescents' MVPA via separate pathways. This premise is based on previous findings indicating that autonomy-supportive and controlling behaviours relate to adolescents' health-related quality of life (HRQoL; Tilga, Hein, Koka, & Hagger, 2020), as well as to students' autonomous and controlled forms of motivation (Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015) via separate pathways (i.e. via need satisfaction and need frustration, respectively). The current study adds to the existent literature by investigating the specific role of autonomous and controlled forms of motivation in PE in adolescents' LT PA participation though the perceived effort towards LT PA. It is important to identify whether teachers should focus simultaneously on increasing autonomy-supportive behaviour and decreasing controlling behaviour in PE classes if the aim is to increase adolescents' LT PA participation. The current study aims to examine the specific pathways of perceived autonomy-supportive and controlling behaviour to adolescents' LT PA participation via experiences of psychological need satisfaction and need frustration, autonomous motivation and controlled motivation in PE, and effort towards LT PA. More specifically, we hypothesize that:

H1: Adolescents' perceived autonomy-supportive behaviour of their PE teacher is positively related to LT PA participation via experiences of need satisfaction in PE, autonomous motivation in PE, and adolescents' effort towards LT PA.

H2: The relationship between perceived autonomy-supportive behaviour and adolescents' LT PA participation is not mediated by experiences of need frustration in PE, controlled motivation in PE and adolescents' effort towards LT PA.

H3: Adolescents' perceived controlling behaviour of their PE teacher is negatively related to LT PA participation via experiences of need frustration in PE, controlled motivation in PE, and adolescents' effort towards LT PA.

H4: The relationship between perceived controlling behaviour and adolescents' LT PA participation is not mediated by experiences of need satisfaction in PE, autonomous motivation in PE and adolescents' effort towards LT PA.

Methods

Participants and procedure

Participants were 381 secondary school students (157 boys and 224 girls) aged between 12 and 15 years ($M_{age}=13.64$; $SD=1.19$). The participants were randomly selected from different schools in Estonia. Information regarding this survey was provided to adolescents by their class teachers. The questionnaires were administrated online and designed that adolescents had to fill in all the items. The local ethical committee approved this study.

Measures

Perceived autonomy-supportive behaviour. Adolescents' self-reported autonomy-supportive behaviour of their PE teacher was measured using the *Multidimensional Perceived Autonomy Support Scale for Physical Education* (MD-PASS-PE; Tilga, Hein, & Koka, 2017). Adolescents were presented with a common stem: "My PE teacher ...", followed by the items tapping three dimensions: organisational autonomy support (e.g. "... accepts different solutions in learning of exercises"), procedural autonomy support (e.g. "... guides students in finding solutions"), and cognitive autonomy support (e.g. "... allows me to express my opinion"). Each subscale comprised five items with responses provided on seven-point scales ranging from one (*strongly disagree*) to seven (*strongly agree*). Previous research has supported the reliability and factor structure of the current measure (Burgueño, Macarro-Moreno, & Medina-Casabón, 2020; Tilga, et al., 2020; Zimmermann, Tilga, Bachner, & Demetriou, 2020).

Perceived controlling behaviour. Adolescents' self-reported controlling behaviour of their PE teacher was measured using an adapted version (Hein, Koka, & Hagger, 2015) of the multidimensional *Controlling Coach Behaviours Scale* (CCBS; Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010). Adolescents were presented with a common stem: "My PE teacher ...", followed by the items

tapping three subscales: negative conditional regard (e.g. “... is less friendly with me if I don’t make the effort to see things his/her way”), intimidation (e.g. “... shouts at me in front of others to make me comply”), and the controlling use of grades (e.g. “... promises to give me a good grade if I do well”). Each subscale comprised three items with responses provided on seven-point scales ranging from 1 (*strongly disagree*) to seven (*strongly agree*). Previous research has supported the reliability and factor structure of the current measure (Hein, Emeljanovas, & Mieziene, 2018; Koka, Tilga, Kalajas-Tilga, Hein, & Raudsepp, 2020).

Perceived need satisfaction and need frustration. Adolescents’ self-reported need satisfaction and need frustration in PE were measured by the *Basic Psychological Need Satisfaction and Need Frustration Scale* (BPNSNF; Chen, et al., 2015) adapted for the PE context (Haerens, et al., 2015). Adolescents were presented with a common stem: “During the PE lesson ...”, followed by the items tapping six subscales: need satisfaction for autonomy (e.g. “... I felt like what we have been doing during the lesson really interests me”), competence (e.g. “... I felt I could successfully complete difficult tasks”), and relatedness (e.g. “... I experienced a warm feeling with the class members I spend time with”), and need frustration for autonomy (e.g. “... I felt obligated to do certain things”), competence (e.g. “... I felt like a failure because of the mistakes I made”), and relatedness (e.g. “... I felt the relationships I had with class members were just superficial”). Each subscale comprised four items with responses provided on seven-point scales ranging from one (*strongly disagree*) to seven (*strongly agree*). Previous research has supported the reliability and factor structure of the current measure (Tilga, et al., 2020).

Perceived autonomous and controlled motivation. Adolescents’ self-reported autonomous and controlled motivation in PE were measured by using the *Perceived Locus of Causality Questionnaire* (PLOCQ; Goudas, Biddle, & Fox, 1994). Adolescents were presented with a common stem: “During the PE lesson ...”, followed by the items tapping four subscales: intrinsic motivation (e.g. “... because I enjoy PE”), identified (e.g. “... because it’s important to me to improve”), introjected (e.g. “... I will feel bad about myself if I don’t”), and external regulation (e.g. “... because I must do it; it’s the rule”). Each subscale comprised four items with responses provided on seven-point scales ranging from one (*strongly disagree*) to seven (*strongly agree*). Previous research has supported the reliability and factor structure of the current measure (Kalajas-Tilga, et al., 2020).

Perceived effort. Adolescents’ self-reported effort (Hagger & Hamilton, 2018) adapted to LT PA participation context (Polet, et al., 2019) was meas-

ured on two items (e.g. “During the last five weeks, how hard did you try to be physically active?”). Responses were made on seven-point scales ranging from one (*did not try at all*) to seven (*tried extremely hard*). Previous research has supported the reliability and factor structure of the adolescents’ self-reported effort measure (Hagger & Hamilton, 2019).

Leisure-time physical activity. *Leisure-time Exercise Questionnaire* (LTEQ; Godin & Shepard, 1985) was used to measure adolescents’ LT PA participation by two items. An example item is “In the course of the past five weeks, how often on average, have you participated in moderate to vigorous physical activities during your leisure time for at least 20 minutes at a time?” Responses were made on seven-point scales ranging from one (*not at all*) to seven (*most of the time*). Previous research has supported the reliability and factor structure of the current measure (Hagger, et al., 2005).

Data analysis

The SPSS Statistics version 23.0 and SPSS AMOS version 23.0 statistical packages were used for statistical analyses. First, we screened data for outliers, examined the distribution of the data, estimated internal consistency of the scales and calculated the descriptive statistics. Second, we performed a series of separate confirmatory factor analyses (CFA) to estimate fit of the proposed factor structure of the scales with the data among the current sample. We based on Hu and Bentler’s (1995) recommended goodness-of-fit indices to estimate fit of the proposed factor structure of the scales with the data: values $\geq .90$ for the comparative fit index (CFI) and the Bentler–Bonett non-normed fit index (NNFI), and value $\leq .08$ for the root mean square error of approximation (RMSEA). Third, we calculated composite scores as the average item scores for each scale for the cognitive, organisational, and procedural autonomy support; controlling use of grades, negative conditional regard, and intimidation; autonomy, competence, and relatedness need satisfaction; autonomy, competence, and relatedness need frustration; and for intrinsic motivation, identified, introjected, and external regulation. Latent autonomy-supportive behaviour, controlling behaviour, need satisfaction, and need frustration were indicated by the three composite variables for each latent construct. Latent autonomous motivation and controlled motivation were indicated by the two composite variables for each latent construct. Latent effort and LT PA were indicated by the two items for each latent construct. Fourth, to support the discriminant validity of the study measures (Hagger, 2014), we estimated the adequacy of the measurement model with eight latent constructs and 20 indicators. Fifth, we examined a structural equation model (SEM; see Figure 1) in which direct paths from autonomy-supportive

behaviour and controlling behaviour to leisure-time physical activity, and the indirect paths from autonomy-supportive behaviour via need satisfaction, autonomous motivation and effort to LT PA, and from controlling behaviour via need frustration, controlled motivation and effort to LT PA were estimated. We also set the direct path from autonomy-supportive behaviour to need frustration, from need satisfaction to controlled motivation, from controlling behaviour to need satisfaction, and from need frustration to autonomous motivation to be freed. The SEM also included a covariation between autonomy-supportive behaviour and controlling behaviour, a correlation between the need satisfaction and need frustration disturbance terms, and a correlation between autonomous motivation and controlled motivation disturbance terms. Consistent with recommendations from Cerin and MacKinnon (2008), we calculated bias-corrected bootstrapped confidence intervals and parameter estimates for each of the proposed pathways.

Results

The skewness and kurtosis estimate of each item ranged between -1.23 to 1.71, supporting normal univariate distribution (George & Mallery, 2010). Descriptive statistics and correlations among latent study variables are presented in Table 1. Results of a series of CFAs for each of the study measure with the current sample indicated an acceptable fit of the data: MD-PASS-PE (CFI=.93; NNFI=.91; RMSEA=.08), CCBS (CFI=.97; NNFI=.96; RMSEA=.08), BPNSNF (CFI=.92; NNFI=.90; RMSEA=.08), PLOCQ (CFI=.92; NNFI=.90; RMSEA=.08). The measurement model of all eight latent constructs and 20 indicators as well as results of the SEM demonstrated acceptable fit with the data ($\chi^2=662.80$, $df=151$, $p<.001$; CFI=.93, NNFI=.91, RMSEA=.08). In this model

(see Figure 1), direct relationships of autonomy-supportive and controlling behaviour with LT PA were not significant. The relationship between perceived autonomy-supportive behaviour and LT PA was mediated by need satisfaction, autonomous motivation towards PE, and effort towards LT PA ($B=.23$, $CI_{95}=.14-.33$, $\beta=.18$, $p=.003$), but not by need frustration, controlled motivation towards PE, and effort towards LT PA ($B=.00$, $CI_{95}=-.06-.09$, $\beta=.00$, $p=.895$). The relationship between perceived controlling behaviour and LT PA was mediated by need frustration, controlled motivation and effort towards LT PA ($B=.12$, $CI_{95}=.07-.19$, $\beta=.07$, $p=.012$), but not by need satisfaction, autonomous motivation and effort towards LT PA ($B=-.02$, $CI_{95}=-.05-.00$, $\beta=-.02$, $p=.056$). In total, the SEM accounted for 63% variance in the LT PA participation.

Discussion and conclusions

The aim of the current study was to examine whether the effect of perceived autonomy-supportive and controlling behaviour of PE teachers on adolescents' LT PA participation have unique pathways mediated by experiences of need satisfaction, autonomous motivation and adolescents' effort towards LT PA, and need frustration, controlled motivation and adolescents' effort towards LT PA, respectively.

In line with our hypothesis (H_1), we found that the effect of perceived autonomy-supportive behaviour on adolescents' LT PA participation was mediated by experiences of need satisfaction and autonomous motivation in PE, and perceived effort towards LT PA. The reason for this might be that autonomy-supportive environment offers more opportunities for experiencing need satisfaction, which, in turn, will result in shaping the autonomous motivation towards PE. The latter, in turn, will likely result in higher perceptions of effort exertion in and subsequently higher levels of LT

Table 1. Descriptive statistics, reliabilities, and correlations among latent study variables

Variable	Correlation							
	1.	2.	3.	4.	5.	6.	7.	8.
1. Autonomy support								
2. Controlling behaviour	-.37**							
3. Need satisfaction	.76**	-.40**						
4. Need frustration	-.35**	.61**	-.51**					
5. Autonomous motivation	.64**	-.37**	.80**	-.44**				
6. Controlled motivation	.06	.21**	.05	.39**	.15**			
7. Effort	.21**	-.02	.30**	-.08	.36**	.26**		
8. Leisure-time physical activity	.13*	.04	.26**	-.08	.34**	.18**	.72**	
M	4.89	2.96	4.76	3.06	5.01	4.10	4.63	4.57
SD	1.23	1.30	1.38	1.31	1.77	1.35	1.71	1.62
α	.94	.88	.94	.91	.96	.82	.93	.90

Note. * $p<.05$, ** $p<.01$.

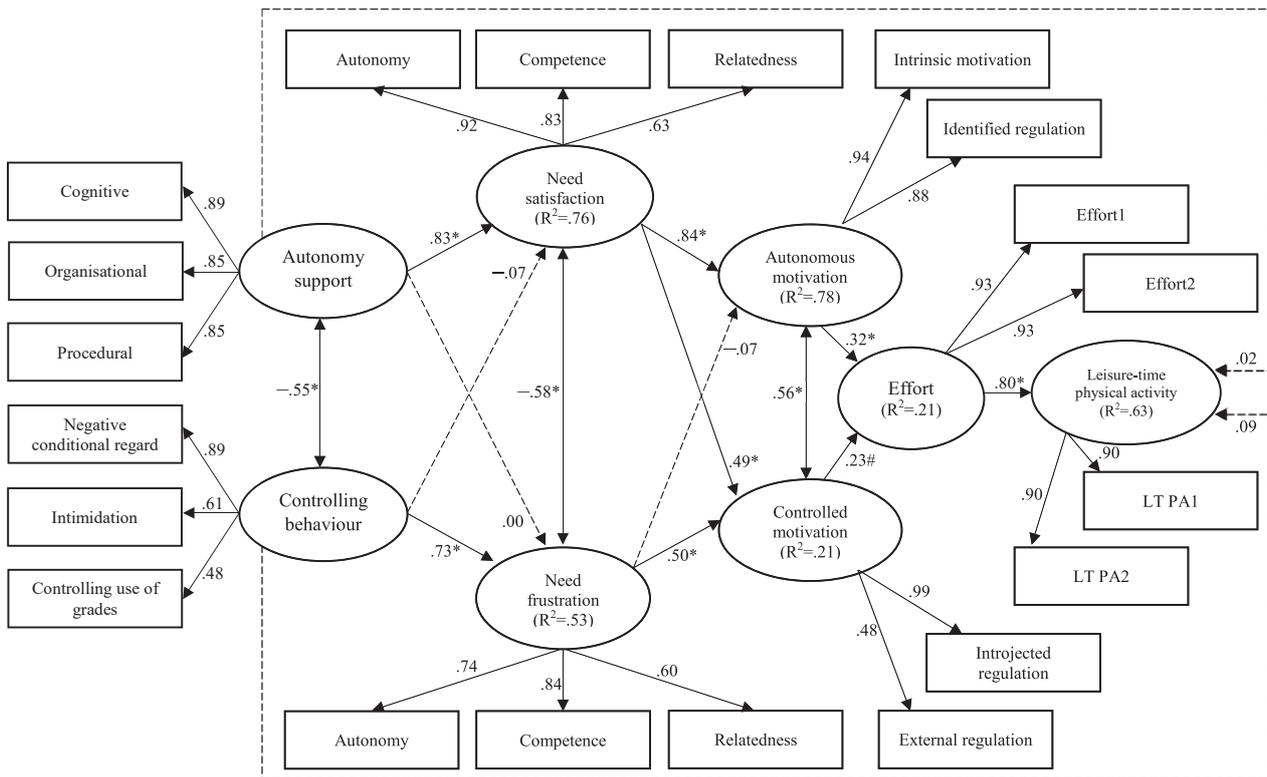


Figure 1. The structural equation model measuring the relationships of adolescents' perceived autonomy-supportive and controlling behaviour with adolescents' leisure-time physical activity participation via perceived need satisfaction, need frustration, autonomous motivation, controlled motivation and effort towards leisure-time physical activity. Note. # $p > .01$, * $p < .001$; Broken lines indicate not significant relationships.

PA participation. A finding similar with previous studies (e.g. Kalajas-Tilga, et al., 2020) that adolescents' LT PA is an outcome of a pathway that is instigated by autonomy-supportive behaviour, need satisfaction and autonomous forms of motivation. Confirming our hypothesis (H_2), it was found that the relationship between perceived autonomy-supportive behaviour and adolescents' LT PA participation is not mediated by need frustration, controlled motivation, and effort towards LT PA. This finding is similar to a previous study (Tilga, et al., 2020) demonstrating that perceived autonomy-supportive behaviour is not related to adaptive PE-related outcomes such as health-related quality of life through the experiences of need frustration. Based on H_1 and H_2 we concluded that perceived autonomy-supportive behaviour has an effect on adolescents' LT PA participation only via experiences of need satisfaction, autonomous motivation, and perceived effort towards LT PA. This finding is important for practice because it provides us with deeper understanding regarding the specific mechanism of how perceived autonomy-supportive behaviour of PE teachers is related to adolescents' effort and, in turn, to LT PA participation.

Rejecting our hypothesis (H_3), we found that the effect of perceived controlling behaviour on adolescents' LT PA participation was positively related to LT PA participation via experiences of need frus-

tration, controlled motivation, and effort towards LT PA. This is not in line with the previous study by Koka et al. (2019), demonstrating that perceived controlling behaviour of PE teachers was related to adolescents' lower levels of objective LT MVPA via the mediation of need frustration for autonomy and competence, and external regulation, the most controlled form of motivation. The reason for these contradicting results may lie in the specification of the latent construct of controlled motivation. Specifically, the latent construct of controlled motivation in the model was indicated by external and introjected regulation, and the latter had the strongest factor loading to the latent construct of controlled motivation. Among the current sample, thus, the latent construct of controlled motivation may reflect more the nature of introjected regulation towards LT MVPA, rather than external regulation. As a previous study (Koka, et al., 2019) has also revealed the positive relationship between introjected regulation towards LT MVPA and adolescents' objective LT MVPA, the current finding is not entirely surprising. Results of the present study seem to suggest that although perceived controlling behaviour of PE teachers was related to their students' higher levels of need frustration experiences and subsequently controlled motivation towards PE, the controlled motivation is also an essential antecedent of perceived effort towards LT MVPA along-

side autonomous motivation towards PE among the current sample of students. The positive role of introjected regulation in adolescents' LT PA may be particularly common for this age group students as demonstrated by previous research (Dishman, Mciver, Dowda, Saunders, & Pate, 2015; Wang, Baranowski, Lau, Chen, & Zhang, 2016).

Confirming our hypothesis (H_4), it was found that the relationship between perceived controlling behaviour and adolescents' LT PA participation is not mediated by need satisfaction, autonomous motivation, and effort towards LT PA. This finding is similar to a previous study (Tilga, et al., 2020) demonstrating that perceived controlling behaviour is not related to experiences of need satisfaction. Based on H_3 and H_4 , we concluded that controlling behaviour has an effect on adolescents' LT PA participation only via experiences of need frustration, controlled motivation and effort towards LT PA. This finding is important to practice because it provides us with a deeper understanding regarding the specific mechanism of how perceived controlling behaviour is related to adolescents' effort and, in turn, to adolescents' LT PA participation.

Our proposed model accounted for 63% of variance in adolescents' LT PA participation. Previous studies have demonstrated a moderate predictive power of various psychological constructs on self-reported PA, ranging between 13% and 29% of the explained variance (Grasten & Watt, 2017; Zhang, Solmon, Kosma, Carson, & Gu, 2011). The possible reason for the higher explained variance in adolescents' LT PA participation in the current study might be that we added perceived effort towards LT PA to the model, mediating the relationship of autonomous and controlled forms of motivation with adolescents' LT PA participation. This is in

line with previous suggestions (e.g. Hagger, et al., 2005; Ntoumanis, 2001; Standage, et al., 2003) and reasoning that it might be perceived effort towards LT PA participation that explains the mechanism of how autonomous and controlled motivation is linked with adolescents' LT PA participation.

The current study is not without limitations. Firstly, all the variables were measured using self-reported questionnaires. Self-reported data has been subject to common method variance and may inflate associations among constructs (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Secondly, we collected only cross-sectional data to investigate the proposed relationships. A cross-sectional data provides little information about the causal relationships between model constructs. Thirdly, all the participants were from a limited age group (i.e. adolescents aged between 12 and 15 years). Future studies could examine whether these relations exist for example in older participants.

To sum up, this study provided evidence that adolescents' perceived autonomy-supportive behaviours of PE teachers relate to adolescents' LT PA participation only through need satisfaction and autonomous motivation in PE, and perceived effort towards LT PA, whereas perceived controlling behaviours only through need frustration and controlled motivation in PE, and effort towards LT PA. Findings of the current study highlight the facilitative role of autonomy-supportive behaviour of teachers in a PE context in adolescents' PA participation outside of school. This study also highlights the beneficial role of controlled motivation in PE, although instigated by perceived controlling behaviours of teachers and experiences of need frustration in PE, in adolescents' LT PA participation.

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