Education and Science

Original Article

Vol 50 (2025) No 223 141-159

The effect of variety-support in physical education on participation: the serial mediation role of enjoyment and motivation *

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Abstract

Although adolescents' Physical Activity (PA) levels are associated with various benefits, PA participation rates remain low. Previous studies have revealed that one of the psychological factors that may have a significant impact on adolescents' PA and participation in Physical Education and Sport (PES) is perceived variety-support. The aim of this study is to examine the serial mediation role of enjoyment and motivation in the relationship between variety-support and participation in PES. For this purpose, firstly, the "The Perceived Variety-Support in Physical Education Scale (PVSPES)" developed by Eather et al. (2022) adapted to Turkish and applied to middle school (n=561) and high school (n=457) samples. CFA results showed that the Turkish version of the PVSPES was measurement invariant across gender and educational level. The study, which examined the serial mediation role of enjoyment and motivation in the relationship between variety-support and participation, was conducted using structural equation modeling with a sample of 1018 (532 female, 486 male) middle school (n=561) and high school (n=457) students. The findings of the study revealed that students' perceptions of variety-support in the PES had a significant positive direct effect on course participation. It was found that enjoyment (b = .086, BootSE = .014, 95% CI [.059, .115]) and motivation (b = .061, BootSE = .012, 95% CI [.039, .087]) mediated the relationship between variety-support and participation. The serial mediation model revealed that the serial mediation effect of enjoyment and motivation was significant in the effect of students' perception of variety-support on participation

Keywords

Participation
Diversity
Physical activity
Pleasure
Adolescents

Article Info

Received: 02.26.2024
Accepted: 12.01.2024
Published Online: 07.28.2025

DOI: 10.15390/ES.2025.2575

* A part of this study was presented at the 9. Uluslararası Bilim Kültür ve Spor Congress held between 11-14 Sep 2023 as an oral presentation.

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(b= .087, BootSE= .011, 95% CI [.067, .109]). As a result, it was found that students' perception of variety-support in PES increases enjoyment and motivation towards the courses, and as a result, both factors positively affect course participation through serial mediation. Offering a variety of activities to students in PES will increase their enjoyment and motivation towards the course and contribute positively to their course participation.

Introduction

Physical Education and Sports (PES) covers all healthy life activities that develop the mental, affective and psychomotor abilities of the individual, remove them from inactivity, and enable them to socialize (Demir & Cicioğlu, 2018). The PES lesson plays an important role in providing the necessary knowledge, skills and motivation to sustain lifelong mobility (Eather et al., 2022; Kliziene et al., 2021; Kohl & Cook, 2013). In this context, it is very important to understand the factors affecting participation in the PES course in order to intervene in the increasing rates of inactivity in adolescents especially with the introduction of technology into our lives and to provide them with lifelong movement habits. When the rates of participation in PES are analyzed; Global Student Health Survey data show that 55.2% of adolescents attend PES classes 1-2 days a week, while 20% of adolescents almost never attend PES classes (Martins et al., 2020). There may be many different reasons for this situation, but one of the most important reasons is the lack of variety and monotony in PES classes. This situation negatively affects students' attitudes towards the course and reduces interest and participation (Silverman & Scrabis, 2004). Studies have shown that when PES courses are enriched with variety, students are more enthusiastic about the course and this increases participation (Dismore & Bailey, 2010; MacPhail, 2011; Smith & Parr, 2007).

Variety is one of the important factors that enrich the PES course and increase students' interest in the course. While the concept of variety is defined as the experience of various activities and opportunities in one's social environment (Kahn & Ratner, 2005; Sheldon & Lyubomirsky, 2012), variety-support is defined as the way in which an individual structures activities and opportunities to facilitate the experience of available opportunities (Sylvester, Standage et al., 2016). Variety in PES classes includes diversity in effort, opportunities, and tasks (Lyubomirsky & Layous, 2013; Sylvester, Standage, Dowd et al., 2014), as well as diversity in pedagogy, equipment, lesson topics, assignments, venues such as fields or gyms, activities, and teaching methods (Eather et al., 2022). There are studies showing that students like the course more, show interest, and participate more when the curriculum content of the PES course is appropriate to their own experiences and variety-support is provided (Dismore & Bailey, 2010; MacPhail, 2011; Smith & Parr, 2007). In this context, it can be said that providing variety in the PES course has the potential to greatly affect activity behavior and increase participation (Juvancic-Heltzel et al., 2013). While participation increases at the same rate when variety-support increases (Agans & Geldhof, 2012; Koorts et al., 2011), a lack of variety in the PES course may cause negativity in students' interest and attitudes (Hazar et al., 2021). Research on variety in the literature shows that variety is directly related to increased participation, as variety-support increases, participation and efficiency of the course increases, and as variety-support decreases, interest, attitude and participation in the course decreases (Agans & Geldhof, 2012; Hazar et al., 2021; Koorts et al., 2011, Michael et al., 2016; Yetim et al., 2014). For example, a study examining the impact of school physical education on exercise habits (Wang et al., 2024) found that the variety of sports offered in class encouraged children to participate in out-of-school exercise. In addition, it was found that when one extra type of exercise was added to the PES program, the likelihood of students exercising increased by 5.6%.

Variety-support is an important element that increases the enjoyment of the lesson, thus making the lesson more fun and attractive (Hazar et al., 2021; Michael et al., 2016). Enjoyment is conceptually defined as an individual's intrinsic motivation towards an activity and the enjoyment of the activity is

directly proportional to variety-support (Michael et al., 2016). PES is a field in which an individual can only participate if he/she likes, wants and enjoys it. One of the important factors that can increase enjoyment in PES is variety-support. Providing variety in PES and the chance to choose among different alternatives can increase the enjoyment of participation in the activity. Studies indicate that enjoying the PES is one of the important reasons affecting participation in the course (Frederick & Ryan, 1993) and that especially children and young people participate in the PES course for physical improvement, fun and enjoyment (Gill et al., 1983; Kolt et al., 1999; White & Duda, 1994). In this direction, it can be said that if the individual cannot experience enjoyment in PES, he/she may move away from the activities. Michael et al. (2016) emphasized the necessity of providing adolescents with a variety of activities, methods, and tools to increase their participation in the PES and stated that the variety provided in the PES increases participation through enjoyment. Similarly, Dimmock et al. (2013) found that variety increases the enjoyment of the activity, and increased enjoyment increases interest in the activity. Based on the researches, it can be said that providing variety-support in PES increases the enjoyment of the PES course.

Providing variety-support is one of the most important intrinsic motivation reasons (Wann, 1997; Ryan & Deci, 2000). Instead of using a single teaching strategy in lessons, diversifying the teaching strategy encourages students' motivation to learn (Halawah, 2011). While monotonous lessons with traditional methods in PES reduce attention span, trying new methods and providing variety in lessons can greatly increase students' interest and motivation levels (Öztürk & Eren, 2020). Failure to provide a variety of materials, activities, environments, and methods in PES is cited among the reasons that lead to decreased lesson efficiency, decreased motivation, reluctance, and student disengagement from the lesson (Güven, 2021; Sylvester, Standage, Ark et al., 2014). In a study examining the effect of diversified instructional strategies, the course motivation of the student group in which different instructional strategies were used increased throughout the semester, while the motivation of the other group remained at the same level or decreased throughout the semester (Tremblay-Wragg et al., 2021). Therefore, based on the related studies, the key factor in the formation of motivation and willingness to participate is the provision of variety in the PES. When variety is not provided, individuals may develop feelings of inadequacy, lack of control and reluctance (Pelletier et al., 1995). This may reduce students' motivation for the lesson and negatively affect their participation in the lesson.

One of the challenges in learning environments is the decline in students' motivation due to the lack of enjoyment (Dismore & Bailey, 2011; Ntoumanis, 2001). An individual's intrinsic motivation is directly proportional to the enjoyment derived from an activity (Aydın et al., 2024; Deci et al., 2001). Enjoyment in PES is identified as a key factor influencing lesson motivation (Frederick & Ryan, 1993). When examining factors that increase participation in PES, psychological reasons such as the need for socialization and having a good time, along with physical goals like improving fitness, stand out. Among these, the fundamental requirement is the enjoyment and motivation developed toward PES (Demir & Cicioğlu, 2018; Gill et al., 1983; Rickel, Park, & Morales, 2012; Sit & Lindner, 2007). If individuals do not experience the enjoyment gained from participation, they are unlikely to maintain motivation for the activity and may eventually distance themselves from it.

Research has shown that a lack of excitement and enthusiasm for PES classes, disinterest in in-class activities (De Corby et al., 2005; Morgan & Bourke, 2005), difficulty in adapting to lessons, absence of enjoyment, and lack of motivation negatively impact class participation (Boyle et al., 2008; Dagkas & Stathi, 2007). At this point, it can be stated that providing adequate variety-support could enhance the enjoyment and motivation derived from activities, thereby influencing participation (Dimmock et al., 2013; Glaros & Janelle, 2001; Juvancic-Heltzel et al., 2013). When students' motivation and interest in classes decrease, participation in PES declines, leading to a sedentary lifestyle (Silverman & Scrabis, 2004). Participation in PES classes is essential for individuals to take a step toward a healthy life, and for participation, enjoyment and motivation play a critical role (Demir & Cicioğlu, 2018). This study emerged from the need to examine the factors affecting participation in PES classes. The conceptual framework of the study involves designing a mediation model to test the role of perceived enjoyment

and motivation in the relationship between variety-support and participation in PES. The research problem is centered on the question: Does variety-support influence participation in PES classes? Within this scope, the study aims to examine the serial mediation role of enjoyment and motivation in the relationship between variety-support and participation in PES classes.

Method

Before initiating the research, ethical approval was obtained from the Research Ethics Committee of Kırıkkale University, along with the necessary permissions from the Governorship and the Ministry of National Education. Prior to data collection, permission and appointments were secured from school principals. Additionally, consent forms were collected from students, and data were gathered only from those who voluntarily agreed to participate in the study. Students were also verbally informed about the study.

Participants

The research data were collected during the 2022-2023 academic year from a sample of 1018 middle school and high school students (ages 11-18; 532 girls, 486 boys) across eight schools in Kırıkkale. The sample size was determined using the method of selecting 15 participants per variable (Pituch & Stevens, 2015). Additionally, data from a subsample of 70 students (6th grade = 32, 9th grade = 38; 39 boys) were used for test-retest reliability analysis (Bonett & Wright, 2015). All data were collected by researchers under exam-like conditions in schools, and it took approximately five minutes for students to complete the scale. The demographic information and mean values of the participants are presented in Table 1.

Table 1. Demographic information and mean values of participants

Grade	Gender	n	Age ($\bar{X}$)	Variety-Support ($\bar{X}$)	Enjoyment ($\bar{X}$)	Motivation ($\bar{X}$)	Participation ($\bar{X}$)
5th	Male	78	10.551	2.978	4.197	3.958	4.560
Grade	Female	59	10.525	3.095	3.842	3.815	4.350
6th	Male	78	11.487	2.941	3.917	3.712	4.447
Grade	Female	67	11.433	2.938	3.945	3.692	4.318
7th	Male	98	12.480	2.767	4.092	3.663	4.408
Grade	Female	71	12.465	2.805	3.819	3.464	4.246
8th	Male	52	13.423	2.700	3.949	3.577	4.577
Grade	Female	58	13.569	2.416	3.489	3.260	3.966
9th	Male	51	14.529	2.873	3.990	3.618	4.464
Grade	Female	80	14.613	2.814	3.660	3.429	4.229
10th	Male	55	15.582	2.648	3.882	3.524	4.303
Grade	Female	72	15.458	2.597	3.810	3.374	4.225
11th	Male	47	16.574	2.630	3.890	3.514	4.301
Grade	Female	68	16.515	2.623	3.757	3.370	4.054
12th	Male	27	17.556	2.958	3.914	4.026	4.407
Grade	Female	57	17.474	2.765	3.895	3.659	4.295
Total		1018	13.7	2.786	3.883	4.321	3.593

Measures

Perceived Variety-Support in Physical Education (PVSPE) Scale: Developed by Eather et al. (2022) and analyzed for reliability and validity in this study, was used to measure students' perceptions of variety-support in PES. Example items: "In PES classes, I can try different activities/events within a lesson" and "In PES classes, my teacher provides a range of different sports equipment for me to use throughout the term (e.g., balls, hoops, rackets, nets)."

In order to adapt the PVSPE to Turkish, the translation steps suggested by De Vaus (2002) were followed. It is recommended to have at least two independent translators in the translation process

(Coster & Mancini, 2015). Therefore, in the translation process, the scale items were translated from English, the source language, into Turkish, the target language, by two PES field experts and two non-PES translators. After the translations, each item of the scale was evaluated by 4 researchers who are experts in the field of PES in terms of semantic, conceptual, and suitability for the target audience (Çapık et al., 2018). Minor corrections were made that did not make a difference in the meaning of the items and were appropriate for the field and culture (e.g., using the term "grass field" instead of "oval", which is not common in Turkey). In addition, the meaning of each translated item was explained in detail and the original scale authors were consulted. After the Turkish language expert confirmed that the scale items were appropriate for Turkish, the scale was administered to a middle school class as a pilot study (n= 26). In the pilot study, the responses of students who marked the "I understood the questions/I did not understand the questions" option were evaluated by four PES experts, who concluded that the items were understandable. Based on these findings, the scale was deemed suitable for use in the study.

In this study, data were collected during the 2022-2023 academic year from a sample of 561 middle school students (255 girls, 306 boys) in Kırıkkale to adapt the PVSPE scale for middle school students. Additionally, to evaluate the generalizability of the PVSPE scale to the high school population, data were collected from a sample of 457 high school students (257 girls, 180 boys). All data were gathered by the research team under exam-like conditions in schools, and it took approximately five minutes for students to complete the scale. Participants' ages ranged from 11 to 18. Test-retest reliability data were collected and analyzed from a sample of 32 middle school and 38 high school students (Bonett & Wright, 2015).

The single-factor, eight-item structure of the scale was tested using Maximum Likelihood rotation Confirmatory Factor Analysis (CFA) on the middle school sample. The results indicated that the scale demonstrated good model fit indices (χ^2= 44.849, p<.05, χ^2/df= 2.242, CFI= .987, SRMR= .0235, and RMSEA= .047). Factor loadings for the scale items ranged between .65 and .81. The AVE and CR values indicated high reliability across all factors (AVE = .50, CR = .89). Cronbach's Alpha was calculated as .89, skewness as .318, kurtosis as .356, and the test-retest reliability coefficient as .899.

The confirmatory factor analysis results for the high school sample of the PVSPE scale were analyzed. The scale demonstrated high model fit indices (χ^2= 43.356, p<.05, χ^2/df= 2.168, CFI= .985, SRMR= .0254, and RMSEA= .051). Factor loadings for the scale items ranged from .67 to .82. To assess the validity and reliability levels of the scale for the high school sample, AVE (.50), CR (.89), and Cronbach's Alpha (.89) values were examined. These results indicate that the scale is reliable (Field, 2009). The test-retest reliability coefficient (.899) further confirms that the scale remains consistent over time.

The measurement invariance of the single-factor PVSPE scale was compared across gender (male-female) and educational stage (middle school-high school). A multiple group analysis was conducted using the Maximum Likelihood estimation method, as the data demonstrated a normal distribution. The results of the measurement invariance analysis are presented in Table 2.

Table 2. Measurement invariance results for gender and educational stage

Models	χ^2 (*df*)	χ^2/*df*	CFI	SRMR	RMSEA	Model Comparison		
							$\Delta\chi^2$ (Δdf)	ΔCFI
Gender (Male-Female)								
1. Configural	81.18 (40)	2.03	.988	.0272	.032	—	—	—
2. Metric	85.22 (48)	1.17	.989	.0279	.028	2 vs. 1	4.04 (8)	.001
3. Scalar	112.72 (32)	2.01	.983	.0280	.032	3 vs. 2	27.5* (8)	.006
4. Strict	121.41 (24)	1.9	.983	.0291	.030	4 vs. 3	8.69 (8)	.000

Table 2. Continued

Models	χ^2 (*df*)	χ^2/df	CFI	SRMR	RMSEA	Model Comparison		
							$\Delta\chi^2$ (Δdf)	ΔCFI
Educational Stage (Secondary School-High School)								
1. Configural	88.27* (40)	2.21	.986	.0235	.034	—	—	—
2. Metric	104.98* (48)	2.19	.984	.0261	.034	2 vs. 1	16.70* (8)	.002
3A. Scalar[a]	249.58* (56)	4.46	.945	.0271	.058	3A vs. 2	144.6* (8)	.039
3B. Scalar[b]	189.32 (33)	3.44	.962	.0264	.049	3B vs. 2	84.34* (7)	.022
3C. Scalar[c]	146.98 (54)	2.72	.973	.0266	.034	3C vs. 2	42* (6)	.011
3D. Scalar[d]	129.01 (53)	2.43	.978	.0263	.038	3D vs. 2	24.03* (5)	.006
4. Strict	285 (64)	4.453	.937	.0281	.058	4 vs. 3D	155.99* (11)	.041

Note: *p<.05; n= 1018 (Male= 532, Female= 486 / Secondary school= 561, High school = 457); a= Measurement intercepts; the constants (intercepts) of b= item named Ç8, c= item named Ç5, and d= item named Ç4 are released; CFI= Comparative fit index; SRMR= Standardized Root Mean Square Residual; RMSEA= Root mean square error of approximation.

In the measurement invariance analysis conducted by gender, configural equivalence was first tested using the baseline model without constraining any parameter values. The results indicated good model fit, suggesting that configural equivalence was achieved (χ^2 [40, n=1018] = 81.18, $p < .05$, χ^2/df = 2.03, CFI = .988, SRMR = .0272, and RMSEA = .032). After establishing configural equivalence, metric equivalence was tested by constraining the scale items, and the results from the multi-group CFA were compared with the configural model. In measurement invariance analyses, it is recommended to use differences in CFI (ΔCFI) instead of χ^2 for model comparisons, with ΔCFI values of < .01 indicating invariance across models (Byrne, 2010). Since the ΔCFI values between the structural model and the metric model, the metric model and the scalar model, and the scalar model and the strict model were all < .01, the results indicate that the scale is equivalent across groups.

In the measurement invariance analysis conducted across educational levels, configural equivalence was first tested using the baseline model without constraining any parameter values. The model fit indices indicated that configural equivalence was achieved (χ^2 [40, n=1018] = 88.27, $p < .05$, χ^2/df = 2.21, CFI = .986, SRMR = .0235, and RMSEA = .034). Metric equivalence was then tested by constraining the scale items, and the multi-group CFA results were compared with the configural model. Since ΔCFI < .01, metric equivalence was established. To test scalar equivalence, the intercepts of the scale items were constrained across groups, and the resulting CFA results were compared with the metric model. The comparison showed that ΔCFI > .01, indicating that scalar equivalence was not achieved. When examining the intercept differences across groups, the greatest discrepancy was observed in item Ç8. The parameter constraints for item Ç8 were relaxed, and the analysis was repeated. However, the comparison still showed ΔCFI > .01, indicating that scalar equivalence was not achieved again. Next, the parameter constraints for item Ç5, which also had a high intercept difference, were relaxed, and the analysis was repeated. The comparison with the metric model revealed a ΔCFI value of .011, which was borderline. Finally, the parameter constraints for item Ç4, another item with a high intercept difference, were relaxed, and the analysis was repeated. The comparison with the metric model showed ΔCFI < .01, establishing scalar equivalence. To test strict equivalence, the error variances of the scale items were constrained across groups, and the multi-group CFA results were compared with the scalar model. Since ΔCFI > .01, strict equivalence was not achieved.

Classroom Engagement Inventory (CEI): Developed by Wang et al. (2014) and adapted into Turkish by Sever (2014), this scale was used to measure students' engagement in PES classes. The scale consists of three subdimensions and 23 items (e.g., "I actively participate in classroom discussions during PES classes"; "I participate seriously in activities conducted during PES classes"). In this study, the subdimensions of emotional engagement, behavioral engagement-compliance, and behavioral engagement-effortful classroom participation were used, as these items better reflect the context of PES. The subdimensions of cognitive engagement and disengagement were excluded from the study because they contain items that do not fully align with the PES context (e.g., "When we have a quiz, I think more deeply about the topics"). The scale is evaluated using a 5-point Likert scale (1 = Never, 3 = Sometimes, 5 = Always). To enable the use of relevant subdimensions, bifactor analysis, a superior and more recent method compared to second-order CFA (Bonifay et al., 2017), was applied. The model fit indices for this study were calculated as $\chi^2/df = 7.17$, RMSEA = .078, SRMR = .050, CFI = .947, and NFI = .940. Cronbach's Alpha coefficient was calculated as .89, skewness as .546, and kurtosis as .202.

Enjoyment of Participation in Physical Education Classes (EPPEC): To measure the enjoyment derived from participation in PES classes, the "Satisfaction Interest Scale" developed by Duda and Nicholls (1992) and adapted into Turkish by Erturan-İlker et al. (2018) was used. The scale, named "Enjoyment of Participation in Physical Education Classes (EPPEC)" in Turkish, consists of a single factor and six items (e.g., "I usually have fun in PES classes"; "I usually enjoy being in PES classes"). The scale is evaluated using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). The model fit indices for this study were calculated as $\chi^2/df = 9.890$, RMSEA = .093, SRMR = .0307, CFI = .957, and NFI = .953. The Cronbach's Alpha coefficient was calculated as .68, skewness as .697, and kurtosis as .221.

Physical Education Motivation Scale (PEMS): Developed by Sulz et al. (2016) and adapted into Turkish by Akbulut (2021), this scale was used to measure students' motivation toward PES. The scale consists of three subdimensions (Intrinsic Motivation, Extrinsic Motivation, and Amotivation), with three items under each subdimension, making a total of nine items (e.g., "I participate in PES because it is interesting"; "PES is a waste of time"). The scale is assessed using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). In this study, only the subdimensions of Intrinsic Motivation and Amotivation were used. Amotivation is considered the opposite of intrinsic motivation, occurring when an individual is neither intrinsically nor extrinsically motivated (Ntoumanis, 2001; Wang, 2017), and has been coded as a reverse item (Deci & Ryan, 1985). The subdimension of Extrinsic Motivation and its regulatory styles, which are commonly used in studies to measure motivation (Standage et al., 2006; Vallerand et al., 2008; Wang et al., 2002), were excluded from this study. This decision was influenced by the abstract nature of distinctions among regulatory styles, the difficulty of applying these distinctions to younger age groups (Sebire et al., 2013), the lack of relevance of integrated regulation (the regulatory style closest to intrinsic motivation) as a reason for participation in sports contexts (Deci & Ryan, 1985), and the cognitive and developmental limitations of adolescents in adopting this regulatory style (Vallerand, 1997). To evaluate motivation using a single subdimension, a bifactor model analysis was conducted. The analysis results indicated good model fit indices for this study ($\chi^2/df = 4.381$; RMSEA = .058; SRMR = .020; CFI = .993; NFI = .990). The Cronbach's Alpha coefficient was calculated as .82, skewness as .1057, and kurtosis as .262.

Statistical Analysis

A multiple serial mediation analysis was conducted to determine the effect of variety-support in PES on participation in PES through the mediating roles of enjoyment and motivation. Multiple serial mediation analysis is a method used to test the direct and indirect effects of X on Y through the mediators M_1 and M_2 using Ordinary Least Squares (OLS) regression analysis (Hayes, 2022). The analyses were performed using Process Macro 4.2 developed by Hayes (2022). Model 6, which tests serial mediation effects, was selected in Process Macro (Figure 1). The bootstrap method, considered to provide more reliable results compared to the traditional method of Baron and Kenny (1986) and the

Sobel test (1982) (Gürbüz, 2021; Hayes, 2022), was applied with 5000 resamples. In mediation analyses using the bootstrap method, the 95% confidence interval values must not include zero (MacKinnon et al., 2004). Additionally, prior to the analysis, CFA was conducted using AMOS 22 to check the model fit indices.

Results

In the study, a CFA was first conducted to validate the serial mediation model. For this purpose, a measurement model was created, including 8 items from the PVSPE, 13 items from the CEI, 6 items from the EPPEC, and 6 items from the PEMS. The CFA results showed that all model fit indices were within the desired ranges except for the CFI value, which was .872. To improve the CFI value to the acceptable threshold (.90), covariance corrections were examined, and the highest modification indices were found under the CEI. Considering the two highest modification indices among the CEI items, two covariances were drawn between the related items. The final CFA results indicated that the measurement model was validated (χ^2[487, n=1018] = 2039.248, p < .001, χ^2/df = 4.187, CFI = .902, SRMR = .0523, and RMSEA = .056).

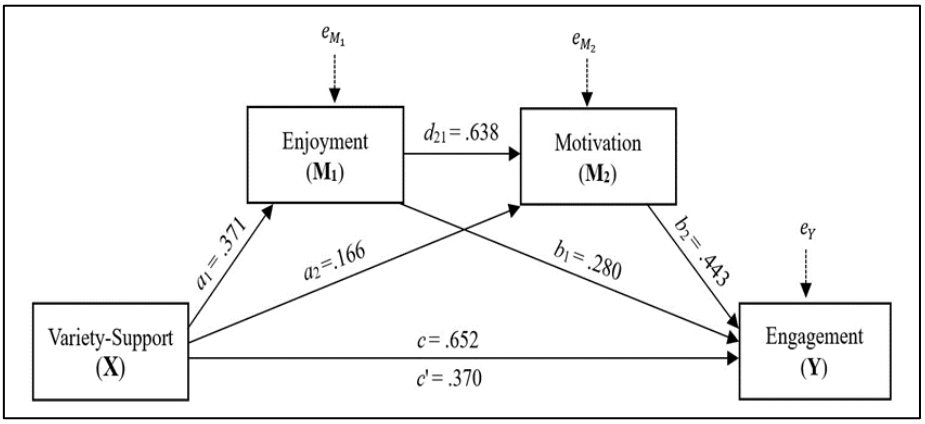

Figure 1. The serial mediation model

In the study, the mediating effects of enjoyment derived from PES and motivation toward PES, acting serially, were analyzed in the relationship between perceived variety-support in PES and participation in PES. The results of the multiple serial mediation analysis are presented in Table 3 and Figure 1.

Table 3. Regression coefficients, standard errors, and model summary information of the serial multiple mediation model

		Consequent										
		Enjoyment (M_1)				**Motivation (M_2)**				**Engagement (Y)**		
Antecedent	**Path**	***Coeff.***	***SE***	***p***	**Path**	***Coeff.***	***SE***	***p***	**Path**	***Coeff.***	***SE***	***p***
Variety-Support (X)	a_1	.371	.029	.000	a_2	.166	.025	.000	c	.652	.032	.000
									c'	.370	.028	.000
Enjoyment (M_1)		—	—	—	d_{21}	.638	.025	.000	b_1	.280	.035	.000
Motivation (M_2)		—	—	—		—	—	—	b_2	.443	.034	.000
Constant	i_{M_1}	2.852	.083	.000	i_{M_2}	1.380	.098	.000	i_Y	.439	.117	.000
		R^2=.14				R^2=.48				R^2=.55		
		F(1, 1016)= 164.803, *p*<.000				F(2, 1015)= 468.446, *p*<.000				F(3, 1014)= 419.645, *p*<.000		

Table 3. Continued

Indirect Effects of X on Y	Path	Effect	BootSE	Boot 95% CI	
				LL	UL
Total indirect effect		.282	.024	.238	.331
Ind1 (Variety S. →Enjoyment→Engagement)	a_1b_1	.104	.017	.071	.139
Ind2 (Variety S. →Motivation→Engagement)	a_2b_2	.074	.015	.046	.105
Ind3 (Variety S. →Enjoy. →Motiv. →Engagement)	$a_1d_{21}\ b_2$	.105	.014	.079	.133
Completely Standardized Indirect Effects of X on Y	**Path**	**Effect**	**BootSE**	**Boot 95% CI**	
				LL	**UL**
Total indirect effect		.235	.18	.200	.269
Ind1 (Variety S. →Enjoyment→Engagement)	a_1b_1	.086	.014	.059	.115
Ind2 (Variety S. →Motivation→Engagement)	a_2b_2	.061	.012	.039	.087
Ind3 (Variety S. →Enjoy. →Motiv. →Engagement)	$a_1d_{21}\ b_2$	.087	.011	.067	.109

Note: n= 1018; SE: Standard Error; CI: Confidence Intervals; LL: Lower Limit; UL: Upper Limit

As shown in Table 3, the results of the multiple serial mediation analysis indicate that the total effect of variety-support in PES on participation in PES (path c) is positive and significant (b = .652, SE = .032, p < .000). Variety-support positively predicts the mediating variable of enjoyment derived from PES (path a1; b = .371, SE = .029, p < .000). Additionally, variety-support positively predicts the other mediating variable, motivation toward PES (path a2; b = .166, SE = .025, p < .000). The effect of the mediating variable enjoyment on the other mediating variable, motivation (path d21), is also positive and significant (b = .638, SE = .025, p < .000). According to the results of the multiple regression analysis, where variety-support, enjoyment, and motivation were considered predictor variables for participation in PES, both enjoyment (path b1; b = .280, SE = .035, p < .000) and motivation (path b2; b = .443, SE = .034, p < .000) significantly and positively predict participation in PES. Furthermore, the direct effect of variety-support on the dependent variable, participation in PES (path c'), is positive and significant (b = .370, SE = .028, p < .000).

In the two-variable serial mediation analysis, the indirect effect of variety-support in PES on participation in PES was tested using the bootstrap method (see Table 3). The results indicated that enjoyment and motivation mediated the relationship between variety-support and participation. Specifically, the serial mediation effect of enjoyment (Ind1: b = .086, BootSE = .014, 95% CI [.059, .115]) and motivation (Ind2: b = .061, BootSE = .012, 95% CI [.039, .087]) on the effect of variety-support on participation was found to be significant. Additionally, the combined serial mediation effect of both enjoyment and motivation (Ind3: b = .087, BootSE = .011, 95% CI [.067, .109]) was also significant. The fully standardized effect sizes of the indirect effects were calculated as .086 for Ind1, .061 for Ind2, and .087 for Ind3, indicating medium effect sizes (Preacher & Kelley, 2011).

Discussion

The purpose of this study is to determine the serial mediation role of enjoyment and motivation in the relationship between variety-support provided in the PES and participation in the PES. Our findings support that the scale adapted by the authors is suitable for use with Turkish middle and high school students. The study tested a serial mediation model that includes three mediation pathways: enjoyment, motivation, and enjoyment-motivation in assessing the link between variety-support and participation. Our findings support the direct positive effect of variet-support in the PES on participation in the PES as well as the serial mediation effects of enjoyment and motivation in the link between variety-support and participation.

Given that PES is mandatory in teaching curricula and delivered by trained professional educators (PE teachers), it should provide unique and important opportunities to develop the necessary skills for PA among all students (Eather et al., 2022). Given that the experience of variety in PES is a

psychological factor that supports optimal motivation and well-being (Lubans et al., 2016), it is important to assess variety-support and examine its impact on students' participation in PES. In a cross-country study examining the level of participation in PES, it was reported that most adolescents worldwide (in a review covering 54 countries) participate in PES 1-2 days a week (55.2%), while almost 20% do not participate in PES at all (Martins et al., 2020). In another study comparing adolescents' PA levels at school across 52 countries, data show that Turkish students engage in PES 1-2 days a week, compared to Hungary, where students are offered PES 3-4 days a week (Bann et al., 2019). Considering the importance of PES classes for students, the findings of the studies show that participation in PES is not at an adequate level. Therefore, understanding the factors influencing students' participation in PES can contribute to the development of effective strategies to increase interest in these classes.

The Mediating Role of Enjoyment

The purpose of this section is to confirm the effect of variety-support provided in PES on class participation, as well as the mediating role of enjoyment in the relationship between perceived variety-support and participation. The results of our study confirmed a medium-sized positive effect among the variables and the mediating role of enjoyment. When standardized path coefficients were evaluated, a one-standard-deviation change in the predictor variable (variety-support) resulted in a 9-unit increase in participation mediated by enjoyment (Table 3). The findings indicate that variety-support in PES positively influences students' perceived enjoyment and, consequently, their level of participation in the class. Similarly, a previous study demonstrated that individuals exposed to messages emphasizing variety in an exercise class reported higher levels of enjoyment and interest compared to those exposed to messages highlighting monotony (Dimmock et al., 2013). A study conducted by Juvancic-Heltzel et al. (2013) found that equipment variety enhanced enjoyment and increased participation among children, adolescents, and older individuals. Considering the impact of enjoyment derived from PES classes on participation, the desire to have fun and enjoy oneself emerges as a critical factor to address (Dismore & Bailey, 2010; Sylvester, Lubans et al., 2016). Teachers can develop strategies to enhance enjoyment by offering a variety of activities that appeal to both boys and girls (Brooke et al., 2013). Additionally, designing and implementing age-appropriate activities can foster gains in enhancing enjoyment through variety (Callcott et al., 2015). Training teachers in this regard is crucial for providing an optimal learning environment for students.

The Mediating Role of Motivation

The purpose of this section is to confirm the effect of variety-support in PES on participation, as well as the mediating role of motivation in the relationship between perceived variety-support and participation. Our findings confirm a medium-sized positive effect among the variables and the mediating role of motivation. The standardized path coefficients indicate that a one-standard-deviation change in the predictor variable (variety-support) results in a 6-unit increase in participation mediated by motivation (Table 3). The results suggest that perceived variety-support in PES positively influences students' interest, thereby enhancing their motivation, which in turn increases the participation levels of highly motivated individuals. Previous studies have shown that perceived variety in exercise settings positively contributes to fulfilling the needs of autonomy, competence, and relatedness as explained by self-determination theory (SDT), playing a significant role in predicting motivation and, indirectly, exercise behavior (Miao et al., 2024). This suggests that it may serve as an important factor in predicting autonomous motivation and behavior in exercise settings (Sylvester, Standage, Dowd et al., 2014). Similarly, Sylvester et al. (2018) found a positive link between perceived variety in exercise and self-reported exercise participation. Moreover, this positive link between perceived exercise variety and self-reported exercise participation was mediated by autonomous motivation to exercise. Considering that various reasons affect individuals' activity motivation and that factors such as activity type, duration and preferred location may vary from person to person (Akbulut, 2021), the importance of motivation in the effect of variety-support on participation emerges. The variety created in the use of equipment, activities, and learning environment in PES can increase students' engagement by creating a motivational factor that each student discovers for himself/herself (Vansteenkiste et al., 2020). Students' mental, emotional, and physical motivation can help improve the learning environment through active

engagement (Scott Rigby et al., 1992). Therefore, teachers should utilize factors that can influence perceptions of motivation, such as exercise history and skill level, to increase engagement by using variety in PES (Sylvester et al., 2018).

The Serial Mediating Role of Enjoyment and Motivation

The research findings confirm that enjoyment and motivation mediate the direct positive effect of variety-support in PES on participation. Analyzing the standardized path coefficients of the serial mediation analysis reveals that a one-standard-deviation change in the predictor variable (variety-support) results in a 9-unit increase in participation mediated by enjoyment and motivation (Table 3). Our results indicate that perceived variety-support in PES enhances individuals' enjoyment and motivation, thereby increasing their engagement in classes. The variety of methods, equipment, tasks, and activities provided in PES classrooms can naturally make the experience more engaging and rewarding (Pronin & Jacobs, 2008), as diverse cognitive stimuli have been found to produce more enjoyment compared to uniform stimuli (Cabanac, 1979). This heightened engagement fosters interest (Silvia, 2006) and creates positive emotions such as enjoyment, which are directly linked to well-being (Sheldon & Lyubomirsky, 2012). Considering that people tend to voluntarily participate in activities they find personally interesting and enjoyable (Ryan & Deci, 2002) and are more motivated toward them (Juvancic-Heltzel et al., 2013), it can be concluded that variety-support in PES helps students derive greater enjoyment from classes, which in turn increases their motivation toward activities and ultimately enhances their participation. Sylvester, Lubans et al. (2016) found that participants who received variety-support during a six-week exercise program reported higher perceived variety compared to those following a standard program, which was associated with better exercise adaptation and well-being. Furthermore, it is suggested that variety-support could enhance students' enjoyment of PA and exercise settings, thereby increasing their motivation for PES classes, which is linked to higher participation (Juvancic-Heltzel et al., 2013; Sylvester, Lubans et al., 2016).

Strengths and Limitations

In this study, it was possible to examine the links between variety-support and three important and meaningful variables (Participation, Motivation, and Enjoyment) related to PES as suggested by Eather et al. (2022). Moreover, the data were collected from a substantial population-based sample of Turkish students, including high school and middle school students, which increases the external validity of the findings. However, generalizing these results should be approached cautiously, as the demographic characteristics of Kırıkkale may not fully reflect those of the broader Turkish population. Additionally, self-report questionnaires, while widely used, have limitations in accurately assessing variables such as participation, motivation, and enjoyment (Ekelund et al., 2011). Instruments like accelerometers, however, can offer valuable insights into PES-related activities that may not be easily captured through self-reported measures.

Implications and Recommendations

Our findings contribute to the field of PA research by investigating and expanding the foundations of Self-Determination Theory (SDT) as established by Ryan and Deci (2002), aligning with significant studies conducted by Sylvester, Lubans et al. (2016), Sylvester, Standage, Ark et al. (2014), Sylvester, Standage, Dowd et al. (2014). These findings support the notion that variety may represent a fourth psychological need (in addition to autonomy, competence, and relatedness) influencing PA behaviors. Considering the high levels of physical inactivity among adolescents, our results are particularly relevant for PA researchers, teacher training institutions, and PES teachers. They provide valuable insights for developing strategies to enhance adolescents' participation in and engagement with PES classes. PES teachers can target variety to increase students' enjoyment and motivation in PES, which in turn may contribute to improved academic performance and success. Thus, employing diverse teaching methods (e.g., direct instruction, stations, exploratory activities, small-sided games), creating learning tasks with various equipment (e.g., balls of different sizes, station tools, ropes), and utilizing different venues and facilities (e.g., schoolyards, gymnasiums, outdoor spaces) are essential for developing new teaching strategies that enhance variety (Eather et al., 2022). Administrators and

policymakers should allocate funding, create regulations to ensure access to equipment, and develop national education policies to improve the quality of PES classes by increasing variety. Providing durable materials, equipment for different mobility needs, and legal frameworks for sports equipment standards is crucial for sustaining variety-support in PES. Moreover, the scope of our study could be expanded by addressing new factors influencing variety and participation in PES. Research conducted across different age groups and subpopulations in PA settings could foster broader participation and success by developing strategies tailored to individuals' physical capabilities, interests, and needs.

Conclusion

This study evaluated the validity and reliability of the PVSPE, adapted for use with Turkish adolescents in a school context. The findings revealed a positive relationship between perceived variety-support and participation in PES among middle and high school students, as well as the serial mediation role of enjoyment and motivation. Our research is the first to investigate the relationships among these variables within the context of PES for this population, supporting the idea that providing variety in PES practices can be an effective strategy for teachers aiming to enhance adolescents' PA levels through increased enjoyment and motivation. Further research in diverse school settings is needed to support our novel findings on the benefits of variety-support.

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Appendix 1

Beden Eğitimi Çeşitlilik Desteği Ölçeği (BE-ÇDÖ)

Lütfen aşağıdaki soruları dikkatlice okuyunuz ve sağdaki seçeneklerden en yakın hissettiğinizi X ile işaretleyiniz.		**Asla**	**Bazen**	**Sık Sık**	**Genellikle**
1	Beden eğitimi dersinde, öğretmenim dönem boyunca kullanmam için bir dizi farklı spor ekipmanı sağlar (örneğin toplar, çemberler, raketler, file).				
2	Beden eğitimi dersinde, öğretmenimiz farklı türde branşları öğretmek için bizi okulumuzun farklı yerlerine götürür (örneğin spor salonu, çim saha, basketbol sahası).				
3	Beden eğitimi dersinde, bir ders süresince farklı aktiviteler/etkinlikler deneyebiliyorum.				
4	Beden eğitimi dersinde yaptığımız aktiviteler bir dersten diğerine değişiklik gösterir.				
5	Beden eğitimi dersinde, yaptığımız aktivitelerin amaçları çeşitlilik gösterir. (örneğin becerileri veya zindeliği geliştirmek, takım olarak çalışmak, puan toplamak, karar verme kabiliyetini geliştirmek).				
6	Beden eğitimi dersinde, bir konuyu anlamazsam öğretmenim bana onu öğretmek için farklı yollar kullanır (örneğin öğretmenim bana bir beceriyi nasıl yapacağımı söyler veya gösterir).				
7	Beden eğitimi dersinde, farklı beceri düzeylerine sahip öğrencilerle çalışabiliyorum (örneğin başlangıç düzeyi, ileri düzeyi).				
8	Beden eğitimi dersinde, aktiviteler farklı şekillerde öğretilir (örneğin takım oyunları, eşli oyunlar, değişmeli tur oyunları).				