

Effects of Novelty Support in the Physical Education Lesson on Motivation and Academic Performance of Children aged 9-12 Years

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Abstract

Purpose: This study aimed to examine the impact of supporting the need for novelty on motivation toward physical activity and academic performance of primary school children.

Methods: A quasi-experimental design with a pretest-posttest framework was utilized in this research, involving a sample of 55 children aged between 9 and 12 years. The participants were split into two distinct groups: an intervention group of 28 children and a control group of 27 children. The intervention group participated in a 16-week novelty support program. To assess the research variables, standardized assessment tools were employed, and the data were subsequently analyzed using ANCOVA.

Results: The analysis conducted at the conclusion of the intervention revealed significant differences among the groups for the assessed parameters, including autonomous motivation and academic performance metrics ($P < 0.001$). These results indicate that the novelty support intervention effectively improved both autonomous motivation and academic performance in children.

Conclusion: These findings highlight the importance of incorporating novelty in physical education to motivate students to participate in physical activity and enhance academic performance. Therefore, it is crucial for physical education teachers to adopt teaching styles that support the need for novelty.

Keywords: Novelty, Motivation, Exercise, Physical Education, School Teachers

INTRODUCTION

The promotion of active lifestyles is a key objective for contemporary societies, particularly given that approximately 75% of children fail to engage in sufficient physical activity (van Sluijs, et al. 2021). In this context, schools play a crucial role, with Physical Education being essential for fostering healthy habits (Pulimeno et al. 2020). As the sole component of the curriculum that mandates structured and regular physical activity, Physical Education holds significant potential (Michael et al. 2021). However, the limited hours allocated to this subject vary across different countries. Therefore, while it offers a direct means to enhance physical activity levels, it is equally vital to ensure that the experience is psychologically rewarding to motivate

students to pursue physical activities outside of school (Farhangnia, Hassanzadeh, & Ghorbani, 2020). Recent research has increasingly focused on students' basic psychological needs in conjunction with motivation, recognizing that these teaching factors significantly impact their experiences in Physical Education classes and can influence important outcomes such as academic performance, the desire to participate in extracurricular activities, and overall leisure-time physical activity (Dana, Vesal Alipour, & Ghorbani, 2022; Rodríguez Macías, Abad Robles, & Giménez Fuentes-Guerra, 2021; Trigueros et al. 2019).

Self-Determination Theory serves as a foundational framework for understanding how to enhance individual motivation towards increased physical activity and the adoption of an active lifestyle (Lev-Arey, Gutman, & Levental, 2024). Central to this theory are the Basic Psychological Needs, which encompass autonomy, competence, and relatedness (Patrick & Canevello, 2011; Teixeira et al. 2012). Autonomy involves the ability to make independent choices and connect personal capabilities with emotions and limitations. Competence is a dynamic concept that influences an individual's drive for mastery and success; those who perceive themselves as competent are more likely to engage actively in tasks and enjoy positive experiences. Relatedness pertains to the quality of interpersonal relationships and the sense of belonging within a community; fulfilling this need fosters connections with others, while its frustration can lead to feelings of isolation. Understanding these Basic Psychological Needs not only guides individual motivation but also aids parents, educators, and healthcare professionals in creating supportive environments that enhance participation and effectiveness in various contexts (Lev-Arey, Gutman, & Levental, 2024; Patrick & Canevello, 2011; Teixeira et al. 2012).

Motivation plays a crucial role in Self-Determination Theory (Yang & Qian, 2024). Within this framework, two distinct types of motivation are identified: autonomous motivation and controlled motivation (Ganotice et al. 2023). Autonomous motivation encompasses intrinsic motivation and identified regulation, while controlled motivation includes introjected regulation and external regulation. Research indicates that autonomous motivation is linked to enhanced performance across various activities, whereas controlled motivation tends to correlate negatively with performance outcomes (Huang, et al. 2023). According to Self-Determination Theory, fulfilling the three basic psychological needs is essential for fostering autonomous motivation in individuals, enabling them to engage effectively in specific activities (Torre 2024).

Recent research has highlighted the importance of novelty as an essential need, complementing the needs outlined in self-determination theory (Fernández-Espínola et al. 2020; Fierro-Suero et al. 2024). The concept of novelty encompasses the desire to encounter experiences that are unfamiliar, such as meeting new people, discovering different scents, exploring new environments, or engaging in novel activities (González-Cutre et al. 2016, 2019). Physical Education teachers cultivate innovative approaches by introducing activities that are unfamiliar to students, exploring alternative content beyond traditional curricula, utilizing diverse materials, and implementing creative teaching methodologies (González-Cutre et al. 2020, 2023). Novelty plays a crucial role across various domains of life, such as education, work, leisure, physical activity, and social relationships. For example, students and athletes benefit from integrating new experiences with established routines to find an optimal balance that enhances their motivation, satisfaction, overall well-being, and performance (Fierro-Suero et al. 2020). Research indicates that the support of novelty fulfills basic psychological needs, which is a predictor of autonomous motivation (Aibar et al 2021; González-Cutre et al. 2020). Furthermore, evidence suggests that satisfaction derived from novelty in physical education is closely linked to the enjoyment of related activities (Khajeaflaton Mofrad, 2024; Zaborova, Voronov, & Shestakov, 2024). Studies indicate that fulfilling the need for novelty is linked to the satisfaction of basic psychological needs and enhances intrinsic motivation (González-Cutre et al. 2016, 2019). Furthermore, in the context of physical education, the fulfillment of novelty is correlated with increased autonomous motivation, enjoyment, and a sense of vitality during physical activities (González-Cutre et al. 2020, 2023).

The engagement in extracurricular physical activities is significantly shaped by individuals' prior intentions to participate. A primary objective of Physical Education is to encourage lifelong physical activity among students. Research indicates that the motivational experiences during Physical Education classes play a crucial role in shaping their intentions. This study aimed to test whether perceived teacher support for novelty would positively influence motivation toward physical activity. Furthermore, it was aimed to examine whether novelty support in physical education would lead to an increase in academic performance.

METHODOLOGY

This research utilized a quasi-experimental design involving 55 children, comprising 29 boys and 26 girls, who were recruited from regularly schools. The sample size was determined using G*Power, which indicated that a minimum of 51 participants was necessary, thus the study included 53 children aged between 9 and 12 years (Mage: 10.77±1.12 years), focusing specifically on primary school students. The participants were randomly assigned to either the intervention group (n=28) or the control group (n=27). Inclusion criteria were being a primary school student, physically and mentally healthy and parent consent form. Also, exclusion

criteria ruled out individuals with other comorbid psychiatric or neurological conditions. The research protocol received approval from the University Ethics Committee, and informed consent was obtained in writing from both the participants and their parents.

The Revised Perceived Locus of Causality in Physical Education (PLOC-R) was utilized to assess motivation regulation in physical education classes (Moreno Murcia, González-Cutre Coll, & Chillón Garzón, 2009). In this study, the students answered to “autonomous motivation” part of the questionnaire encompassing dimensions such as intrinsic motivation and identified regulation. Students responded to eight items beginning with the prompt “I take part in PE ...” using a 7-point scale, where 1 indicated strong disagreement and 7 indicated strong agreement. Each subscale included four items corresponding to amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation. The reliability of the questionnaire was confirmed with a Cronbach’s alpha coefficient of 0.94. To evaluate the academic performance of students, the average grades from the first and second rounds were utilized. In this study, the grade point average from the first round served as a pre-test for academic performance. Subsequently, all students in the experimental group participated in novelty support intervention during the interval between the first and second semesters. Finally, the average grades from the second round were assessed as the post-test for academic performance.

Demographic data, including age, parental financial status, and educational background, was gathered from both parents and school officials. Additionally, students' height and weight were measured using standardized tools. Following established methodologies from previous research, the study's experimental design included pretest, intervention, and posttest. In the pretest, the participants of both groups completed research questionnaires, which required approximately 15 to 20 minutes. The intervention group then participated in a 16-week program where physical education teachers implemented specific strategies learned during a training course, focusing solely on these methods during classes. Teachers were permitted to seek guidance from experts as needed. A week after the intervention, participants completed a posttest similar to the pretest. The control group underwent the same testing procedures as the intervention group but continued with their regular physical education classes without any additional instructional support for their teachers.

Before the intervention commenced, the physical education teachers in the intervention group were briefed on the study's objectives. They then participated in a five-day training course, each session lasting three hours, which was grounded in Self-Determination Theory and led by an academic expert in physical education for special schools. This course took place in a university classroom equipped with comprehensive visual and video resources, allowing for interactive role-playing. Throughout the training, teachers were encouraged to engage actively and pose questions. On the first day, the expert provided an overview of Self-Determination Theory, highlighting various types of motivational regulation, the significance of fulfilling basic psychological needs to foster autonomous motivation, and the influence of the physical education teacher's instructional style—whether supportive or controlling—on satisfying these needs. The session also addressed how cultivating autonomous motivation can enhance outcomes in the physical education context, such as enjoyment, engagement in activities, and the intention to increase physical activity. From the second to the fifth day, the focus shifted to equipping physical education teachers with diverse strategies that incorporated innovative materials, environments, and activities aimed at satisfying students' need for novelty, drawing primarily from insights in existing research.

In this research, the variables were defined through the calculation of the mean and standard deviation (SD). The Kolmogorov-Smirnov test was employed to evaluate the normality of the data distribution, revealing P values exceeding 0.05 across all results. To compare the pretest scores among the different research groups, an independent t-test was performed. Furthermore, analysis of covariance (ANCOVA) was utilized to examine the differences between the two groups from pretest to posttest. A significance level of 0.05 was established for all analyses, and the data were analyzed using SPSS version 27.

RESULTS

Table 1 presents the average and standard deviation of the demographic characteristics of the study participants. The mean ages for the intervention and control groups were 10.79 ± 1.15 years and 10.74 ± 1.10 years, respectively, with no statistically significant differences observed ($P > 0.05$). Additionally, initial assessments revealed that the body mass index (BMI) of participants in both groups was comparable, again indicating no significant differences ($P > 0.05$). Furthermore, approximately 75% of the parents reported a medium level of financial status, while around 52% had attained a college education.

Table 1. Comparison of the demographic data across groups

Variable	Intervention	Control	Comparison
Age (years)	10.79 ± 1.15	10.74 ± 1.10	$P = 0.956$
Height (m)	1.36 ± 0.12	1.37 ± 0.14	$P = 0.927$
Weight (kg)	34.22 ± 2.14	35.02 ± 3.63	$P = 0.714$
BMI	18.5 ± 1.33	18.7 ± 1.45	$P = 0.882$

Comparison of research variables in the pretest

Table 2 presents the mean and standard deviation for autonomous motivation, which includes intrinsic motivation and identified regulation, alongside academic performance metrics. The results indicate that the mean intrinsic motivation scores were 3.26 for the intervention group and 3.22 for the control group, reflecting a moderate level of intrinsic motivation among the children, with no statistically significant differences observed between the groups ($P=0.866$). Similarly, the mean scores for identified regulation were 3.23 for the intervention group and 3.25 for the control group, again showing a medium level of identified regulation and no significant differences ($P=0.890$). In terms of academic performance, the intervention group achieved a mean score of 17.31, while the control group scored 17.26, with no significant differences noted ($P=0.637$). These results suggest that both groups exhibited comparable baseline conditions regarding the assessed variables.

Table 2. Comparison of research variables in the pretest

Variable	Intervention	Control	Comparison
Autonomous motivation			
Intrinsic motivation	3.26 ± 1.12	3.22 ± 1.16	$P=0.866$
Identified regulation	3.23 ± 1.08	3.25 ± 1.02	$P=0.890$
Academic performance	17.31 ± 2.33	17.26 ± 2.54	$P=0.637$

Comparison of pretest-posttest

Table 3 illustrates the average changes in autonomous motivation, encompassing both intrinsic motivation and identified regulation, as well as academic performance metrics from pretest to posttest. The analysis conducted at the conclusion of the intervention revealed significant differences among the groups for the assessed parameters, including autonomous motivation and academic performance metrics ($P<0.001$). These results indicate that the novelty support intervention effectively improved both autonomous motivation and academic performance in children.

Table 3. Comparison of pretest-posttest

Variable	Mean difference Intervention	Mean difference Control	F value	P-value
Autonomous motivation				
Intrinsic motivation	1.28	0.02	8.746	<0.001
Identified regulation	1.43	0.03	10.526	<0.001
Academic performance	1.13	0.10	7.639	<0.001

DISCUSSION

The participation in extracurricular physical activities is heavily influenced by individuals' initial intentions to engage. A key goal of Physical Education is to promote lifelong engagement in physical activity among students. Research has shown that the motivational experiences encountered during Physical Education classes are vital in shaping these intentions. This study sought to investigate whether perceived teacher support for innovative approaches would enhance motivation for physical activity. Additionally, it aimed to determine if such support in physical education could lead to improved academic performance.

Our findings showed that novelty support intervention in physical education class positively affects the autonomous motivation in physical education class. In addition, novelty support intervention was able to have a positive effect on the academic performance. These findings were consistent with the findings of previous studies (Fernandez-Espínola et al. 2020; Fierro-Suero et al. 2024; González-Cutre et al. 2016, 2019). To interpret these findings, it can be sated that fostering a desire for novelty can help fulfill basic needs, which subsequently enhances autonomous motivation through the process of internalization (Ye, Li, & Zhang, 2025). This process involves the transformation of behaviors that were initially driven by external factors into actions motivated by internal sources, reflecting a shift towards intrinsic motivation (Li, Sueb, & Said Hashim, 2025).

The self-determination theory posits that engaging in autonomous behaviors and fulfilling psychological needs can facilitate the internalization of actions (Lev-Arey, et al. 2024). This internalization process transforms behaviors that were initially motivated by external factors into those driven by internal motivation (Baniasadi et al. 2022). It highlights that behavioral contexts are not rigid but rather adaptable, influenced by supportive environmental elements that encourage independent actions, such as those found in a physical education setting (Patrick & Canevello, 2011). Research indicates that physical education teachers can enhance the need for novelty by incorporating alternative sports like volleyball, introducing dynamic activities such as martial arts, facilitating out-of-school experiences like parkour, utilizing digital tools such as mobile apps, implementing gamification strategies, crafting guiding questions, assisting in the development of clear action plans, and offering a diverse and innovative array of physical activities during classes (González-Cutre et al. 2020, 2023).

The findings indicate that, despite the challenges associated with planning curriculum-based activities in physical education classes, employing interpersonal teaching styles that address fundamental psychological needs—particularly the need for novelty—can significantly enhance children's motivation to engage in physical activity. This suggests that physical education teachers should prioritize self-determined teaching approaches in their classes to foster greater participation among students (Khajaeafaton Mofrad, 2024; Zaborova, et al. 2024; Salehian, Ezzati Arbat, 2023; Salehian, Hosseinzadeh, 2023; Salehian et al., 2022).

The strengths of our study include the novel application of the need for novelty within a physical education context specifically for primary school students, marking a first in this area. However, the study's limitations include its focus solely on primary school children, which may restrict the generalizability of the results to other populations. Furthermore, the intervention was exclusively centered on novelty support, whereas previous research has incorporated strategies addressing autonomy, competence, and relatedness to enhance motivation toward physical activity among school students. Future research should explore interventions that encompass all basic psychological needs to provide a more comprehensive understanding of this issue.

CONCLUSION

This research was among the pioneering studies to investigate the impact of a novelty-supportive intervention in physical education classes on motivation and academic performance in children. The results indicated that altering teaching strategies to incorporate novelty support effectively enhanced students' motivation toward physical activity and academic performance. These outcomes suggest that the principles of novelty support can be beneficial for primary school students. This underscores the importance for physical education teachers in education settings to adopt self-determined teaching approaches.

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