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Physical Activity Enjoyment, Physical Activity Behavior, and Motor Competence in Low-Income Elementary School Students

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Abstract: This study aimed to investigate the relationship between low-income elementary school students' physical activity enjoyment and physical activity behavior and to determine if their motor competence predicts their physical activity enjoyment and physical activity behavior. A total of 82 students (51.2% male; M_{age} = 10, SD = 0.861) from two Title I elementary schools in the western United States were involved in this study. The students completed the Physical Activity Enjoyment Scale (PACES), the Physical Activity Questionnaire for Children (PAQ-C), and the Test of Gross Motor Development–Third Edition (TGMD-3). The results of the correlation analysis showed that physical activity enjoyment and physical activity behavior among the students were significantly related, $r(80) = 0.379$, $p < 0.001$. Multiple regression models indicated that locomotor skills were a significant predictor of the level of physical activity enjoyment ($F_{(2,79)} = 8.334$, $p < 0.001$; $t = 3.76$, $p < 0.001$), while motor competence did not predict the level of physical activity behavior. These findings illustrate the importance of both physical activity enjoyment and physical activity behavior and the significant role of locomotor skills in enhancing the level of physical activity enjoyment in this specific population of children. Motor competence should be considered a priority when designing and implementing physical education and physical activity programs for school-aged children from lower-income families.

Keywords: Title I; school health; physical education; locomotor skill; assessment

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1. Introduction

Regular engagement in physical activity has significant health benefits for children [1,2]. However, physical inactivity and sedentary behavior among the age group have unfortunately been troublesome public health issues in the United States [3]. The Centers for Disease Control and Prevention (CDC) warns that insufficient physical activity among children and adolescents can elevate the risk of developing numerous non-communicable diseases, including heart disease, cancer, type 2 diabetes, high blood pressure, osteoporosis, and obesity [4]. Furthermore, a number of research studies have shown that low socioeconomic status is associated with physical inactivity and low levels of health-related fitness among school-aged children. Factors such as limited physical activity opportunities, unhealthy eating habits, and environmental stressors disproportionately affect children from economically disadvantaged backgrounds, contributing to poorer health outcomes [5–7]. Similarly, Peralta et al.'s research emphasized the impact of socioeconomic status on physical activity behaviors. The findings of their research indicated that children attending low-income schools were less likely to achieve healthy physical activity outcomes compared to their peers in higher-income schools [8]. This underscores the crucial role socioeconomic status plays in shaping lifestyle choices and health behaviors.

One of the critical elements of a physically active lifestyle for children is motor competence. Motor competence refers to "the mastery of physical skills and movement patterns that enable enjoyable participation in physical activities" [9] (p. 359), and it significantly contributes to children's physical, cognitive, and social development [10]. A systematic review of motor skills in children around the world suggests motor competence increases with age and children tend to demonstrate greater proficiency in locomotor skills compared with object control skills [11]. Motor competence is typically classified into three components, including postural stability (e.g., static and dynamic balance), locomotor movements (e.g., running and jumping), and object control (e.g., throwing and catching) [12]. Empirical evidence has demonstrated the association between motor competence and physical activity with improved health outcomes, including increased cardiorespiratory fitness [13]; therefore, the appropriate development of motor competence and levels of physical activity are vital for children to sustain health throughout their lifetime. By nurturing motor competence, children develop the skills and confidence needed to engage in a variety of activities, setting the foundation for a healthy and active lifestyle.

Besides socioeconomic status and motor competence, physical activity enjoyment could be another influential factor in habitual physical activity behaviors in children. Previous studies have shown that children are more likely to engage in physical activity when they perceive it to be pleasant and enjoyable [14–16]. The level of physical activity enjoyment has been considered a predictor of many outcomes, such as exercise habit and frequency, learning motivation, and academic performance [17–19]. To increase the level of physical activity enjoyment among children, it is important for them to have sufficient time to participate in physical activity [15,20,21]. While there have been a number of research studies investigating the relationship between physical activity enjoyment and physical activity behaviors among school-aged children in general, there is limited research focusing on this topic with specifically low-income children, even though socioeconomic status is an influential factor for physical activity participation for the age group.

Given the need to explore the factors that can account for physical activity participation among children living in low-income households, it is crucial to investigate low-income school students' physical activity enjoyment, physical activity behavior, and motor competence. Thus, this study aimed to investigate the relationship between low-income elementary school students' physical activity enjoyment and physical activity behavior and to determine if their motor competence predicts their physical activity enjoyment and behavior. Based on the literature discussed above, it was hypothesized that there would be a relationship between low-income elementary school students' enjoyment of physical activity and their actual physical activity behavior. Additionally, it was hypothesized that their motor competence would predict their enjoyment of physical activity and their behavior related to physical activity. The findings of this study have the potential to guide strategies for promoting physical activity among children from low-income households.

2. Materials and Methods

2.1. Participants

The study included a total of 82 students (51.2% male; M_{age} = 10, SD = 0.861). These students were purposefully selected from 13 fourth- and fifth-grade classes in two elementary schools located in a mid-sized suburban area in the western United States. Both of these schools were Title I schools, meaning that at least 40% of the students came from low-income families [22]. The majority of the participants (74.4%) were Hispanic/Latino, while the remaining participants were from different ethnicities, including White (17.1%), Asian (6.1%), Black (1.2%), and Native Hawaiian (1.2%). In both elementary schools, the majority of students (89.6% and 83%, respectively) qualified for free and reduced-price lunch programs.

2.2. Data Collection Procedures

After receiving approval from the Institutional Review Board, district, school, and teacher approvals, along with parental consent and student assent, were obtained to carry out the study. The research was conducted over one semester, during which, a team of trained research associates administered two self-report questionnaires to measure physical activity enjoyment and physical activity behavior. Additionally, motor competence assessments were implemented during physical education classes. The research team included three university faculty members, six graduate research assistants, and ten undergraduate students. All research assistants who participated in data collection were trained by the principal investigator of the project and had demonstrated at least 80% accuracy in motor competence assessment via TGMD video analysis prior to data collection.

2.2.1. Physical Activity Enjoyment

The Physical Activity Enjoyment Scale (PACES) was administered to measure the level of physical activity enjoyment among students [23]. This scale includes 16 items that begin with the statement "When I am physically active . . ." and requires participants to select their level of agreement on a 5-point scale, where "1" indicates strong disagreement and "5" indicates strong agreement. The students completed the scale using iPads during their physical education class, and the research team provided assistance with the iPads and survey questions as needed. For instance, the research team read the questions for students who faced challenges in understanding survey questions, especially if certain words were too advanced for them. PACES is a reliable and valid measure of physical activity enjoyment in children, as reported in previous studies [24–26]. For instance, Latorre Roman et al. found that PACES showed very high internal consistency (Cronbach's alpha = 0.906) in their study. Furthermore, the test–retest reliability of PACES also demonstrated good temporal consistency (Spearman rho = 0.868, $p < 0.001$) [24].

2.2.2. Physical Activity Behavior

The Physical Activity Questionnaire for Children (PAQ-C) was administered to measure students' physical activity behavior [27]. The PAQ-C is a 7-day recall instrument designed to estimate the physical activity levels of children approximately 8 to 14 years of age. This instrument encompasses nine questions and has widely been employed in various research projects with acceptable validity and reliability. Benítez-Porres et al. highlighted its high reliability, with test–retest results showing an ICC = 0.96 for the final score of PAQ-C [28]. The first question was a checklist of 27 typical physical activities and leisure sports, which was slightly modified based on feedback from cooperating teachers about the most relevant physical activities for children in the schools being studied. The last question measured daily physical activity frequency over the last seven days. These two questions were scored using the mean of all responses on a 5-point Likert-type scale. The remaining seven questions captured a segmented time-of-the-day or day-of-the-week pattern, and these seven items were also scored using a 5-point Likert-type scale. Similar to the PACES administration, students completed the PAQ-C using iPads. Throughout this process, the research team provided assistance to students as they completed the PAQ-C.

2.2.3. Motor Competence

The Test of Gross Motor Development–Third Edition (TGMD-3) was implemented to assess the motor competence of students [29]. This assessment tool, designed as a norm-referenced test, is used to identify children aged 3 to 10 with gross motor deficits by assessing 13 fundamental motor skills divided into two subsets, including locomotor and ball skills. The TGMD-3 incorporates standardized criteria for scoring each skill, allowing for comparisons of a child's motor performance with that of their peers. The TGMD-3 has been considered a reliable and valid test as per multiple research studies [30–33]. For this project, only 10 of the 13 assessments in TGMD-3 were selected due to class

time restraints, including six locomotor skills (i.e., running, galloping, hopping, skipping, sliding, and jumping) and four ball skills (i.e., kicking, overhand throwing, underhand throwing, and catching). Students in each class were divided into groups of four to six and rotated through testing stations administered by research team members. The students performed each skill two times after the instructors introduced the skill with physical demonstrations. All the students' performances were video recorded for later scoring, which could elicit a more precise scoring process with the TGMD-3 Examiner's Manual [34].

2.3. Data Analysis

Data were initially screened for missing values, outliers, and violations of statistical assumptions. Descriptive statistics were calculated using mean scores and standard deviations for the data collected from the PACES, PAQ-C, and TGMD-3 instruments. Three analyses using inferential statistics were performed in accordance with the focus of this research project, aiming to investigate the relationship between low-income elementary school students' physical activity enjoyment and physical activity behavior and to determine if their motor competence predicts their physical activity enjoyment and physical activity behavior. All the data analyses were conducted in R with the alpha set a priori at $p < 0.05$ for statistical significance.

A Pearson correlation coefficient was computed to assess the linear relationship between students' physical activity behavior and the level of their physical activity enjoyment. Multiple regression analysis was performed to determine if students' motor competence predicted their level of physical activity enjoyment. The outcome variable was the mean of all 16 questions of the PACES, while two predictor variables included the mean score of six locomotor skills and the mean score of four ball skills in TGMD-3. To determine if students' motor competence predicted their physical activity behavior, multiple regression analysis was also performed. Similar to the first multiple regression model, the outcome variable was the mean of all nine questions of the PAQ-C, while two predictor variables included the mean score of six locomotor skills and the mean score of four ball skills in TGMD-3.

3. Results

The mean scores and standard deviations for PACES, PAQ-C, and TGMD-3 are presented in Table 1. Enjoyment of physical activity was relatively high among students, averaging nearly four on a five-point scale. Analysis of the PAQ-C data revealed that jogging/running ($M = 3.41$, $SD = 1.457$), playing tag ($M = 3.37$, $SD = 1.401$), and walking ($M = 3.37$, $SD = 1.495$) were the most frequently reported physical activities, while badminton ($M = 1.16$, $SD = 0.400$), rowing/canoeing ($M = 1.20$, $SD = 0.597$), and street hockey ($M = 1.17$, $SD = 0.605$) were least reported by students. In terms of TGMD-3, students obtained the highest scores for catching and the lowest scores for overhand throwing.

The result of the correlation analysis showed that physical activity enjoyment and physical activity behavior were significantly moderately correlated, $r(80) = 0.379$, $p < 0.001$. The first multiple regression model indicated that the two predictors (i.e., locomotor skills and ball skills) explained 17.4% of the variance ($R^2 = 0.174$, $F_{(2,79)} = 8.334$, $p < 0.001$). Locomotor skills were a significant predictor of the level of physical activity enjoyment ($t = 3.76$, $p < 0.001$), while ball skills were a nonsignificant predictor ($t = 0.10$, $p = 0.924$; see Table 2). In contrast, the result of the second multiple regression model indicated that locomotor skills and ball skills were not significant predictors of physical activity behavior ($F_{(2,79)} = 2.028$, $p = 0.138$).

Table 1. Descriptive statistics for physical activity enjoyment, behavior, and motor competence.

Assessment Instrument		Max Score	*M*	*SD*
PACES		5	3.91	0.582
PAQ-C		5	3.05	0.668
TGMD-3: Locomotor Skills	Run	4	1.49	0.517
	Gallop	4	1.35	0.408
	Hop	4	1.20	0.476
	Skip	3	1.48	0.499
	Slide	4	1.30	0.267
	Horizontal Jump	4	1.26	0.580
TMGD-3: Ball Skills	Kick	4	1.26	0.470
	Catch	3	1.66	0.411
	Overhand Throw	4	1.15	0.554
	Underhand Throw	4	1.45	0.344

Note: PACES = Physical Activity Enjoyment Scale; PAQ-C = Physical Activity Questionnaire for Children; TGMD-3 = Test of Gross Motor Development–Third Edition.

Table 2. Multiple regression result: Motor competence predicts physical activity enjoyment.

Predictor Variables	*β*	*SE*	*t*	*p*
Locomotor Skills	1.08	0.27	3.76	<0.001
Ball Skills	0.02	0.23	0.10	0.924

Note: Dependent variable = PACES; independent variables = TGMD-3 scores; $R^2 = 0.174$, $F_{(2,79)} = 8.334$, $p < 0.001$.

4. Discussion

The results of this study revealed that low-income students who enjoyed physical activity also participated in more activities in and outside of school. This result is consistent with the findings from a number of research studies previously conducted with children from varying backgrounds and in different contexts [14–16,35,36]. For instance, research by Jin et al. reported that children who enjoyed school-based physical activity, including allocated physical education classes and recess time, were more likely to engage in physical activity [35]. Likewise, Michael et al. indicated that participation in a wider variety of physical activities contributed to students' enjoyment, suggesting that providing students with opportunities to engage in various activities may help them identify the enjoyment and value of physical activity which can lead to lifelong physical activity habits [20]. These findings collectively underscore the importance of integrating varied and enjoyable physical activities within educational settings. Such initiatives not only nurture sustained engagement but can also foster lifelong habits that lead to physical fitness among students from economically disadvantaged backgrounds.

Research consistently underscores the pivotal role of physical activity enjoyment as a key determinant influencing children's sustained engagement in physical activities. This reciprocal relationship suggests that heightened enjoyment of physical activity correlates positively with increased motivation to remain physically active, and correspondingly, students who are more motivated tend to derive greater enjoyment from their participation [37,38]. Within the realm of physical activity, children often experience moments of joy and satisfaction during games, activities, and sports, fostering an intrinsic desire to partake in additional endeavors. Consequently, the dynamic interplay between physical activity enjoyment and behavior underscores their synergistic nature, wherein enjoyment serves as both a catalyst and a consequence of engagement in physical activity. Recognizing the significance of this relationship, schools can strategically prioritize the cultivation of enjoyment during physical activity sessions across various settings, including physical education classes, recess periods, and before- and after-school programs. By emphasizing enjoyment as a fundamental component of physical activity experiences, educators can effectively enhance the overall physical activity levels of low-income stu-

dents, thereby promoting their holistic well-being and long-term adherence to healthy lifestyle practices.

In this study, locomotor skills emerged as a significant predictor of physical activity enjoyment among low-income students, shedding light on a relatively underexplored aspect of the relationship between motor competence and the pleasure derived from physical activity. To date, there are limited studies demonstrating the relationship between motor competence and physical activity enjoyment. The assessment in this study encompassed six fundamental locomotor skills—running, galloping, hopping, skipping, sliding, and jumping—which serve as essential building blocks for children to engage in a myriad of activities both within and beyond the school setting. These locomotor skills constitute the bedrock upon which students can actively participate in sports and physical endeavors, facilitating their enjoyment and fulfillment in the process. Consequently, it becomes imperative for students not only to experience enjoyment during physical activities but also to acquire and refine these foundational skills, as they are instrumental in sustaining and amplifying the pleasure derived from such engagements. One possible explanation for the observed relationship between locomotor skills (not ball skills) and physical activity enjoyment among low-income students is that these fourth- and fifth-grade students primarily engaged in locomotor skills-related physical activities instead of sports that require ball skills after school. Indeed, the top three physical activities identified by students were jogging/running, playing tag, and walking, while activities such as baseball and volleyball were rated lower. By prioritizing the development of basic locomotor skills alongside fostering enjoyment in physical activities, educators can empower low-income students to not only revel in their active pursuits but also lay the groundwork for a lifetime of physical literacy and well-being.

It is worth noting that motor competence (both locomotor skills and ball skills) did not emerge as a significant predictor of students' physical activity behavior in this study. However, multiple research studies have shown the relationship between motor competence and physical activity behavior [39–41]. These studies consistently emphasize the pivotal role of motor competence, particularly locomotor skills, as a foundational competency facilitating children's engagement in physical activity within their daily lives. While the role of motor competence in fostering physical activity participation is widely acknowledged, the findings of this study suggest that it may not exert a predominant influence on the physical activity behaviors of low-income students. Instead, various other contextual factors, such as environmental conditions, social dynamics, and socioeconomic status, may potentially wield a more substantial impact on their participation in physical activities [42–45]. Therefore, while motor competence remains a crucial aspect of physical activity engagement, its relative contribution to behavior among low-income student populations warrants nuanced consideration in light of broader contextual influences. This underscores the necessity of considering external factors beyond students' abilities and skills when facilitating physical activity promotion.

4.1. Implications

As motor competence, especially locomotor skills, is associated with children's physical activity enjoyment, physical education in schools should play an initial role in developing students' motor competence. National physical education standards also emphasize that motor skills are a fundamental part of child development and support everyday movements, so physical education classes should help students develop motor skills across different learning environments [46]. Similarly, a systematic review by Dudley highlighted that improving children's motor skills in physical education is one of the most effective strategies for enhancing their levels of physical activity [47]. Thus, physical education teachers, especially at the elementary level, should offer a wide range of physical activities that help students naturally develop their motor competence, including fundamental and foundational body movements [48–50]. Primary-level (PreK-2) children should have more opportunities to practice fundamental and foundational body movements in physical

education, and then, they can learn advanced movement skills (e.g., properly kicking a ball) at higher grade levels. Those advanced skills are essential to participate in and enjoy a range of physical activities in and outside of schools. When teaching fundamental and foundational body movements at lower grade levels, implementing game-based activities (e.g., tag games) and incorporating game elements (e.g., fleeing and chasing) into learning activities can be excellent strategies.

Given that children spend a significant amount of time in school, physical education is an ideal place to promote physical activity for the age group [51]. The goal of physical education is to help students develop not just skills and knowledge related to physical activity and sports but also social and personal skills that can lead to a healthy and active lifestyle [46]. Physical education teachers are responsible for providing students with appropriate activities with full consideration of the affective learning domain (focusing on emotional aspects) in allocated physical education class time. While teachers help students develop appropriate knowledge about various physical activities and sports, they should also enable students to have positive perceptions about active lifestyles that can motivate students to participate in and enjoy physical activities in and outside of school. For example, teachers can create a motivational learning environment, increase students' autonomy by offering multiple choices, provide modifications and challenges for students with diverse backgrounds, and implement cooperative learning [48–50,52]. The newly released national physical education standards suggest a more student-centered approach to the standards, with standard 4 addressing the importance of giving students opportunities to reflect on their own experiences in physical education [46]. By allowing students to explore various physical activities with autonomy, physical education becomes more meaningful.

Students from low-income families may not receive enough support from their parents to participate in physical activities and sports [8]. To tackle this issue, schools can provide physical activity opportunities throughout the day beyond the allocated physical education time. The comprehensive school physical activity program (CSPAP) model can be a promising approach to increasing physical activity opportunities for these students. Serving as a multi-component strategy, the main focus of the CSPAP model is to maximize physical activity opportunities within school communities, with physical education as the cornerstone and foundation [51]. In addition to physical education classes, schools can offer opportunities for physical activity before, during, and after school. For instance, fostering active transportation through programs like Safe Routes to School encourages children to walk or bike to school safely, thereby incorporating physical activity into their daily routines [53]. Moreover, optimizing recess periods and integrating movement breaks throughout the school day offer additional avenues for students to engage in physical activity [54]. Recognizing that students from low-income families may have fewer opportunities for structured after-school activities, schools can also offer enriching after-school programs that cater to their interests and needs while promoting movement [55]. Notably, research by Brusseau et al. underscores the efficacy of implementing the CSPAP model in improving both physical activity levels and health-related fitness among children from low-income backgrounds [56]. For the successful implementation of the CSPAP model, it is crucial that all staff members, including administrative personnel in the school, students' families, and communities around the school, work together to create an active school environment [51]. Obtaining support from families and the community can lead to more physical activity opportunities for students [57–59].

The participants in this study were students enrolled in elementary schools that were qualified as Title I, which made them a unique population. National reports and research studies have shown that students from low-income families often lack adequate environmental, educational, and health-related support and resources from both their parents and schools [60–63]. These factors, which include insufficient equipment, facilities, resources, financial support, and others, can contribute to low levels of physical activity among low-income students in their daily lives. Research shows that promoting physical

activity for children from low-income families can be challenging due to various barriers linked to family and home environments [64,65]. For instance, parents' work schedules, which may involve working at night or on weekends, can limit the amount of time they can devote to physical activity with their children. During out-of-school hours, children may require additional time for physical activity. As previously discussed, schools can consider providing children with more opportunities for physical activity on school campuses in accordance with the CSPAP approach.

Another factor contributing to low levels of physical activity among children from low-income families is the community context. Research by Finkelstein et al. found that transportation, neighborhood inequities, and limited engagement with the community are barriers to promoting physical activity for children from low-income families [65]. The authors emphasize the significance of community engagement and stakeholder involvement in planning initiatives to improve community health. Aligning with the CSPAP approach, which highlights the importance of community engagement in creating an active school environment [51], schools should find a way to work with the community to promote and encourage physical activity. Finkelstein et al. also suggest improving parks and recreation centers, using existing facilities more effectively, and providing subsidized transportation. If schools can assist in identifying these facilities and resources while collaborating with community organizations around the school, it could be more realizable to support low-income families. Promoting physical activity can be approached in consideration of the socioeconomic context in which children live and learn. Developing and implementing policies to enhance access to recreational spaces is an essential step toward promoting health equity among children of all socioeconomic backgrounds. Promoting physical activity among students from low-income families requires a multifaceted approach that involves collaboration between schools, communities, various stakeholders, and policymakers.

4.2. Limitations

This study has a few limitations that need to be addressed in future research. Firstly, the sample size was small, which may affect the generalizability of the findings. However, this study used multiple regression analysis with two predictors, and the power analysis suggested that a target number of 478 participants was needed for a small effect size, 67 for a medium effect size, and 31 for a large effect size ($p < 0.05$; 80% power) [66]. With 82 participants, this study's sample size is larger than the acceptable 67 for a medium effect size. Second, a large portion of participants in this study were Hispanic/Latino (74.4%), which might make it hard to represent students with diverse backgrounds; therefore, it is suggested to recruit students with different ethnicities in future studies. Additionally, the present study is exploratory research to investigate the correlation and predictive nature among several variables within a unique population. Future research can implement an intervention to examine its actual influence on the physical activity enjoyment, physical activity behavior, and motor competence of students in low-income families. Finally, due to time restraints, only 10 of 13 assessments of TGMD-3 were used in this study. Future research is recommended to use the 13 assessments of TGMD-3 to obtain more comprehensive information regarding students' motor competence in Title I schools. Despite these limitations, this study is still valuable because there has been limited research conducted on this topic with this unique population, and the findings of this study can contribute to the body of knowledge related to this specific population. By working together, these entities can address complex challenges and create environments that facilitate physical activity, thereby promoting the overall well-being of children in low-income areas.

5. Conclusions

Over the years, a large body of research has indicated that children in low-income households have limited opportunities to engage in physical activities despite the well-known benefits of physical activity among school-aged children. The results of this study showed a significant relationship between physical activity enjoyment and physical activity behavior and the critical role of motor competence, especially locomotor skills, in predicting physical activity enjoyment among students in Title I elementary schools. These findings suggest that motor competence should be considered one of the priorities when implementing physical education and physical activity programs for school-aged children from low-income families. In this study, no significant relationship was found between motor competence and student physical activity behaviors. Future research could delve into this aspect by gaining insights from students to understand the underlying reasons. Furthermore, the findings give schools, school administrative personnel, and physical education teachers, especially in low-socioeconomic-status areas, insights when designing physical education curricula and developing school-based physical activity programs.

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