

**Surveying Students' Experiences and Thoughts Related to Alternative
Environment Activities in Physical Education**

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Abstract

Purpose: Alternative Environment Activities (AEAs) are described as physical activities conducted beyond the gymnasium or sport field. These activities are emphasized in Ontario's Health and Physical Education curriculum, yet students' perspectives and experiences with AEAs remain underexamined, thus creating the conceptual foundation for the present research. Specifically, this study investigated Students' AEA experiences and current viewpoints on AEAs in PE.

Methods: This study followed a conceptual framework and utilized a quantitative approach. A cross-sectional online questionnaire (34 items; 10-15 minutes) was administered to Grade 9 students in Ontario schools and summer camps (ethics: Brock REB 24-051). A total of 104 participants were recruited for the study of which 94 met the inclusion criteria for whole sample descriptive analysis. An AEA experienced subsample of 57 participants was examined for inferential tests. Analyses (JASP 0.95.3) included t-tests, ANOVAs, and linear regressions.

Results: Students reported diverse AEA exposure, with a shift from "no exposure" in K-6 towards monthly or higher frequency in 7-9. AEA participation peaked in spring, followed by fall and winter. AEAs occurred most at school and within walking distance; and dryland AEAs were most enjoyed across grades; snow/ice enjoyment increased in grades 7-9. Students strongly endorsed the value of AEAs in PE and specifically the novelty, contact with nature, fun, and field-trip potential they provide. AEA inclusive lessons were associated with higher enjoyment, willingness to participate, and intention to continue PE than non-AEA lessons.

Conclusion: This study holds significance within the PE field as it shows that students

view AEs as valuable and beneficial to the curriculum. AEs promote greater participation and enjoyment in PE, highlighting their role in keeping programs engaging and meaningful. Practitioners should maintain AEs as a foundational element and consider which types and settings best support student interests and sustained involvement.

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Chapter 1: Introduction

Purpose of Research and Research Questions

In today's rapidly evolving world, where technology invades every aspect of our lives and sedentary lifestyles are on the rise (Haghjoo et al., 2022), the need for diverse and engaging physical education (PE) programs has never been more critical (Michael et al., 2016). Traditional PE curricula often focus on competitive sport and a limited set of activities, leaving many students disengaged and uninspired (Ferry & McCaughtry, 2013). Recognizing the importance of fostering a lifelong love for physical activity and overall well-being, it is critical to advocate for a paradigm shift in the approach to PE. Encompassing a more varied and diverse range of activities not only caters to the individual interests and abilities of students but also promotes inclusivity and a sense of belonging (Bernstein et al., 2011). By advancing the scope of PE programs, we can nurture a generation of individuals who are not only physically fit but also enthusiastic about exploring a multitude of activities, paving the way for healthier, happier, and more active lives.

It is important that researchers look at learning through a student's perspective because it can help teachers to tailor learning, enhance understanding with respect to what engages and motivates students, and can identify areas for improvement within school curricula. This helps create a student-centered learning environment which enhances the overall quality of education and prepares students for their future endeavors (Lyngstad et al., 2020). Through examining and developing a clearer understanding of student's experiences and viewpoints regarding Alternative

Environment Activities (AEAs) in PE, the results from this study could influence teaching practices, future curriculum, and overall, PE learning experiences of students.

In PE, AEAs refer to physical activities that are not confined to the traditional uses of gymnasiums, sport fields and running tracks settings (Hall et al., 2020). Some examples of AEAs are orienteering, snow shoeing and kayaking. In recent years there has been an increase in research related to AEAs (e.g., Hall et al., 2020; Hall et al., 2022; Robinson et al., 2021), yet almost all this research has focused on teachers and consequently there is a lack of student focused research in this area. The only existing research on students' experiences and perspectives of AEAs in PE was a small-scale study involving interviews with university students conducted this past year (Kuehnen, 2024). Furthermore, existing research on AEAs has primarily examined participants from outside of Ontario.

Kuehnen's (2024) study serves as the foundation for the present research, focusing on a different demographic – grade 9 students in Ontario schools and using a quantitative methodology. By expanding the scope to this specific grade level and employing a quantitative questionnaire, this research aspires to provide a more comprehensive understanding of the experience and viewpoints of current students regarding AEAs in PE, specifically within the Ontario school system. The study is guided by two research questions, outlined as follows:

1. What have been Ontario grade 9 students' experiences with AEAs across their PE programs from grades K - 9?
2. What are grade 9 students' current viewpoints on AEAs in PE programs?

Organization of Thesis

This thesis will consist of five (5) chapters. This introductory chapter presents the research topic, outlines the purpose of the study, and poses the research questions. Chapter two (2) will offer a comprehensive literature review focused on PE in Ontario, traditional PE programs, and student participation levels in PE. It will explore teachers' influence on PE programming and alignment with adult activity habits. Additionally, this chapter will make a case for AEA in PE by laying out where things stand, emphasizing the benefits of AEA and their integration into the PE curriculum. The chapter will conclude with a summary of key points discussed. Chapter three (3) will comprise an explanation of the chosen methodology, which involves basic quantitative research. It will detail the methodology of the study, positionality of the researcher, participants and recruitment, data collection instruments involved in the research process and data analysis. Additionally, the reliability and validity of the study will be discussed. Chapter four (4) will present the results of the data analysis. It will include descriptive statistics for full sample and an AEA-experienced subsample group, examining students' experiences with AEA from Grades K-9 and their viewpoints on AEA inclusion in the PE curriculum. ANOVAs, t-tests, and linear regressions were used to explore the relationships between key variables. This chapter will summarize patterns, trends, and relationships observed in the data, providing a clear overview of quantitative outcomes relevant to the study's objectives. Chapter five (5) will provide an in-depth discussion and interpretation of the findings in relation to the existing literature. Additionally, this chapter will identify limitations and recommendations for future directions.

Chapter 2: Literature Review

Introduction

This literature review is broken down into three main sections. The first section, “*Traditional PE Programs*”, will provide an overview of teachers’ influence on PE programming, the alignment with adult activity habits and challenges leading to PE disengagement. The second section, “*PE in Ontario*,” outlines the structure of PE programming within the Ontario Curriculum, emphasizing the requirement for Alternative Environment Activities (AEAs) and analyzing students’ participation in PE programs and physical activity levels. The third section, “*Making a Case for AEAs in PE: Where Things Stand*,” focuses on the potential benefits and limitations of AEAs in PE, AEAs in the PE curriculum, and teachers’ embracement of AEAs in PE.

While AEAs represent a relatively new area of research in the field of PE, limited work has been conducted on students’ experiences and perceptions regarding the inclusion of AEAs in PE programming. This highlights the need for further investigation. To address this gap, this study seeks to answer the following questions:

1. What have been Ontario grade 9 students’ experiences with AEAs across their PE programs from grades K - 9?
2. What are grade 9 students’ current viewpoints on AEAs in PE programs?

Traditional PE Programs

The traditional PE curriculum in North America generally encourages PE programs that utilize a sport-centered approach (Ennis, 2014). This means that a

significant portion of PE classes revolve around organized sports such as basketball, soccer, baseball, and others (Ferry & McCaughtry, 2013). Students often participate in team sports where they learn rules, practice skills, and engage in competitive games (Ward et al., 2022). While this model has long been a cornerstone of PE programs, research suggests that it provides limited opportunities for students to enhance the main foundations for lifelong physical activity and develop a wide variety of movement competencies (Armour & Harris, 2013). This overarching theme of sport has become apparent in PE programs; a focus that has generated both advantages and disadvantages (Ferry & McCaughtry, 2013).

Incorporating sports into PE classes offers several benefits for students. First, it promotes physical health and fitness by providing a structured environment for regular exercise, helping students develop strength, endurance, and coordination (Goudas & Giannoudis, 2008; Martínez-Santos et al., 2020). Beyond physical health, sports in PE foster social skills and teamwork, as students learn to communicate effectively, collaborate, and support each other in working toward common goals (Bailey et al., 2009). Additionally, for some students' sports can boost self-esteem and confidence, as students gain a sense of accomplishment through practice and perseverance. For students who thrive in competitive environments, PE can be a source of motivation and excitement, reinforcing their enthusiasm for physical activity (Hagger et al., 2014). However, for students who struggle with sport-based PE, the experience can be discouraging, leading to avoidance behaviours and negative associations with physical activity (Ntoumanis et al., 2004).

While the benefits of incorporating sports into PE classes are significant, it is essential to recognize the potential drawbacks of placing too much emphasis on sports. When sports dominate the curriculum, students who may not excel in traditional athletic settings or who have physical limitations risk being excluded (O'Connor et al., 2024). This can lead to feelings of isolation or inadequacy among students who do not fit the traditional athletic mold. Studies have shown that an excessive focus on sports in PE has resulted in a decline in enjoyment and participation levels within classes, promoting growing concerns in the educational community (Banville et al., 2021; Barney et al., 2015). Furthermore, overemphasizing competitive sports can sometimes overshadow PE's core purpose: to develop movement competence, educate, and establish a foundation for lifelong physical activity (Piggins, 2020).

Sport in PE is frequently shaped by broader competitive influences, including experiences in school settings, community sports leagues, and televised events. These contexts tend to emphasize scores and winning as the primary focus of the sport, which can lead students to carry an overly competitive mindset into their PE classes (O'Connor et al., 2024). Consequently, students might push too hard to secure a win, heightening their risk of injury (Goossens et al., 2019). Furthermore, less skilled students might feel excluded due to the intense pressure to perform well, adding stress and anxiety to students. Negative social dynamics such as bullying or aggressive behaviour can emerge in an overly competitive environment, impacting the overall atmosphere of PE classes (Wei et al., 2023).

To mitigate these challenges, PE programs should strive for a more balanced approach. It is crucial to incorporate a wide variety of physical activities into PE

programming rather than relying solely on traditional sports. By broadening the scope of PE to include more activities that emphasize personal growth, skill development, and lifelong movement, educators can create a more inclusive and engaging environment for all students.

Teachers' Influence on PE Programming

It is not only the policymakers and curriculum that emphasize sport in PE; PE teachers significantly shape students' learning experiences through their choices in instruction and activity selection (Banville et al., 2021). While the Ontario HPE curriculum does include sport-related outcomes, it is designed to promote a broad, well-rounded approach to physical literacy, health, and well-being rather than prioritizing competitive sports (Ontario Ministry of Education, 2015). Teachers are responsible for implementing the curriculum, selecting appropriate activities, and creating a positive learning environment for students.

Teachers' personal backgrounds, experiences, personal confidence, and teaching styles can all directly influence the content and delivery of PE programs (Halpern, 2018; Zhou, 2024). Many individuals are drawn to become PE teachers due to their strong personal connection with competitive sports during their teenage years, fostering a desire to continue their love for their sport by joining PE teachers' education (PETE) programs (Ferry & McCaughtry, 2013). Although the Ontario HPE curriculum supports a variety of movement experiences, including games, dance, fitness activities, and AEA's, the personal sport histories of teachers can shape how the curriculum is interpreted and enacted in practice. However, while this personal connection to sport is strong, it may not always align with the best interests of their students. Harvey and

O'Donovan (2013) indicate that PE teachers are heavily influenced by their own experiences with PE and sport, which can show up in the activities they select for their programs. This tendency can lead to overrepresenting traditional sports at the expense of other movement-based activities. As a result, some students may feel disengaged if their preferences and abilities do not align with sport-centric programming (Halpern, 2018). This suggests that it is less the written Ontario HPE curriculum that pushes sports, and more the way individual teachers choose to implement it. It highlights the importance of PE teachers critically reflecting on their personal biases and ensuring that their teaching approach caters to the diverse needs and interests of all students.

Research by Krings (2023) highlights the significant influence that PE teachers have over students' perception, enjoyment and understanding of PE. PE teachers' preferences and expertise can unintentionally lead to the inclusion of certain sports over other forms of physical activity, potentially limiting the variety of experiences available to students. For example, a teacher with a strong background in basketball may focus more on basketball-related activities, potentially neglecting other equally valuable forms of physical activity and movement. This can impact students' exposure to diverse physical activities and their overall enjoyment of PE (Krings, 2023). Teachers' interpretation of a broadly framed curriculum can result in sport-dominant programming, even when the official policy encourages balance and variety. Teachers must consider the interests and abilities of all students when planning PE programs, ensuring a well-rounded and inclusive approach that caters to the diverse needs of their students while still meeting curricular guidelines.

Alignment with Adult Activity Habits

An over-reliance on traditional team sports in PE programs fails to align with adult activity habits and may ultimately hinder long-term physical activity participation (Bernstein et al., 2011). While some adults consistently engage in competitive sports, a growing number are gravitating toward individual non-competitive activities like strength training, hiking, and biking (Outdoor Industry Association, 2024). This shift suggests that PE curricula emphasizing competitive team sports may not effectively prepare students for lifelong physical activity engagement.

Furthermore, a study conducted by Ham and colleagues (2009) closely analyzed the physical activity patterns of adults, revealing that participation in team sports declines significantly post-adolescence, with a greater preference for non-sport-based physical activity. The low rates of adult engagement in traditional team sports – which remains a focal point in North American PE – suggest a misalignment between school-based PE experiences and the realities of lifelong physical activity participation (Ham et al., 2009).

The decline in physical activity habits often stems from a young age, influenced by the PE curriculum. Ferry & McCaughtry (2013) highlight the concern regarding the disconnect between the wider adult physical activity trends favouring non-sport setting activities and the sport-dominant curricula that comprise many PE programs. They note a seeming 'silence' about this issue in the PE field. Findings suggest that secondary school PE participation has a significant impact on physical activity levels over time (Buchan et al., 2025; Ferry & McCaughtry, 2013). There is a clear need for more attention to be directed towards the inclusion of activities that foster lifelong physical

activity. Incorporating AEAs into PE programs can be instrumental in aligning these programs with adult activity habits. AEAs such as hiking, biking, gardening and yoga are popular among adults and can help students develop skills and interests that translate into lifelong physical activity (McNamee & Timken, 2017).

Challenges Leading to PE Disengagement

Students often drop out of PE classes due to a combination of negative experiences, including competitive environments, lack of skill development, social exclusion, and misalignment with personal interests (Bernstein et al., 2011). While sports-based PE programming can benefit some students, it frequently separates those who do not enjoy or excel in competitive sports (O'Connor et al., 2024). Research indicates that students who feel pressured to perform in a sport-dominant setting are more likely to disengage from PE, reducing their motivation to participate in physical activity both in and out of school (Banville et al., 2021; Hagger et al., 2014).

One of the most significant factors contributing to PE dropout is the exclusion of less skilled or non-competitive students (Landolfi, 2014). Traditional PE programs often prioritize high-intensity sports that emphasize competition and performance. Bernstein et al. (2011) found that students' skill levels directly influenced their participation, with low-skilled students feeling excluded from game-like situations. This structure may discourage students who struggle with athletic skills, leading them to experience feelings of inadequacy (Barney et al., 2015). When students perceive limited opportunities for success, their attitudes towards PE become increasingly negative, reinforcing avoidance behaviours (Bernstein et al., 2011). Additionally, the practice of team selection – whether through teacher assignment or peer choice – can reinforce

social hierarchies, making PE classes an uncomfortable space for those who are not naturally athletic (Wei et al., 2023). Negative social interactions, such as bullying or embarrassment during PE activities, further discourage participation, leading to avoidance behaviours and withdrawal from PE programs altogether (Ntoumanis et al., 2004).

Another factor influencing PE dropout rates is the disconnect between PE curricula and students' personal interests or perceived usefulness (Landolfi, 2014). While PE is intended to promote lifelong physical activity, many students do not see the relevance of traditional sports to their future exercise habits (Ham et al., 2009). Bernstein et al. (2011) emphasized that when students feel forced to participate in competitive activities that do not align with their abilities or interests, their engagement declines. The focus on sports like basketball, soccer, or volleyball may not align with the types of activities students are likely to engage in outside of school, making PE feel disconnected from their fitness goals (Ferry & McCaughtry, 2013). This misalignment can lead to disinterest and disengagement, particularly for students who prefer non-traditional or individual-based physical activities.

AEAs have been proposed to address some of these issues, providing students with a broader range of movement experiences, such as hiking, yoga, and biking (McNamee & Timken, 2017). However, AEAs are not a universal solution; some students may find them unappealing. Just as some students disengage from competitive sports, others may feel disconnected from outdoor or non-traditional activities. For example, students who prefer structured, fast-paced activities may struggle to engage with the more exploratory or individual nature of AEAs. Additionally,

students' perception of success plays a crucial role in participation, suggesting that if AEA's are not structured to provide achievable skill development, students may feel discouraged (Bernstein et al., 2011). Factors such as accessibility, familiarity, and perceived difficulty of AEA's can also influence whether students see them as a viable alternative to traditional sports (Krings, 2023).

To reduce dropout rates and improve engagement, PE programs must adopt a balanced and flexible approach that considers a variety of students' preferences. Instead of exclusively focusing on one form of physical activity (e.g., traditional sports; fitness activities), PE programming should integrate a diverse range of physical activities that allow students to explore and develop movement skills in ways that feel relevant and enjoyable to them (Standage et al., 2005). This approach can help students build confidence, foster a positive relationship with physical activity, and increase the likelihood of maintaining an active lifestyle beyond their school years.

PE in Ontario

The main purpose of PE is to develop, educate and create a foundation for healthy active living and develop movement competence (Pharez, 2016; Piggins, 2020). In the province of Ontario, PE is taught from kindergarten to grade 12, playing a crucial role in students' overall education. There are no mandated minutes for elementary school PE in Ontario, only a recommended guideline of 150 minutes per week (Swaites, 2022). The implementation of this recommendation is done on a school-by-school basis. Once students reach secondary school, they are required to complete at least one PE credit at some point over their four years to receive an Ontario Secondary

School Diploma (Ontario Ministry of Education, 2015). PE not only promotes physical health but is also essential in shaping students' attitudes towards physical activity, fostering lifelong habits that contribute to overall well-being (Boonekamp et al., 2022).

Overview of Ontario HPE Curriculum

The Ontario Health and Physical Education (HPE) curriculum is structured to address the developmental needs of students at different educational stages, with separate frameworks for elementary and secondary levels. In elementary school, kindergarten to grade 8, the focus is on developing fundamental movement skills, active participation, and understanding health concepts through a variety of activities (Ontario Ministry of Education, 2019). In secondary school, grade 9 to 12, the curriculum builds on these foundations by encouraging students to refine their physical abilities, engage in more specialized sports and activities and develop a deeper understanding of health and fitness principles (Ontario Ministry of Education, 2015).

The Ontario HPE curriculum is guided by five fundamental principles (Ontario Ministry of Education, 2019):

1. Health and PE programs are most effective when they are delivered in healthy schools and when students' learning is supported by school staff, families, and communities.
2. Physical activity is the key vehicle for student learning.
3. Physical and emotional safety is a precondition for effective learning in health and PE.
4. Learning in health and PE is student-centred and skill based.
5. Learning in health and PE is balanced, integrated and connected to real life.

The curriculum emphasizes a holistic approach to learning, focusing on balanced, integrated, and real-life connections (Ontario Ministry of Education, 2019). One key component of the curriculum is the inclusion of AEAs, such as hiking, orienteering, and outdoor pursuits, to encourage lifelong physical activity beyond traditional sports (Ontario Ministry of Education, 2015). These activities are integrated at both the elementary and secondary levels, aiming to provide diverse movement experiences that cater to various student interests and abilities (Ontario Ministry of Education, 2019). The curriculum also emphasizes the importance of effective learning environments, which prioritize physical and emotional safety, use physical activity as the primary learning vehicle, and thrive most when supported by healthy school environments, staff, families, and communities (Ontario Ministry of Education, 2015).

The curriculum promotes a wide range of activities to cater to diverse student interests and abilities. These activities include traditional team sports, personal and fitness activities, rhythm and movement activities, and outdoor activities (Ontario Ministry of Education, 2015).

Students' Participation in PE Programs and Physical Activity

Participation levels of students in PE programs in Ontario are influenced by various factors, such as school policies, resources, and student preferences. While PE is a mandatory component of the curriculum from kindergarten to grade 9, but taught up until grade 12, the level of student engagement can differ. Research has shown that as grade levels increase, student enrollment in PE decreases in Ontario (Hobin, et al., 2010). Specifically, Hobin and colleagues found that enrollment rates in PE at Ontario secondary schools dropped from 73.4% in grade 9 to 51.3% in grade 12. Some

students enthusiastically participate in PE, embracing the opportunity to improve their fitness, develop skills, and engage in team sports (Goudas & Giannoudis, 2008).

However, some students may be hesitant to participate in PE. Students have expressed reluctance to enroll in PE classes because of their dislike for specific physical activities during PE class, repetitive nature of the material being delivered, dominance of male-oriented sports, and the overly competitive curriculum (Barney et al., 2015).

Furthermore, students have expressed that experiencing failure in a physical activity can deter their continued participation in PE (Bernstein et al., 2011). There has been a large amount of evidence suggesting that physically inactive and low participation groups tend to find sports during PE unappealing (Green, 2002; O'Connor et al., 2024; Smith & Parr, 2007). These groups tend to feel less motivated to participate, impacting their engagement in PE classes. Additionally, competing academic demands and varying fitness levels can further affect students' participation.

Previously stated, the recommended amount of time spent on PE is done on a school-by-school basis and is only a recommendation (Swaites, 2022). The absence of mandated minutes for PE in Ontario means that schools have flexibility in how they allocate time for these classes, which can further impact the amount of physical activity students receive at school. The recommended guidelines for youth aged 12-17 is that they should be getting at least 60 minutes of moderate-to-vigorous-intensity physical activity on average daily (ParticipACTION, 2022). In the 2021-2022 period, there was a 14% decline in physical activity among youth aged 12-17, resulting in only 37% of youth meeting the recommended guidelines (ParticipACTION, 2022). The decline in participation should serve as a wakeup call to PE teachers and curriculum developers.

Research indicates that PE and regular physical activity can improve academic performance, focus, concentration, classroom behaviour, mental health, and ability to cope with stress (Ontario Ministry of Education, 2015). To help address these issues of participation it is essential that the current structure and focus of PE programs in Ontario is considered thoroughly. Avoiding an overemphasis on competitive sports, especially team sports, and a greater emphasis being put on other physical activities such as AEA's could help.

Making a Case for AEA's in PE: Where Things Stand

Encouraging balance and variety within PE programs is crucial, recognizing its acute impact on students' holistic development. Striking a balance between different physical activities, from team sports to gymnastics and rhythmic activities to AEA's, fosters not only physical health for students but also mental and social well-being (Gruno & Gibbons, 2020). Additionally, a holistic experience in PE can inspire participants to adopt a lifelong commitment to physical activity. A well-rounded and varied curriculum opens numerous possibilities across different movement domains, which can encompass non-traditional sports settings and holistic forms of movement like dance, gymnastics, or outdoor activities (Robinson et al., 2021).

Azlan and colleagues (2021) propose an efficient and sustainable method for promoting physical activity in PE classes by incorporating enjoyable and meaningful activities. These activities not only appeal to sport-inclined students but also engage those who may not consider themselves as active. Embracing AEA's is one approach to diversifying PE programming, motivating students who are less inclined to participate in

traditional PE, and shifting away from an excessive focus on competition and team sports (Gruno & Gibbons, 2020).

However, while AEs provide an alternative to sport-based PE, they are not immune to some of the same challenges that traditional PE presents. For example, students with lower skill levels or unfamiliarity with AEs may feel just as excluded as they would in competitive sports if AEs are not structured to support gradual skill development and accessibility (Bernstein et al., 2011). Additionally, students who prefer structured, fast-paced, or social environments may feel disengaged (Krings, 2023). Just as competition can be a deterrent in traditional PE, factors such as perceived difficulty, limited prior exposure, or personal disinterest may influence student engagement in AEs (Krings, 2023). Therefore, ensuring that AEs are implemented with flexibility and inclusivity in mind is key to maximizing their benefits without replicating the exclusion and disengagement issues found in traditional PE team sport-focused programming.

Advantages of AEs in PE

While Canadian society predominantly favors indoor schooling, the integration of green schoolyards, naturalized outdoor settings, and outdoor learning can offer opportunities for comprehensive education (Blanchet-Cohen & Elliot, 2011). Some benefits that come with outdoor learning are the positive impact on the social relations between students and social skills, cognitive benefits such as enhanced motivations for learning, enhanced academic performance and behaviour, heightened environmental awareness, and increased physical and psychological well-being (Barrable & Lakin, 2020; Sjöblom et al., 2023). Additionally, outdoor learning interventions have recently been found to improve students' life skills (Qu et al., 2025). Extensive literature

emphasizes the advantages of outdoor learning for students, although not exclusively within the realm of PE, making it a valuable consideration. AEAs can add variety and help balance PE programs, fostering a more holistic approach to education that integrates both indoor and outdoor experiences. There are numerous advantages to incorporating AEAs into PE, as evidenced by Hall and Colleagues (2022). These benefits encompass faster information retention, long-lasting knowledge preservation, reduced anxiety, boosted self-esteem, and enhanced creativity. Moreover, participating in outdoor activities, such as many AEAs, has been shown to effectively limit sedentary behavior, increase the overall physical activity of students, increase enjoyment level, provide the opportunity to explore new activities, and provide a sense of freedom from the traditional gymnasium setting (Gray et al., 2015; Kuehnen, 2024). Kuehnens' study further underscores students' appreciation for AEAs, recognizing their values in offering a variety of programming, ability to promote students to be physically active beyond the confines of schools, and providing students with exposure to the outdoors and nature. Additionally, AEAs have the potential to motivate a wide range of individuals to continue their PE journey, possibly setting many up for a lifetime of physical activity (Gibbons & Humbert, 2008; Smith & Parr, 2007).

To reiterate the definition of AEAs, they encompass any physical activity conducted outside of a traditional gymnasium, fitness facility or designated sports field (Hall & Bradford, 2016). Some common examples of AEAs are hiking, snow shoeing, orienteering, swimming, canoeing, skating and many more. The majority of AEAs take place outdoors, however, there are some AEAs that typically take place indoors such as squash and jai-alai. Additionally, to make certain AEAs accessible year-round in various

climates, many versions of AEAs are offered in specific indoor venues created for the activity (Hall et al., 2020). Some examples of these are indoor swimming pools, ice skating rinks, tennis courts, and rock-climbing walls.

It is notable that for Canadian children, the average time spent outdoors has declined to approximately one and a half hours per day (De Lannoy, 2021), largely attributed to the rise of screen-based entertainment and the impact of the COVID-19 pandemic. By including more AEAs in PE programs, there is a potential opportunity to encourage children to become more active outdoors once again. AEAs can provide numerous advantages similar to outdoor education, yet in a format that is accessible to a broader range of students within PE (Gruno & Gibbons, 2020). PE teachers can find ways to take students outdoors more frequently in PE programs than in other programs as there is a wide variety of activities, such as orienteering, parkour, and gardening, that can be done in the school yard and fall within the requirements for their program.

Integrating AEAs into PE offers a unique opportunity for holistic education (Blanchet-Cohen & Elliot, 2011). By taking students outside of their traditional PE environments, such as gymnasiums or sports fields, a wide variety of activities like hiking and snowshoeing can be introduced (Kuehnen, 2024). This exposure allows students to thrive in diverse settings, fostering their development beyond physical fitness and team sports alone. Research indicates that those who have engaged in AEAs as part of PE perceive these activities as enjoyable and offering new experiences (Hall et al, 2020; Kuehnen, 2024). When students engage in activities they may not have tried before, it can significantly increase their interest and appreciation for PE. This approach not only promotes physical fitness but also encourages personal growth,

social interactions, and an understanding of the natural world aligning with the principles of holistic education (Claver et al., 2020).

Furthermore, AEs are valuable across various developmental levels, providing adaptable and engaging experiences that cater to the unique needs and abilities of students at different points of their PE journey. Many activities that would come under the umbrella of AEs often involve adapting equipment, offering varied intensity levels, and implementing inclusive rules and modifications to accommodate different needs (Grano & Gibbons, 2020; Morrison & Gleddie, 2019). Given that many students may be new to these activities, AEs create a level playing field for all participants in the program (Hall et al., 2022). Additionally, AEs promote peer support and collaboration by encouraging students to work together regardless of their physical abilities. Designed to promote active participation and student success, AEs are integral to enhancing the inclusivity and effectiveness of PE programs (Chen & Garn, 2018).

AEs in the HPE Curriculum

In line with the comprehensive approach of HPE curricula in Ontario, which advocate for diverse forms of physical activity encompassing traditional sports, fitness activities, dance, gymnastics, and AEs (Swaites, 2022), revitalizing students' enthusiasm and engagement in PE is attainable through diverse methods. Over the last twenty years, Canadian PE curriculum documents across various provinces have encouraged the incorporation of AEs into PE programs (Kilborn, 2016). Terms such as "alternative pursuits" (Manitoba Education, Citizenship and Youth, 2004), "individual pursuits" (Nova Scotia, 2014), "outdoor activities" (Newfoundland Labrador Education, 2011), and other similar phrases are often used to describe these AEs in the

curriculum across different provinces, reflecting their diverse nature and the flexibility that AEA's offer in PE.

Despite the emphasis in curriculum documents, practical implementation of AEA's has often fallen short, as highlighted by Hall et al. (2020). The unique challenges of integrating AEA's into PE programs include organizational requirements, safety concerns, costs, transportation, individual knowledge limitations, and associated risks (Robinson et al., 2021). Nonetheless, it remains essential to emphasize the importance of AEA's in PE curricula, as they offer significant benefits for student engagement and the development of lifelong physical activity habits. By addressing these challenges and fostering a supportive environment, schools can better incorporate AEA's, enhancing the overall effectiveness and inclusivity of PE programs.

Distinguishing AEA's from Outdoor Education. While AEA's share similarities with Outdoor Education, they are distinct in both intent and curricular placement. AEA's are embedded within PE programs and focus on helping students develop movement competence, confidence, and decision-making in nontraditional or natural environments such as snow or water (Hall et al., 2020). The emphasis remains on physical skill development and personal challenge within a PE framework. Outdoor Education, by contrast, often sits within a school's broader experiential learning or environmental studies framework (Borsos et al., 2018). Its goal extends beyond physical competence to include environmental awareness, stewardship, and cross-curricular learning.

Teachers' Embracement of AEA's in PE

In many Western countries, modern curricula task PE teachers with delivering a well-rounded and varied education to their students (O'Connor & Penney, 2021). These

comprehensive curricula outline diverse movement domains, encompassing artistic, expressive, and holistic activities like dance, gymnastics, and outdoor pursuits alongside traditional sports (Robinson et al., 2021). Research has found that many teachers are unaware that AEA's are a required component of the curriculum (Hall et al., 2020). Additionally, 60% of PE teachers are unaware of their instructional obligations (Robinson et al., 2021). However, it has been found that professional development specifically relating to the teaching and inclusion of AEA's in PE plays a significant role in teachers' adoption of AEA's in PE programs (Hall et al., 2020). Professional development encompasses activities or programs aimed at enhancing the skills, knowledge, and effectiveness of teachers in their respective areas (Beni et al., 2022). This is typically done through workshops, seminars, courses, or other training opportunities. The goal of professional development is to support educators in staying current with best practices, research in education and innovations (Louws et al., 2018). Hall and colleagues (2020) discovered that PE teachers who are willing to participate in professional development activities focusing on AEA's are likely to be more interested in integrating AEA's into their PE classes. This highlights the positive impact that targeted education related to AEA's can have on teachers' readiness to incorporate new and innovative approaches into their PE teaching practices, such as AEA's.

While professional development can be beneficial, its impact on aiding teachers in implementing AEA's can be limited due to various issues that teachers perceive as barriers to including AEA's in their PE programs regularly. Research by Hall and colleagues (2020) highlights these obstacles, including costs, organizational requirements, time restrictions, safety concerns, transportation, individual knowledge

limitations, and associated risks. Among these barriers, teachers have consistently identified perceived costs associated with AEAAs as the most significant barrier. PE teachers, particularly those who link AEAAs with costly pursuits like snowboarding or sailing, may perceive financial barriers associated with transportation and participation expenses (Robinson et al., 2021). Nonetheless, certain AEAAs, such as orienteering, tobogganing, disc golf, hiking, parkour, and cycling, can be integrated into PE programs at a comparable or even lower cost than many traditional activities (Hall et al., 2022). Teachers believe that reducing the financial burden associated with AEAAs would greatly enhance their successful implementation. These challenges underscore the need for comprehensive support and resources to address the practical concerns that hinder the incorporation of AEAAs into PE programs.

Chapter Summary

This literature review has examined three main sections related to PE and AEAAs. The first section provided insights into traditional PE programs, focusing on teachers' influence on PE programming, alignment with adult activity habits and challenges leading to PE disengagement. The second section examined PE in Ontario specifically the PE curriculum and students' participation in PE programs and physical activity. The third section provided a case for the status of AEAAs in PE, highlighting their limitations and advantages, and discussed teachers' embracement of AEAAs in PE. By understanding these aspects, educators and policymakers can work towards creating more holistic and effective PE programs that cater to the diverse needs and interests of students.

The existing literature specific to AEA is somewhat limited, indicating a clear need for further investigation and research. While prior studies have offered valuable insights, there is still much to explore in understanding the impact and effectiveness of AEA in PE programs. Most notably, there is a need for more research focusing on students' perceptions and experiences with AEA in PE. To date, no research has examined the AEA experiences and perspectives of students' who are still attending elementary or secondary school. Furthermore, the only research that has looked at student experiences and perspectives of AEA was based on qualitative findings from a relatively small and heterogeneous sample (Kuehnen, 2024). Therefore, a larger-scale quantitative study looking into the experiences and perspectives of AEA among students currently in elementary or secondary school seems warranted. By quantitatively examining current students' viewpoints and experiences with AEA in PE, researchers can gain valuable and more generalizable insights into students' experiences and perspectives regarding the inclusion of AEA in PE programming. Additionally, conducting a study such as this has the potential to highlight barriers or facilitators to the successful implementation of AEA in PE.

Chapter 3: Methodology and Methods

Introduction

In this chapter, the research purpose and questions underpinning this study, which focus on AEAs in PE, are restated. The chapter also outlines the study's methodology, the researcher's positionality, participant selection criteria and recruitment process, ethical considerations, data collection methods, data analysis procedures, and considerations for reliability and validity.

Restatement of Research Purpose and Questions

Recent years have witnessed a growth in research around AEAs (e.g., Hall et al, 2022; Kuehnen, 2024). However, most of this research has focused on teachers. The only available research on students' perspectives of AEAs was a small-scale study involving qualitative interviews with university students (Kuehnen, 2024). Therefore, there is a knowledge gap regarding the absence of research on current students' viewpoints regarding AEAs in PE. Consequently, the present research study was designed with the purpose of providing a more comprehensive understanding of the experience and viewpoints of current students regarding AEAs in PE within the Ontario school system. The study was guided by two research questions, outlined as follows:

1. What have been Ontario grade 9 students' experiences with AEAs across their PE programs from grades K-9?
2. What are grade 9 students' current viewpoints on AEAs in PE programs?

Methodology of the Study

This study employed a quantitative methodological approach to comprehensively examine AEA experiences and viewpoints of grade 9 students in Ontario schools. The study followed a cross-sectional research design, utilizing an online questionnaire as the primary mode of data collection. A cross-sectional research design was selected due to its efficiency, cost-effectiveness, ability to provide immediate insights, and its capacity to offer a snapshot of a specific time (Kowalski et al., 2018). Because of the aims of this study, a quantitative approach was deemed most appropriate because it allowed for a large amount of data to be condensed to provide a broad picture (Armour & MacDonald, 2012) of how AEAs in PE have been experienced and are presently viewed by current students in Ontario.

Self-administered online questionnaires were sent out to grade 9 students across various Ontario schools beginning in January 2025 and to youth aged 14-15 at summer camps beginning in July 2025. By utilizing a self-administered format, participants had the opportunity to independently provide their responses, ensuring the integrity and authenticity of the data collected. The decision to employ a quantitative approach is supported by its inherent advantages, as outlined by Mat Roni et al. (2020). Through the use of a questionnaire, it was possible for multiple questions spanning various aspects of AEAs to be posed to participants, enabling the collection of diverse insights and perspectives.

Positionality of the Researcher

As a former varsity volleyball player and current professional athlete, I brought a unique perspective to this research on AEAs within PE. I grew up playing a wide variety of team sports and continue to do so today – this has been a central part of my life and something I'm deeply passionate about. These experiences shaped my identity and instilled in me a strong appreciation for the value of teamwork, competition and physical activity. At the same time, I recognize that not all students have positive experiences with team sports in PE settings.

My passion for AEAs began with my own positive experiences in school, where I was fortunate to engage in a wide variety of non-traditional physical activities, which complemented my love of sport and allowed me to see physical activity through multiple lenses. It was not until I reached university that I began to realize how different my experience was from others. Many of my friends reflected that they had not enjoyed PE and had chosen not to continue being active because of its competitive and repetitive nature. These conversations had a significant impact on me and made me more aware of how traditional approaches to PE can discourage students who do not see themselves as “athletic” in the conventional sense. This growing awareness deepened my commitment to promoting AEAs to provide more inclusive, engaging, and meaningful PE experiences. I believe strongly in the importance of helping students find joy in movement and supporting them in developing lifelong physical activity habits. In this research, I held both insider and outsider positions: I share a strong appreciation for physical activity, yet I differed from the Grade 9 participants in age, authority, and experience. I acknowledge that my interpretations are shaped by my background and

beliefs, and I attempted to remain committed to self-reflection throughout the research process to minimize researcher bias and ensure the data remained central.

Participants and Recruitment

The participant sample selection criteria for this study were based on the research questions and the methods being used. Convenience sampling was chosen for this study because it allowed for ease of access and was cost-effective (Emerson, 2021). This decision was driven by the desire for ease of implementation and resource efficiency. The convenience sampling strategy for this research targeted grade 9 students in both public and private schools in Ontario and youth aged 14-15 in summer camps across Ontario. This selection was purposeful as it represents the culminating compulsory year for PE in Ontario, ensuring participants had a wealth of experiences to draw upon. Existing research demonstrated that gender was associated with PE participation and enjoyment (Bengoechea et al., 2010). Given this established connection, it was important for this study to collect data from both genders to ensure a comprehensive understanding of the factors influencing AEA experiences and perspectives in PE.

The specific participant inclusion criteria for the study encompassed individuals who met the following requirements:

- a) they must have been in grade 9, attending an Ontario public or private school,
- b) required proficiency in the English language as the questionnaire was only provided in English
- c) must have completed all of grade K-9 education in Canada.

Individuals failing to meet any of these criteria were excluded from participating in the study. The inclusion criteria played a critical role in this study by enabling the research to target a specific population, enhance both internal and external validity, and contribute to the statistical power of the study (McElroy & Ladner, 2013).

This study sought to cooperate with both public and private schools in Ontario to gain participants. The public-school boards that were targeted were Halton District School Board, Grand Erie District School Board, the District School Board of Niagara, Hastings and Prince Edward District School Board, Niagara Catholic District School Board, Lakehead District School Board, Superior-Greenstone District School Board, Bluewater District School Board, Greater Essex County District School Board, Toronto District School Board, Durham District School Board, Trillium Lakelands District School Board, and Nipissing Parry Sound Catholic District School Board. The private schools that were approached for potential participation were Ridley College, Great Lakes Christian High School, Smithville Christian High School, Hillfield Strathallan College, Appleby College, and Hamilton District Christian School. To enlist participants, the study depended on ethical approval from school divisions or specific private schools, following already secured ethical approval from Brock University's Research Ethics Board (REB 24-051 HALL). The school boards that gave ethical approval were Halton District School Board, Niagara Catholic District School Board, Trillium Lakelands District School Board, and Superior-Greenstone District School Board. The private schools that gave ethical approval were Great Lakes Christian High School, Hillfield Strathallan College, Appleby College, and Hamilton District Christian School.

Due to challenges in meeting the initial recruitment targets within the originally planned school-based settings, the recruitment period was extended to include youth aged 14-15, the same as grade 9 students, from Ontario summer camps to participate in the study. This adjustment allowed for continued alignment with the study's target population while accommodating the end of the school year. Summer camp settings provided an alternative context for data collection, offering access to participants in a recreational and community-based environment. The following summer camps that approved the study were Brock University Leaders in Training, Balls Falls Leaders in Training, Defensa Volleyball Club, and Niagara Rapids Volleyball Club.

As of 2023, the total number of grade 9 students in Ontario was reported to be 154,750 (Government of Ontario, 2023). Using Qualtrics to calculate the target sample size, with a 90% desired confidence level and a 0.05 margin of error (Qualtrics, 2023), the ideal target sample size of 271 participants was determined. Unfortunately, this sample size was not achieved due to a lack of response from school and camp participants. A detailed description of the final sample is discussed below. This sample size was intended to ensure the study's statistical significance and sufficient power level. Gathering data from this number of participants was expected to enhance the likelihood of meaningful results, while considering practical constraints such as time and resources. Of 104 initial responses, 94 were deemed valid after data cleaning; 57 of these participants completed the entire questionnaire, including the AEA experience items, for a full-completion rate of 60.6%. This small sample may limit the generalizability of inferential findings to AEA-experienced respondents (Lewin et al., 2018).

Ethical Considerations

Ethical considerations were central to the design and implementation of this study. Before initiating recruitment, ethical approval was obtained from Brock University's Research Ethics Board (REB 24-051 HALL), as well as from the relevant school boards, selected private schools and summer camps mentioned previously.

Participation in the study was entirely voluntary, and care was taken to ensure that students did not feel pressured by school staff or peers to take part. Participants who expressed interest in taking part were required to provide both parental or guardian consent and their assent before proceeding (see Appendix A and B.4). All components of the process, including consent, assent, and data collection, were conducted online. Upon completion of the consent and assent forms, participants were granted access to the survey.

While there are no physical or psychological risks associated with completing the survey, a potential ethical concern was the possibility of participants feeling obligated to participate due to the involvement of school principals, camp administrators and, in some cases, teachers in the distribution of the recruitment materials. To address this, several safeguards were put in place. The letter of invitation clearly emphasized that participation was entirely voluntary and that there was no obligation to take part. Additionally, anonymity and confidentiality were ensured throughout the process, so that neither school or camp staff, nor anyone else, would know who had chosen to participate. Participants were also informed of their right to withdraw from the study at any time before submitting their survey responses, without penalty or consequence. To

minimize disruption to the school or camp day, surveys were recommended to be completed outside of school or camp hours.

To ensure participant privacy and confidentiality, data were collected anonymously, and no identifying information was linked to individual responses. All data were securely stored on a password-protected server, Qualtrics, provided by Brock University. The survey materials were written in clear, age-appropriate language to ensure understanding, and efforts were made to reach a diverse range of schools and camps to support equitable access to participation.

Data Collection Instrument and Procedures

The data collection instrument (i.e., online questionnaire) was created specifically for this study and was carefully designed to ensure clarity, accessibility, and comprehensive insights (Appendix A). The items within the questionnaire were created with the research questions in mind and were based on a foundation of the qualitative findings from the recent work of Kuehnen (2024). Following the principles of simplicity and inclusivity, the survey questions had been developed using the KISS method, which stands for 'keep it simple stupid' (Alwin & Beattie, 2013). This approach emphasized the importance of simplicity in facilitating easy comprehension and gathering meaningful responses from participants. Moreover, the survey incorporated a variety of question formats, including multiple choice, selection, rank order and Likert scale (Bachman & Schutt, 2023). By employing diverse question formats, the aim was to capture data representing a wide range of experiences and viewpoints. The questionnaire was laid out in a logical order. The first section (see Appendix A) focused on demographic

questions. The second section (see Appendix A) focused on the first research question, the students' experiences of AEAs in PE. Lastly, the third section (see Appendix A) focused on the second research question, the students' viewpoints on AEAs in PE.

Before commencing the questionnaire, participants received a clear definition of AEAs along with some examples to prevent any confusion. Qualtrics was used to aid in the creation and administration of the survey, as well as to generate reports. Prior to data collection, pilot tests were done with a small group of individuals to examine participants' ability to understand the wording of the questionnaire and make sure it was clear and straightforward (Brooks et al., 2016). This preliminary phase aimed to estimate data variability, fine-tune the research questions, and provide any instrument improvements (In, 2017). The final questionnaire was comprised of 34 questions and took participants around 10-15 minutes to complete. A planned survey stop occurred at Question 10 (see Appendix A) for respondents reporting no AEA experience, after which only AEA-experienced participants continued to the end of the questionnaire.

Ethical approval for the study was obtained from Brock University in October 2024. Following this, selected school boards and private schools were contacted for permission to conduct research. As school boards and private schools approved, data collection commenced in January of 2025. Initially, only a limited number of school boards and private schools were approached; however, to increase participant recruitment, outreach was expanded to additional school boards and private schools over time.

Once approval was granted, school principals were contacted and provided with the study material (see Appendix B.1 and B.2). Principals distributed the letter of

invitation along with the questionnaire link to parents and guardians of Grade 9 students at their school (see Appendix A and B.4). Parents or guardians were then responsible for providing informed consent and sharing the questionnaire with their child for assent and completion.

By May 2025, participation remained lower than anticipated. To address this, an amendment was submitted to the Brock University Research Ethics Board to expand recruitment to summer camps. This modification was approved by the end of May 2025. In this context, camp administrators assumed a role similar to school principals, they distributed the letter of invitation and questionnaire link to parents and guardians of youth aged 14-15 at their summer camp, who then provided consent and shared the survey with their child. A small number of summer camps agreed to participate, including Brock University Leaders in Training, Balls Falls Leaders in Training, Defensa Volleyball Club, and Niagara Rapids Volleyball Club. These camps facilitated the same recruitment process, allowing for additional participants to be reached. Data collection concluded on August 12th, 2025, at which point a total of 104 participants had completed or partially completed the questionnaire.

Data Analysis

Analyses proceeded in two stages: (1) whole sample descriptives for all eligible participants ($n= 94$) and (2) inferential tests within the AEA Experience Subsample ($n= 57$) to evaluate group differences and paired contrasts across key outcomes. This structure aligns the analysis with measurement level and distribution assumptions while limiting inference to respondents with relevant AEA exposure. All analyses were

conducted in JASP (version 0.95.3), using two-tailed tests with $\alpha = .05$; results were considered statistically significant at $p < .05$. Precision targets were set at a 95% confidence level with a margin of error $E = 0.05$ (target $n = 271$); the achieved sample ($n = 94$; AEA Experience Subsample = 57) did not meet this target, so confidence intervals are wider than planned and some subgroup comparisons may be underpowered.

Data were cleaned for completeness, consistency, and adherence to inclusion criteria (Cohen et al., 2017). Missing and inconsistent responses were addressed to protect validity and reliability, and variables were typed as nominal, ordinal, or interval to guide method selection (Kowalski et al., 2018). Of 104 individuals who began the questionnaire, 94 responses met the inclusion criteria after data cleaning (9.6% excluded).

Descriptive statistics for the full sample ($n = 94$) summarized AEA exposure and context across grades and locations, reporting frequencies, means, and standard deviations as appropriate (Creswell, 2009). Inferential analyses were done within the *AEA Experience Subsample* ($n = 57$) and included regressions, ANOVAs, independent samples t-tests, and paired samples t-tests, with p-values and effect sizes reported. Assumptions were evaluated for normality and homogeneity of variance; when assumptions were violated, robust or non-parametric alternatives were used (e.g., Mann-Whitney U, Welch's t-test, or Wilcoxon test) (Armour & MacDonald, 2012).

Demographic and context variables served as independent variables for between-group comparisons: gender (male, female), setting (urban, rural), enjoyment level of PE (1-7 scale), likelihood of taking PE post Grade 9 (1-7 scale), and schooling section (elementary Grades K-6, intermediate Grades 7-9). For between-group

comparisons by gender or urban/rural, and AEA experiences, a repeated measures ANOVA was used due to it being a within-person comparison across multiple related conditions to determine if gender influences the participants' experiences. An independent samples t-test was conducted for questions related to gender or urban and rural, and the participants' thoughts and views on AEAs to determine their influence on each other. For questions relating enjoyment of PE or the likelihood of PE post Grade 9 to AEA experiences and viewpoints, linear regression tested associations with continuous outcomes, with checks of linearity, residual normality, and homoscedasticity. For questions looking specifically at elementary and intermediate grades, a paired samples t-test was conducted. Visual representations, such as charts and graphs, will be used to enhance clarity and understanding of the findings. This comprehensive data analysis plan facilitates an insightful examination of the collected data, aiming to derive meaningful and useful conclusions.

Reliability and Validity

To yield data capable of informing education policies, encourage innovative teaching methods, and yield long-term benefits for students, this study needed to exhibit both reliability and validity. Reliability refers to the consistency and stability of measurement over time. In the case of the present study, this would be important when considering if the questionnaire used consistently captured students' experiences and viewpoints on AEAs (Mat Roni et al., 2020). To ensure reliability, pilot testing was conducted before data collection, allowing any potential issues with the clarity, wording, or formatting of questions to be identified and addressed. Cronbach's alpha was then

used to assess internal consistency, that is, the extent to which items within each construct-specific subscale measure the same underlying construct (Bonett & Wright, 2015). Internal consistency estimates for construct-specific subscales were as follows: Enjoyment $\alpha = 0.805$ (95% CI), Participation $\alpha = 0.836$ (95% CI), Agreement $\alpha = 0.940$ (95% CI), and Barriers $\alpha = 0.580$ (95% CI) (Table 1). Alpha values for Enjoyment, Participation, and Agreement indicate good-to-excellent internal consistency, whereas the barriers subscale shows lower reliability and should be interpreted with caution or refined in the future. Reliability analyses were conducted in JASP (version 0.95.3).

Table 1

Cronbach's Alpha for questionnaire subscales

Subscale	Cronbach's α
Enjoyment	0.805 [0.701, 0.908]
Participation	0.836 [0.754, 0.918]
Agreement	0.940 [0.915, 0.965]
Barriers	0.580 [0.362, 0.794]

Data cleaning and quality control measures were implemented to identify and correct errors or inconsistencies in the data. Regarding validity, a major focus for the present study was on how accurately items captured the intended concept. As Mat Roni et al. (2020) highlighted, validity refers to the degree to which a measurement accurately reflects the concept it was intended to assess. Content validity was supported through a targeted literature review of AEAs in PE and pilot testing to refine item wording and coverage. By drawing on existing research, the questionnaire was designed to comprehensively cover all relevant aspects of students' experiences and viewpoints towards AEAs. Additionally, the questionnaire was constructed with construct validity in mind. This involved ensuring that the items effectively measure the underlying

constructs of interest, such as students' experiences and viewpoints. Together, these procedures were intended to enhance the measurement quality and interpretability of the questionnaire-based findings.

Despite diligent recruitment efforts, the final sample for this study was considerably smaller than the targeted sample size. While 94 participants completed the questionnaire after data cleaning, only 57 completed the AEA experience questions in full. This reduced sample size lowers the statistical power of the study and increases the likelihood of a Type II error, meaning that true effects may not have been detected (Lewin et al., 2018). The decision was made to proceed with the available data, as it provides valuable insight into AEA experiences within PE contexts. For the purpose of a master's thesis, the findings remain meaningful in demonstrating initial trends, identifying potential directions for future research, and contributing to a limited but growing body of evidence in this area.

Chapter Summary

In this chapter, the methodology and methods were discussed. This chapter begins with a restatement of the research purpose and questions. Next, the methodology is outlined, emphasizing a quantitative approach involving the distribution of a self-administered questionnaire. The rationale behind this methodological choice is explained, emphasizing the efficiency, cost-effectiveness, and ability to provide immediate insights offered by quantitative methods. The researcher's positionality was described to acknowledge potential influences on interpretation and to foreground a reflexive stance. The participant selection criteria, recruitment strategy across schools

and summer camps, and ethical considerations involved in the study were detailed. Convenience sampling was chosen to ensure ease of access and resource efficiency, targeting grade 9 students in both public and private schools in Ontario. Ethical approval and informed consent procedures are emphasized to ensure participant privacy and confidentiality. Furthermore, the data collection process is described, highlighting the development of the survey questionnaire, pilot testing procedures, and the collection process. The data analysis plan was presented: descriptive statistics for the full eligible sample and inferential tests within the AEA Experienced Subsample, with assumption checks, robust and nonparametric alternatives, and standardized reporting of p-values and effect sizes. Finally, reliability and validity considerations were addressed.

Chapter 4: Results

Introduction

This chapter reports results from a mixed set of descriptive, comparative, and predictive analyses examining students' experiences with Alternative Environment Activities (AEAs) in physical education (PE) and their viewpoints on AEAs. Group comparisons were conducted across gender (male/female), school location (urban/rural), grade level (elementary/intermediate), enjoyment of PE (1-7 scale), and plans to participate in PE post Grade 9 (1-7 scale) using t-tests, ANOVAs, and linear regressions. Mann-Whitney tests are interpreted as primary when normality was violated, and Levene's tests are used to evaluate homogeneity of variance.

Whole Sample - Demographics

The final sample consisted of 94 Grade 9 students, with 64 (68.1%) from rural schools and 30 (31.9%) from urban schools (see Appendix C Table C1). In rural schools, 27 (42.2%) of the students identified as male, 36 (56.3%) as female, and 1 (1.6%) as other. In urban schools, 9 (30.0%) were identified as male and 21 (70.0%) as female. Across the total sample, female students represented the majority of participants at 57 (60.6%), followed by male students at 37 (38.3%), and 1 (1.1%) participant identifying as other. Due to the small size of the "other" category, this group was omitted from gender-based analyses.

AEA Participation Frequency (K-6 vs. 7-9)

In terms of AEA participation frequency, students reported varied frequencies of participation across elementary (Grades K-6) and intermediate grades (Grades 7-9). For Grades K-6, 24 students (25.5%) reported never participating in AEA, 14 (14.9%) participated less than once per month, 21 (22.3%) participated one to two times per month, 24 (25.5%) participated three to five times per month, and 11 (11.7%) participated six or more times per month (see Appendix C Table C2). For Grades 7-9, 15 students (16%) reported never participating, 24 (25.5%) participated less than once per month, 22 (23.4%) participated one to two times per month, 13 (13.8%) participated three to five times per month, and 20 (21.3%) participated six or more times per month (see Appendix C Table C2).

Frequency of AEA Participation in Urban Versus Rural Schools

For the frequency of AEA participation in urban and rural schools, students reported a full spectrum of experiences across both elementary and intermediate grades, indicating that AEA are implemented with differing emphasis by school location. For Grades K-6, urban schools displayed a mix of very low and relatively infrequent inclusion of AEA, with sizable groups indicating no AEA participation (see Appendix C Table C3). While rural reports were more evenly distributed across mid-ranges and higher frequency categories, suggesting steadier integration throughout the year. In grades 7-9, urban responses leaned towards lower to moderate participation with fewer very frequent offerings, whereas rural responses included both moderate and high participation groups, pointing to broader access or emphasis on AEA in rural programs at this level.

Subsample of Students with AEA Experience in PE – AEA Experience

Demographics

Out of the 94 participants, only 57 (60.1%) indicated having had previous experience with AEAs during PE. Therefore, further analysis was conducted only with participants who indicated they had previously participated in AEAs during PE. The analysis sample included 41 (71.9%) students from rural schools and 16 (28.1%) students from urban schools (see Appendix C Table C4). In rural schools, 18 (43.9%) of students identified as male, 22 (53.7%) as female, and 1 (2.4%) as other. In urban schools, 6 (37.5%) identified as male and 10 (62.5%) as female. Across this subsample, female students represented the majority of participants at 32 (56.1%), followed by male students at 24 (42.1%), and 1 (1.8%) participant identifying as other. Due to the small size of the “other” category, this group was omitted from gender-based analysis.

Enjoyment of Sports, PE, and Likelihood of Continuing PE Post Grade 9

Participants reported enjoyment of sports and PE on a 7-point scale, with descriptive statistics presented in Appendix C Table C5. Participants also indicated their perceived likelihood of continuing PE after Grade 9; those descriptives are also included in Appendix C Table C5. Subsequent analyses will use Enjoy PE and PE Post Grade 9 as independent variables to compare outcomes across categories.

Seasonal Participation in AEAs

Students indicated how frequently they participated in AEAs across different seasons on a 7-point scale, ranging from 1 (never) to 7 (always). The highest reported participation occurred in the spring (M= 4.421, SD= 1.451), followed by fall (M= 4.053, SD= 1.315), and winter (M= 3.351, SD = 1.664) (see Appendix C Table C6).

Frequency of AEA Inclusion in PE Programs by AEA Setting

Using a 7-point Likert scale (1=never, 7=always), participants rated how often they engaged in AEA across three AEA Settings: on school property, within walking distance of school property, and requiring a bus/vehicle to take students off school property. Participants reflected separately on their experiences during Grades K-6 (elementary) and Grades 7-9 (intermediate) (see Appendix C Table C7). In their Grades K-6 experiences, AEA were reported most frequently at school (M= 5.02, SD= 1.67), followed by within walking distance to school (M= 3.68, SD= 1.63), and least frequently when a vehicle or bus was required (M= 3.11, SD= 1.68). For their Grades 7-9 experiences, a similar pattern was observed. AEA were most frequent at school (M= 4.90, SD 1.72), followed by walking distance to school (M= 4.12, SD= 1.78), and least frequent when requiring a vehicle or bus (M= 3.09, SD= 1.92).

Enjoyment of AEA by Activity Type

Using a 7-point Likert scale (1= do not enjoy at all, 7= really enjoy), participants reported how enjoyable they found AEA taking place in different activity types: dry land-based activities (e.g., beach volleyball, biking), snow/ice-based activities (e.g., skating, tobogganing), water-based activities (e.g., kayaking, swimming). Participants reflected separately on their experiences during Grades K-6 and Grades 7-9 (see Appendix C Table C8). In their Grades K-6 experiences, dryland activities were rated most enjoyable (M= 5.92, SD= 1.38), followed by water-based activities (M= 5.37, SD= 1.63), and snow/ice-based activities were rated lowest in enjoyment (M= 4.97, SD= 1.70). For their Grade 7-9 experiences, the pattern was consistent: dryland activities

were most enjoyed ($M= 5.84$, $SD= 1.59$), followed by water-based activities ($M= 5.50$, $SD= 1.77$), and snow/ice-based activities were rated lowest ($M= 5.47$, $SD= 1.43$).

AEAs Participants Most Frequently Participated In

When asked to rank order the top 3 AEAs in which they most frequently participated during their Grades K-6 experiences, students most frequently selected beach volleyball across all three rankings (see Appendix C Table C9). Specifically, 16 students (28.1%) identified beach volleyball as their top activity, 19 students (33.3%) as their second most frequent, and 20 students (35.1%) as their third most frequent. Other commonly reported activities included biking (9 students, 15.8%) and swimming (7 students, 12.3%) as the most frequent activities, and swimming (5 students, 8.8%) and gardening (4 students, 7.0%) as the second most frequent activities. For the third-most frequent activities, rock climbing (4 students, 7.0%) and gardening, curling, and swimming (each 3 students, 5.3%) were also frequently reported. Overall, beach volleyball emerged as the most consistently reported activity across all three rankings, followed by swimming, biking, and gardening.

When asked to rank order the top 3 AEAs in which they most frequently participated during their Grades 7-9 experiences, students most frequently selected beach volleyball across all three rankings (see Appendix C Table C9). Specifically, 13 students (22.8%) identified beach volleyball as their top activity, 15 students (26.3%) as their second most frequent, and 19 students (33.3%) as their third most frequent. Other commonly reported activities included biking (14 students, 24.6%), rock climbing and sledding/tobogganing (each 3 students, 5.3%). For the second most frequent activities, swimming (5 students, 8.8%) and rock climbing (4 students, 7.0%) were frequently

reported, alongside golf and kayaking/canoeing/stand-up paddleboarding (SUP) (each 3 students, 5.3%). For the third most frequent activities, swimming (5 students, 8.8%) and golf and horseback riding (each 4 students, 7.0%) were also commonly reported, with kayaking/canoeing/SUP (3 students, 5.3%) appearing as well. Overall, beach volleyball emerged as the most consistently reported activity across all three rankings, followed by swimming, biking, and golf/horseback riding, depending on rank.

AEAs Participants Most Enjoyed

When asked to rank order the top 3 AEAs the students most enjoyed during Grades K-6, students most frequently selected beach volleyball across all three rankings. Specifically, 16 students (28.1%) identified beach volleyball as the AEA they enjoyed the most, 16 students (28.1%) as their second choice, and 16 students (28.1%) as their third choice (see Appendix C Table C10). Other commonly reported K-6 AEAs the students indicated enjoying the most included swimming (7 students, 12.3%) and cross-country skiing and biking (each 4 students, 7.0%) as first choice activities, swimming (6 students, 10.5%) and horseback riding (4 students, 7.0%) as second choice activities, and horseback riding and rock climbing (each 5 students, 8.8%) as third choice activities. Overall, beach volleyball emerged as the most consistently enjoyed AEA across all three K-6 rankings, followed by swimming, horseback riding, and rock climbing.

For Grades 7-9, beach volleyball again emerged as the AEA most enjoyed by participants (see Appendix C Table C10). Specifically, 13 students (22.8%) identified beach volleyball as the AEA they enjoy the most, 14 students (24.6%) as their second choice, and 17 students (29.8%) as their third choice. Other AEAs commonly reported

as enjoyable activities in Grades 7-9 PE included swimming (8 students, 14.0%) and sledding/tobogganing (5 students, 8.8%) as first choice activities, rock climbing (8 students, 14.0%) and cross-country skiing (5 students, 8.8%) as second choice activities, and swimming (11 students, 19.3%) and horseback riding (5 students, 8.8%) as third choice activities. Overall, beach volleyball was the most consistently enjoyed AEA across all three Grade 7-9 rankings, with swimming, rock climbing, and cross-country skiing also prominent depending on rank.

Subsample of Students with AEA Experience in PE – AEA Experience Relationships

Enjoyment by Activity Type and Gender

A repeated-measures ANOVA tested whether enjoyment of AEAs differed across activity types and whether these patterns varied by gender and grade level, with the activity type treated as the within-subject factor and grade level and gender as between-group factors: activity types were categorized as dry land-based activities (e.g., beach volleyball, biking), snow/ice-based activities (e.g., skating, tobogganing), and water-based activities (e.g., kayaking, swimming). Analyses were run separately for Grades K-6 and 7-9 (see Appendix C Table C11, Panel A). Levene's tests indicated homogeneity of variance for all cells except one in the water condition; inferences for that cell were interpreted cautiously in light of the assumption violation (see Appendix C Table C11, Panel B). The tests indicated a significant grade-level effect for snow/ice activities ($F(1, 41) = 3.702, p=0.030$), whereas grade-level effects for water and dryland were not significant ($F(1, 38) = 0.421, p=0.520$; $F(1, 45) = 0.150, p=0.701$). The grade level x gender interaction was non-significant across all activity types (see Appendix C Table

C11). Collapsing across grades, a significant main effect of gender emerged for water-based activities ($F(1, 38) = 4.359$, $F(1, 38) = 4.359$, $p=0.044$), with no corresponding gender main effects for snow/ice or dryland ($F(1, 41) = 2.507$, $p=0.121$; $F(1, 45) = 0.837$, $p=0.365$). Descriptively, for snow/ice activities in K-6, males reported higher enjoyment than females ($M=5.684$ vs 4.625), and complete means and standard deviations by grade level and gender for each activity type are provided in Appendix C Table C12; higher means reflect greater enjoyment.

Participation in AEAs at Urban & Rural Schools' Across Seasons

Independent samples t-test compared mean AEA participation between urban and rural schools for fall, winter, and spring to determine whether seasonal participation patterns differed by school context (see Appendix C Table C13). Assumptions were evaluated using the Shapiro-Wilk test of normality and Levene's test of homogeneity of variances; when normality was not supported ($p < .05$), Mann-Whitney tests were used for inference. Across all seasons, no between-group differences reached statistical significance, and effect sizes were small (see Appendix C Table C14). Descriptive statistics show that urban and rural means were similar in fall (4.13 vs 4.03) and winter (3.31 vs 3.38), spring showed the largest numerical gap, favouring urban schools (4.75 vs 4.33), though this difference remained nonsignificant (see Appendix C Table C13).

Participation in AEAs by School Location Across AEA Settings

Repeated measures ANOVA tested Grade Level (K-6 vs. 7-9; within subjects) and School Location (Urban vs Rural; between-subjects) across three AEA settings (see Appendix C Table C15, Panel A). Levene's tests indicated homogeneous variance for all grade-by-setting cells; therefore, standard results are reported (see Appendix C

Table C15, Panel B). Across AEA settings, the only statistically significant effect was Grade Level difference in the walking distance condition, with overall participation differing between Grade K-6 and 7-9; the School Location main effect (urban vs rural) and the Grade Level x School Location interaction were not significant in walking, and all tests in the at school and needing a vehicle conditions were non-significant, indicating no reliable urban-rural differences across grades for those AEA settings. Descriptively, at school means were similar across School Locations within grades; for walking, urban was higher in grades 7-9; and for vehicle, group means were close across grades, consistent with non-significant School Location effects (see Appendix C Table C16).

Student Enjoyment by AEA Type and School Location

Repeated measures ANOVAs tested whether enjoyment differed between urban and rural schools across snow/ice, water, and dryland AEAs, with activity environment as the within-subject factor and School Location and Grade Level as between-subjects factors; Levene's tests supported homogeneity of variance for all three environments, so standard results are reported (see Appendix C Table C17, Panel B). Across environments, no significant School Location main effects or School Location x Grade Level interactions were detected (see Appendix C Table C17, Panel A). A grade level effect emerged only for snow/ice ($p = 0.039$), whereas the grade level effects for water and dryland were non-significant. Descriptively, dryland means were slightly higher for urban than rural in both K-6 and 7-9, water means were closely aligned across School Locations within grades, and snow/ice means were modestly higher for urban than rural;

within grades, however, none of these urban-rural differences reached significance (see Appendix C Table C18).

Enjoyment of Activity Type Linked with PE Enjoyment

Three separate linear regressions tested whether students' enjoyment of each AEA activity type (snow/ice, water, dryland; 1-7 scale; higher is more enjoyment) influences the overall enjoyment of PE, allowing estimation of the strength and direction of association for each outcome. None of the models reached significance, indicating that the activity type predictors explained only a small share of variance in PE enjoyment. For snow/ice, the model explained about 5% of the variance and was not significant (adjusted $R^2 = 0.006$, $F(2, 41) = 1.136$, $p = 0.331$; see Appendix C Table C19). For water, the model accounted for roughly 11% of variance and was also non-significant overall (adjusted $R^2 = 0.060$, $F(2, 38) = 2.275$, $p = 0.117$); however, within this model, higher water enjoyment in Grades K-6 was a positive predictor of PE enjoyment ($\beta = 0.491$, $p = 0.040$). For dryland, the model explained about 10% of variance and was not significant (adjusted $R^2 = 0.058$, $F(2, 45) = 2.459$, $p = 0.097$). Collectively, enjoyment of specific AEA types showed limited predictive value for overall PE enjoyment in this sample, with the lone notable pattern being modest, grade-specific link between grade K-6 water enjoyment and higher PE enjoyment despite the model's non-significance.

Likelihood of Taking PE After Grade 9 Predicted by Seasonal AEA Participation

A multiple linear regression examined whether the frequency of AEA participation in fall, winter and spring predicts students' likelihood of enrolling in PE after Grade 9 (1=

not likely at all, 7= extremely likely). The model accounted for a small proportion of variance (7%) and was not statistically significant overall (see Appendix C Table C20).

Likelihood of Taking PE After Grade 9 Predicted by AEA Setting Participation

Three separate linear regressions tested whether the frequency of AEA participation in each AEA setting – at school, within walking distance, and requiring a vehicle— predicts students' likelihood of enrolling in PE post Grade 9 (1= not likely, 7= extremely likely). All three models explained very little variance and were not statistically significant overall, indicating that AEA setting-based participation did not reliably predict PE course intention in this sample (see Appendix C Table C21).

PE Post Grade 9 Predicted by Enjoyment of Activity Type

Three separate linear regressions assessed whether enjoyment of each AEA type (1-7 scale; high is more enjoyment) predicts students' likelihood of taking PE after Grade 9. Each model explained very little variance and was not statistically significant overall, indicating that activity type enjoyment was not a reliable predictor of post-Grade 9 PE intentions in this sample (see Appendix C Table C22).

Paired Comparisons of AEA Setting by Grade Level

A paired samples t-test compared elementary (K-6) and intermediate (7-9) participation for the frequency of each setting where AEAs took place: at school, within walking distance, and requiring a vehicle. Shapiro-Wilk tests on the paired differences indicated non-normality for all three comparisons, so inferences emphasize the Wilcoxon signed rank tests and their matched rank-biserial effect sizes. At school, and requiring a vehicle was non-significant, with small to no effect sizes, indicating no meaningful grade-level difference in at school or requiring a vehicle (see Appendix C

Table C23). Within walking distance, there was significance; the effect was small to moderate, reflecting higher median participation in K-6 than 7-9. Descriptives are provided for context (see Appendix C Table C7).

Activity Type Paired Comparison by Grade Level

A paired samples t-test compared elementary (K-6) and intermediate (7-9) enjoyment for each activity type (snow, water, and dryland). Shapiro-Wilk tests on the paired differences indicated non-normality for all three comparisons, so inferences emphasize the Wilcoxon signed rank tests and their matched rank-biserial effect sizes. For snow/ice the Wilcoxon test indicated a significant difference favouring higher enjoyment in 7-9, the effect was moderate. For water and dryland there was no significance, with small to no effect sizes, indicating no meaningful grade-level difference in water and dryland enjoyment (see Appendix C Table C24). Descriptives are provided for context (see Appendix C Table C8).

Subsample of Students with AEA Experience in PE – Viewpoints on AEA Descriptives

Specific Characteristics that Students Believe make AEA in PE Valuable

The question was: 'Previous research has identified that students value the following characteristics/aspects of AEA in PE. How much do you agree with the following statements?' Students responded on a 1-7 agreement scale, where a higher score indicates stronger agreement. There are six aspects/characteristics looked at – fun, opportunities to be outdoors/nature, introducing new physical activity experiences, field-trip potential, freedom from the gym, and engagement with friends. Descriptively, agreement skewed positive across statements, with means tightly clustered in the mid-

5s with a maximum at 7 for every item, indicating broad endorsement of AEA's value. The highest mean ratings were for providing new physical activity experiences ($M=5.661$, $SD=1.339$) and opportunities to explore/interact with nature ($M=5.649$, $SD=1.316$), followed closely by being fun ($M=5.579$, $SD=1.388$) and enabling field trips ($M=5.536$, $SD=1.375$; see Appendix C Table C25). Rating for engagement with friends ($M=5.536$, $SD=1.348$) and freedom from the gym ($M=5.393$, $SD=1.545$) were likewise favourable, with slightly greater variability for freedom. Frequency tables showed that most responses fell at 6-7, reinforcing that students generally agreed AEA's are valuable for being enjoyable, outdoors-oriented, novel, freeing, and socially engaging.

Ranked Importance of AEA Value Characteristics

Students ranked the six characteristics from 1 (most important) to 6 (least important) to indicate which aspects of AEA's they value most in PE (see Appendix C Table C26). Rankings showed clear preferences for "fun" and "explore/interact with nature," while "new physical activity experiences" also clustered near the top; by contrast, "field trips," "freedom from the gym," and "friends" tended to be placed mid-lower in the order.

Perceived Barriers to AEA Participation

The question was: 'Previous research has identified that students believe the following are common barriers to including AEA's in PE class. How large do you think each barrier is to include AEA's as part of PE programs?' Students rated four barriers—cost, time, safety, and organization—each rated on a 1–7 point scale (1= smallest barrier, 7= largest barrier). Descriptively, mean barrier ratings were modest overall and clustered near the midpoint of the scale, with safety showing the highest average

endorsement (M= 4.228, SD= 1.376), followed by organization (M= 4.158, SD= 1.461), cost (M= 4.105, SD= 1.372), and time (M= 3.982, SD= 1.445; see Appendix C Table C27). This pattern suggests safety and organizational logistics are perceived by the students to be more significant than cost or time, though none were rated as uniformly large barriers.

Willingness to Participate in PE With and Without AEA's Included in Program

The question was: 'How willing are students to participate in a PE class where AEA's are taught versus where AEA's are not taught,' rated on a 1-7 scale, where higher scores indicate greater willingness. Descriptively, willingness was higher when AEA's were included (M= 5.456, SD= 1.310) than when AEA's were not included (M= 5.053, SD= 1.042), a mean difference of about 0.40 scale points in favour of AEA-inclusive PE. Distributions seen in Appendix C Table C28. Together, these descriptives indicate that including AEA's is associated with a higher stated willingness to participate in PE among students in this sample.

PE Enjoyment by Lesson Type: AEA Versus Non-AEA

The question was: 'How enjoyable is PE when AEA content is being taught versus when non-AEA content is being taught,' on a 1-7 scale where higher scores indicate greater enjoyment. Descriptively, students reported higher enjoyment when AEA's were taught (M= 5.614, SD= 1.292) than when non-AEA's were taught (M= 5.123, SD= 1.070), reflecting an average difference of about 0.49 scale point favouring AEA inclusive PE. Distributions seen in Appendix C Table C29. Overall, students perceived PE as more enjoyable when AEA's were being taught than when they were not.

Likelihood to Continue Taking PE With and Without AEA's Included in Program

The question was: 'How likely are the students to continue taking PE if AEA's are regularly added into the students' PE classes or no AEA's are added into the students' PE classes?' The students answered on a 1-7 scale, where higher scores indicated a higher likelihood. Descriptively, students reported a higher likelihood when AEA's are included (M= 5.158, SD= 1.497) than when no AEA's are included (M= 4.357, SD= 1.531), indicating a meaningful shift toward continued enrollment under AEA-inclusive programming (see Appendix C Table C30).

Value of AEA's as Part of PE Curriculum

The question was: 'How valuable do the students believe AEA's are as part of the Ontario HPE Curriculum?' The students answered on a 1-7 scale, where higher scores indicated a higher value. Descriptively, perceptions were favourable overall (M= 5.421, SD= 1.295) and responses concentrated in the upper categories; over three-quarters selected 5-7, indicating broad agreement that AEA's are a valuable component of PE (see Appendix C Table C31).

Subsample of Students with AEA Experience in PE – Viewpoints on AEA's Relationships

Gender Differences in Agreement with AEA Value Characteristics

Independent-samples t-tests compared male and female students on agreement (1-7) for six AEA value statements: fun, explore nature, new physical activity experience, field trips, freedom from the gym, and friends. Shapiro-Wilk tests indicated non-normal residuals for all outcomes ($p < 0.001$), so Mann-Whitney results were prioritized, with t-test reported for context; Levene's tests were nonsignificant for all

items ($p = 0.228-0.809$), indicating comparable variances across genders (see Appendix C Table C32, Panel B). Across all six characteristics, there were no statistically significant gender differences on Mann-Whitney tests, suggesting broadly similar agreement between male and female students regarding the value of AEAs (see Appendix C Table C32, Panel A). Group descriptives showed small mean advantages for males on most items (see Appendix C Table C33). This shows that there is an absence of systematic gender effects in this sample.

Gender Differences in Perceived Barriers to AEA Participation

Independent-samples t-test compared male and female students on four perceived barriers to delivering AEAs in PE— cost, time, safety, and organization— rated on a 1-7 scale where higher value indicates a larger barrier. Shapiro-Wilk tests of residuals indicated non-normality for cost, time, and safety ($p \leq 0.008$) but not for organization ($p = 0.309$), so Mann-Whitney tests were interpreted as primary, with t-tests reported for context; Levene's tests were nonsignificant for all barriers ($p = 0.369-0.728$), indicating comparable variances by gender (see Appendix C Table C34, Panel B). Across all four barriers, no statistically significant gender differences were observed on Mann-Whitney ($p = 0.365-0.964$), and effect sizes were negligible, indicating that male and female students reported similar levels of perceived cost, time, safety, and organizational barriers to AEAs (see Appendix C Table C34, Panel A). This pattern suggests that barrier perceptions are broadly shared across genders in this sample, with no evidence of systematic gender-based differences in perceived obstacles to implementing AEAs in PE. Descriptively indicated broadly similar perceived barrier levels across genders, with means for cost, time, safety, and organization all clustering

near the mid-point of the 1-7 scale and only small between-group differences evident in group means and standard deviations, consistent with nonsignificant tests (see Appendix C Table C35).

Gender Differences in Willingness to Participate in PE With and Without AEA's Included in Program

Independent-sample t-tests compared male and female students on willingness to participate in PE when AEA's are taught and when AEA's are not taught, each rated on a 1-7 scale where higher values indicate greater willingness, and no statistically significant gender differences were detected for either condition (see Appendix C Table C36, Panel A). Shapiro-Wilk tests of model residuals indicated deviations from normality for both willingness outcomes ($p \leq 0.024$), so Mann-Whitney tests were interpreted as primary, while homogeneity of variance was satisfied in both cases, supporting comparable variances by gender (see Appendix C Table C36, Panel B). Descriptively, mean willingness when AEA's are taught was similar across genders (males $M=5.708$ and females $M=5.250$), reflecting only small between-group differences consistent with nonsignificant tests. When AEA's are not taught, means were again close (males $M=5.292$ and females $M=4.875$), reinforcing the absence of statistically meaningful gender difference in this sample (see Appendix C Table C37).

Gender Differences in PE Enjoyment by Lesson Type: AEA Versus Non-AEA

Independent-samples t-tests compared male and female students on perceived enjoyment of PE when AEA's are taught and when AEA's are not taught, each on a 1-7 scale where higher values indicate greater enjoyment, with nonparametric Mann-Whitney tests interpreted as primary due to non-normal residuals (see Appendix C Table C38, Panel B). Both when AEA's are taught and not taught showed no

significance, indicating no evidence of a gender difference in perceived enjoyment when AEs are included or not (see Appendix C Table C38, Panel A). Descriptively, enjoyment when AEs are taught was similar across genders (males $M=5.792$ and females $M=5.594$), aligning with nonsignificant tests and small between-group differences. When AEs are not taught, means were modestly higher for males ($M=5.458$) than females ($M=4.875$), but the distributional assumptions and rank-based test indicate this difference is not statistically reliable in this sample (see Appendix C Table C39).

Gender Differences in Likelihood to Continue Taking PE With and Without AEs Included in Program

Independent-samples comparisons evaluated male and female students' likelihood of continuing PE if AEs are regularly added versus not regularly added, using a 1-7 scale where higher values indicate greater likelihood. A significant gender difference emerged for the AEA-regularly-added condition, whereas no significant difference was found for the no-AEA condition. Residuals were non-normal for the AEA-regularly-added outcome ($p=0.002$) but for the no-AEA outcome ($p=0.277$), so the Mann-Whitney test was taken as primary for the AEA condition; variance homogeneity was upheld for both outcomes (see Appendix C Table C40, Panel B). When AEs are regularly added, males reported higher continuation likelihood than females on the Mann-Whitney test ($p=0.026$; Cohen's $d=0.553$), indicating a small-to-moderate gender effect favouring males under regular AEA inclusion (see Appendix C Table C40, Panel A). When AEs are not regularly added, gender differences are not statistically significant. Descriptively, with AEs regularly added, males reported $M=5.625$ and females $M=4.813$, aligning with the significant tests and implying a practically

meaningful thought modest difference (see Appendix C Table C41). Without regular AEA, means were closer (males $M=4.609$ and females $M=4.125$), consistent with nonsignificant findings and indicating broadly similar continuations by gender in the absence of AEA.

Gender Differences in Value of AEA as Part of PE Curriculum

Independent-samples comparisons assessed how valuable male and female students consider AEA within the PE curriculum on a 1-7 scale, where higher values indicate greater perceived value. Mann-Whitney test used for interpretation due to non-normal residuals (Shapiro-Wilk $p=0.002$; see Appendix C Table C42, Panel B). There was no statistically significant gender difference detected on the Mann-Whitney test ($p=0.607$; see Appendix C Table C42, Panel A). Descriptively, females reported a slightly higher mean perceived value ($M=5.594$) than males ($M=5.250$), but the between-group difference was small (see Appendix C Table C43).

Association Between Agreement with AEA Value Characteristics and School Location

Independent-samples t-tests compared urban and rural students on agreement (1-7) for six AEA value statements: fun, explore nature, new physical activity experience, field trips, freedom from the gym, and friends. The Shapiro-Wilk test indicated non-normality for all six items ($p<0.001$), and Levene's tests were nonsignificant for each item; Mann-Whitney tests were interpreted as primary (see Appendix C Table C44, Panel B). For AEA seen as fun, the Mann-Whitney test was significant ($p=0.005$), indicating higher perceived fun in urban schools relative to rural schools (see Appendix C Table C44, Panel A). For AEA as an opportunity for a field trip, the Mann-Whitney test was also seen as significant ($p=0.003$), again favouring

urban schools. A smaller but statistically significant urban advantage also appeared for freedom from the gym ($p=0.041$), whereas differences were not statistically significant for the remainder of the characteristics, suggesting broadly similar perceptions across school locations on these items. Descriptively, means aligned with inferential pattern, urban schools reported higher central tendencies on AEA's seen as fun, providing an opportunity for field trips, and freedom from the gym, with smaller urban advantages seen on exploring nature, new physical activity, and engagement with friends (see Appendix C Table C45).

Association Between Perceived Barriers to AEA Participation and School Location

Independent-samples t-test compared urban and rural students on four perceived barriers to delivering AEA's in PE— cost, time, safety, and organization— rated on a 1-7 scale, where a higher value indicates a larger barrier. Mann-Whitney emphasized that when residuals were non-normal (see Appendix C Table C46, Panel B). Results showed one significant school location difference for organization, with urban students reporting lower organizational barriers than rural students, whereas cost, time, and safety did not differ significantly by school location (see Appendix C Table C46, Panel A). Descriptively, means showed that urban students reported higher cost barriers ($M=4.438$) than rural ($M=3.976$), slightly lower time barrier (urban $M=3.563$ and rural $M=4.146$), and marginally higher safety barriers (urban $M=4.313$ and rural $M=4.195$), and notably lower organization barrier (urban $M=3.438$ and rural $M=4.439$; see Appendix C Table C47).

Association Between Willingness to Participate in PE With and Without AEA's Included in Program and School Location

Independent-sample t-tests compared urban and rural students on willingness to participate in PE when AEA's are taught and when AEA's are not taught, each rated on a 1-7 scale where higher values indicate greater willingness. Due to non-normal residuals for both outcomes, Mann-Whitney tests were interpreted as primary (see Appendix C Table C48, Panel B). A significant urban-rural difference was found only when AEA's are taught, with urban students reporting higher willingness than rural peers, while no significance emerged for the no-AEA condition (see Appendix C Table C48, Panel A). Descriptively, when AEA's are taught, urban students reported higher willingness (M=6.000) than rural students (M=5.244). When AEA's are not taught, group means were closer (urban M=5.250 and rural M=4.976; see Appendix C Table C49).

Association Between PE Enjoyment by Lesson Type: AEA Versus Non-AEA and School Location

Independent-samples t-tests compared urban and rural students on perceived enjoyment of PE when AEA's are taught and when AEA's are not taught, each on a 1-7 scale where higher values indicate greater enjoyment, with nonparametric Mann-Whitney tests interpreted as primary due to non-normal residuals (see Appendix C Table C50, Panel B). A significant urban-rural difference when AEA's are taught, with urban students reporting higher enjoyment, while no significant difference emerged for the no-AEA condition (see Appendix C Table C50, Panel A). Descriptively, when AEA's taught urban students reported higher enjoyment (M= 6.250) than rural students (M=5.366). Without AEA's taught, group means were closer (urban M=5.500 and rural M=4.976; see Appendix C Table C51).

Association Between Likelihood to Continue Taking PE With and Without AEAs Included in Program and School Location

Independent-samples comparisons evaluated urban and rural students' likelihood of continuing PE if AEAs are regularly added versus not regularly added, using a 1-7 scale where higher values indicate greater likelihood. Mann-Whitney tests interpreted as primary due to non-normal residuals for AE-taught outcome (see Appendix C Table C52, Panel B). Across both conditions, no statistically significant urban to rural differences were observed (see Appendix C Table C52, Panel A). Descriptively, when AEAs are taught, urban students reported somewhat higher continuation likelihood ($M=5.625$) than rural students ($M=4.976$), whereas without AEAs, the group means were closer (urban $M=4.438$ and rural $M=4.325$; see Appendix C Table C53).

Association Between Value of AEAs as Part of PE Curriculum and School Location

Independent samples compared urban and rural students on how valuable AEAs are within the PE curriculum on a 1-7 scale, where higher values indicate greater perceived value. Mann-Whitney tests interpreted as primary due to non-normal residuals for AE-taught outcome (see Appendix C Table C54, Panel B). A significant urban to rural difference emerged, with urban students rating AEAs as more valuable than rural students ($p=0.036$; see Appendix C Table C54, Panel A). Descriptively, urban students reported a higher perceived value ($M=6.000$) than rural students ($M=5.195$; see Appendix C Table C55).

Association Between Agreement with AEA Value Characteristics and PE Enjoyment

A multiple linear regression examined whether agreement with six AEA value characteristics— fun, explore nature, new physical activity, field trip, freedom from the

gym, and friends— jointly predicted students' overall enjoyment of PE. The model was not statistically significant, explaining little variance in enjoyment (adjusted $R^2 = -0.067\%$, $F(6, 49) = 0.425$, $p = 0.858$; see Appendix C Table C56), and none of the individual value predictors emerged as significant.

Association Between Perceived Barriers of AEA to AEA Participation and PE Enjoyment

A multiple linear regression tested whether four perceived barriers to delivering AEA in PE— cost, time, safety and organization— jointly predict students' overall enjoyment of PE (1-7 scale; higher is more enjoyment), and the model was not statistically significant (adjusted $R^2 = 0.004$, $F(4, 52) = 1.052$, $p = 0.390$; see Appendix C Table C57). None of the individual barriers reached statistical significance.

Association Between Willingness to Participate in PE With and Without AEAs Included in Program and PE Enjoyment

A multiple linear regression tested whether students' willingness to participate in PE when AEAs are taught and when AEAs are not taught (1-7 scale; the higher the more willing to participate) predicts overall PE enjoyment. The model was statistically significant with moderate fit, accounting for 21.3% of variance after adjustment (adjusted $R^2 = 0.213$, $F(2, 54) = 8.566$, $p < 0.001$; see Appendix C Table C 58). Both predictors contributed positively; willingness when AEAs are taught showed a borderline effect ($p = 0.050$), and willingness when AEAs are not taught was a significant predictor ($p = 0.015$). Students who report greater willingness to participate— both under AEA and non-AEA conditions— also tend to report higher overall enjoyment of PE, with willingness in non-AEA contexts showing the stronger association in this model.

Association Between PE Enjoyment by Lesson Type (AEA Versus Non-AEA) and Overall PE Enjoyment

A multiple linear regression examined whether students' enjoyment of PE when AEA's are taught and when AEA's are not taught (1-7 scale; higher is more enjoyment) predicts overall PE enjoyment. The model was statistically significant with a small-to-moderate fit, explaining about 20.7% of variance after adjustment (adjusted $R^2 = 0.207$, $F(2, 54) = 8.318$, $p < 0.001$; see Appendix C Table C59). Enjoyment when AEA's are taught showed a positive but marginal effect ($p = 0.097$), whereas enjoyment when AEA's are not taught was a significant positive predictor ($p = 0.027$).

Association Between Likelihood to Continue Taking PE With and Without AEA Included in Program and Overall PE Enjoyment

A multiple linear regression examined whether students' likelihood of continuing to take PE if AEA's are regularly added versus not regularly added, using a 1-7 scale where higher values indicate greater likelihood, predicts overall PE enjoyment. The model was statistically significant with small-to-moderate power, accounting for 16.9% of the variance after adjustment (adjusted $R^2 = 0.169$, $F(2, 53) = 6.591$, $p = 0.003$; see Appendix C Table C60). Within the model, there is a greater likelihood of continuing PE when AEA's are taught was a significant positive predictor of enjoyment ($p = 0.024$), whereas continuation likelihood when AEA's are not taught showed a positive but nonsignificant association ($p = 0.082$).

Association Between Value of AEA as Part of PE Curriculum and Overall PE Enjoyment

A simple linear regression tested whether students' belief that AEA's are valuable in the PE curriculum (1-7 scale, where higher is more valuable) predicts overall PE enjoyment. The model was statistically significant with a small-to-moderate power,

accounting for about 17.3% of variance after adjustment (adjusted $R^2= 0.173$, $F (1, 55) = 12.75$, $p<.001$; see Appendix C Table C61). The standardized coefficient showed a moderate positive association.

Association Between Agreement with AEA Value Characteristics and Post-Grade 9 PE Continuation

A multiple linear regression assessed whether agreement with six AEA value characteristics— fun, explore nature, new physical activity experience, field trip opportunity, freedom from the gym, and friends— predicts students' stated likelihood of taking PE after Grade 9 (1-7 scale; the higher, the greater the likelihood). The model was not significant, with negligible power (adjusted $R^2= 0.083$, $F (6, 49) = 0.299$, $p=0.934$; see Appendix C Table C62). Standard coefficients for all characteristics were small and nonsignificant, indicating no reliable associations (see Appendix C Table C62).

Association Between Perceived Barriers to AEA Participation and Post-Grade 9 PE Continuation Likelihood

A multiple linear regression assessed whether four perceived barriers to delivering AEAs in PE— cost, time, safety, and organization— predict students' likelihood of taking PE after Grade 9 (1-7 scale; the higher, the greater the likelihood). The model was not statistically significant and explained little variance (adjusted $R^2= 0.027$, $F (4, 52) = 1.394$, $p=0.249$; see Appendix Table C63). Perceived barriers around cost, time, safety, and organizational logistics do not reliably predict students' intentions to continue PE beyond Grade 9 in this sample.

Association Between Willingness to Participate in PE With and Without AEA's Included in Program and Post-Grade 9 PE Continuation Likelihood

A multiple linear regression tested whether willingness to participate in PE when AEA's are taught and when AEA's are not taught predicts students' likelihood of taking PE after Grade 9 (1-7 scale; the higher, the greater the likelihood). The model was statistically significant with modest power, accounting for about 10.5% of variance after adjustment (adjusted $R^2 = 0.105$, $F(2, 54) = 4.287$, $p = 0.019$; see Appendix C Table C64). Within the model, standardized effects were positive but did not reach conventional significance thresholds.

Association Between PE Enjoyment by Lesson Type (AEA Versus Non-AEA) and Post-Grade 9 PE Continuation Likelihood

A multiple linear regression tested whether students' enjoyment of PE when AEA's are taught and when AEA's are not taught predicts students' likelihood of taking PE after Grade 9 (1-7 scale; the higher, the greater the likelihood). The model did not reach statistical significance, explaining a small share of variance (adjusted $R^2 = 0.050$, $F(2, 54) = 2.476$, $p = 0.094$; see Appendix C Table C65). Standardized effects were positive but nonsignificant for both enjoyment when AEA's are taught and when no AEA's are taught. Suggesting that higher PE enjoyment shows only a weak association with intentions to continue PE beyond Grade 9.

Association Between Likelihood to Continue Taking PE With and Without AEA's Included in Program and Post-Grade 9 PE Continuation Likelihood

A multiple linear regression assessed whether students' likelihood of continuing to take PE if AEA's are taught and if AEA's are not taught predicts their intention to take PE after Grade 9 (1-7 scale; the higher, the greater the likelihood). The model was statistically significant with strong power for this dataset, accounting for about 36.8% of

variance after adjustment (adjusted $R^2= 0.368$, $F (2, 53) = 16.99$, $p<.001$; see Appendix C Table C66). Both standardized predictors were positive and significant, with AEA-inclusive continuation intentions showing the larger standardized association in this model.

Association Between the Value of AEA as Part of PE Curriculum and Post-Grade 9 PE Continuation Likelihood

A simple linear regression examined whether students' beliefs that AEAs are valuable in the PE curriculum predict their intention to take PE after Grade 9 (1-7 scale; the higher, the greater the likelihood). The model was not statistically significant, explaining a small share of variance (adjusted $R^2= 0.045$, $F (1, 55) = 3.649$, $p=0.061$; see Appendix C Table C67). The standardized coefficient indicated a small-to-moderate positive association, suggesting that students who see AEAs as more valuable tend to report greater intentions to continue PE beyond Grade 9, though the effect is marginal and should be interpreted cautiously.

Chapter Summary

Overall, Grade 9 students reported broadly positive experiences and views of AEAs in PE, with participation most frequent on school property; dryland activities were most enjoyed across grades, spring was the most frequent season of AEA inclusion, and beach volleyball consistently topped both “most participated” and “most enjoyed” lists alongside swimming, biking, rock climbing, and cross-country skiing by context and rank. Inferential tests showed few significant group differences: snow/ice enjoyment rose from K-6 to 7-9, gender differences were limited to a small main effect favouring males for water-based enjoyment, and urban—rural contrasts were generally

nonsignificant across seasons and AEA settings, aside from a grade-level difference at “walking distance”; descriptively, rural schools appeared to integrate AEAs more steadily while urban means were sometimes higher on select enjoyment/value indicators without consistent significance.

Students strongly endorsed AEAs’ value, ranking “fun” and “explore nature” as most important. Willingness to participate, enjoyment, and stated likelihood to continue PE after Grade 9 were higher when AEAs were included. The increase was most noticeable for urban students, and for males specifically, in their likelihood to continue taking PE with AEAs present. Predictive models explained little variance.

Chapter 5: Discussion and Conclusion

Introduction

This chapter interprets how Grade 9 students in Ontario have experienced Alternative Environment Activities (AEAs) across elementary and intermediate school stages, their perceptions regarding the values and barriers to including AEAs in Physical Education (PE), and whether AEA-inclusive programming in PE is related to enjoyment, willingness to participate, and intentions to continue PE beyond Grade 9. This discussion integrates participation patterns, seasonal and logistical influences, enjoyment by activity type, and contextual differences to identify where AEAs truly add value and where constraints limit downstream outcomes such as elective enrollment. The chapter concludes with limitations of the study and suggestions for future research to further advance knowledge on AEAs and their implementation.

This research aims to provide a comprehensive view of students' experiences and viewpoints regarding AEAs in PE, specifically within the Ontario school system. The study was guided by two research questions:

3. What have been Ontario grade 9 students' experiences with AEAs across their PE programs from grades K - 9?
4. What are grade 9 students' current viewpoints on AEAs in PE programs?

AEA Experiences for Students

This section addresses Research Question 1 by examining Grade 9 students' experiences with AEAs across their PE programs from Grades K-9, with the goal of

understanding when and how AEAs are experienced. Focusing on student perspectives is valuable because it explains the factors that support enjoyment and continued participation, key aims of the Ontario HPE curriculum and physical literacy agenda (Ontario Ministry of Education, 2019) and aligns with literature emphasizing that meaningful PE depends on perceived relevance, emotions and social context (Beni et al., 2017).

Participation Patterns

Results regarding students' participation in AEAs as part of their K-9 PE experiences reveal a noteworthy subgroup (about one third) of students with no prior AEA experience, with the gap most evident in the elementary years (K-6). Teachers may be reluctant to implement AEAs due to organizational requirements, cost, and equipment constraints (Hall et al., 2020), compounded by time and scheduling pressures, especially in elementary years with short PE blocks (Avon Maitland District School Board, 2025). Additionally, teachers may feel less confident in implementing AEAs due to a lack of pre-service or in-service training specific to AEAs. Structural factors also constrain delivery, short PE blocks in elementary timetables, limited access to suitable space or equipment, transportation hurdles, and seasonal weather that complicates consistent planning (Robinson et al., 2021; Tucker & Gilliland, 2007). Program culture and policy can play a role as well, schools may prioritize familiar team games for ease of assessment and classroom management, while liability procedures and supervision ratios discourage off-site lessons (Ophea, 2019). Budgets for gear, storage, and maintenance, uneven proximity to safe outdoor environments, and assumptions that students get activity outside school can all reduce early AEA inclusion

(Ophea, 2019). However, this lack of AEA introduction means that students who are less engaged by competitive team sports may miss alternative, lower-competition entry points that could build enjoyment in PE and support lifelong activity, reinforcing participation gaps that more routine AEA exposure could help address (Ntoumanis et al., 2004).

There is a noticeable shift from no exposure toward monthly or more frequent AEA inclusion in PE by Grades 7-9, suggesting expanding embracement within programs; however, some learners remain underexposed to AEAs at entry to secondary school. This suggests that early-years exposure is limited at a time when foundational movement skills and curiosity about varied activity contexts are being developed (Ontario Ministry of Education, 2019). Providing diverse, developmentally appropriate movement opportunities in the early years of education fosters coordination, balance, and perceived competence, which in turn strengthens motivation to be active over time (Blanchet-Cohen & Elliot, 2011). Broadening PE beyond sport-centric models increases inclusivity and perceived relevance, particularly through novel, outdoor-oriented experiences that lead to common community activities and lifelong participation (Gruno & Gibbons, 2020; McNamee & Timken, 2017).

This upward trend of more frequent AEA participation in Grades 7-9 is consistent with Ontario's HPE's developmental aims, in which movement contexts expand as students mature and teachers gain confidence with nontraditional activities (Krings, 2023). It likely reflects combined school and learner factors, older students are better matched to the progressive challenge, teamwork, and reflection typical in AEAs. At the same time, teachers gain confidence with risk management and facilitation, schedules

open up with longer periods and electives, and schools often have better access to equipment, storage, and community partners (PHE Canada, 2020). Clearer risk-management procedures and the ability to time units to favourable seasons further reduce logistical conflicts, while expanded student choice, novelty and lower-competitive nature of AEAs increase motivation among learners less engaged by traditional PE (Waddell, 2023). The emerging pattern aligns with work on meaningful PE and physical literacy, showing that broadening offerings beyond team sports increases the chances that students encounter activities they find enjoyable, appropriately challenging, and socially supportive (Beni et al., 2017). AEAs often provide low competition, novel, and unique experiences that can re-engage students who are less motivated by traditional PE programming (McNamee & Timken, 2017). Closing early zero exposure gaps helps ensure that all students can benefit from AEA-rich programming.

Urban - Rural AEA Experience Pattern. Clear differences in exposure emerged by school locations. Rural schools showed a more balanced distribution of AEA participation across grades, whereas urban schools, especially in elementary, showed greater variability, with a sizable group reporting minimal or no AEA experience. One possible explanation is proximity and access; rural schools may have easier access to trails, fields, and naturalized spaces, lowering logistical cost of running, for example, orienteering, hiking, or other land-based units, while many urban schools are faced with constrained green space and approvals for off-site movement (Ophea, 2023). Built-environment factors in cities, such as busy roads, limited sidewalks around some schools, and safety concerns, also restrict active travel and outdoor transitions during

short PE blocks, compounding the friction to run AEA during the school day (PHE Canada, 2020). Where local outdoor environments are available and procedures may be more familiar, AEA are potentially easier to normalize and schedule, producing the more consistent participation pattern seen in rural settings. The meaningful PE and physical literacy perspectives suggest that context matters. When students experience varied and authentic environments, they are more likely to find activities enjoyable, appropriately challenging and socially supportive (Ní Chróinín et al, 2019). This means teachers at urban schools should focus on implementation. Specifically, they should consider building short, repeated, on school property AEA routines, as well as simplify approvals and safety procedures. In addition, they should consider leveraging of local partnerships, so AEA become feasible within tight schedules and limited green space.

Seasonal Participation in AEA. Seasonal participation patterns suggested that AEA are most participated in by students in the spring, then tapered through fall and especially winter, supporting the notion that environmental conditions and logistical factors shape access and uptake across the school year (Tucker & Gilliland, 2007). In spring, improving temperatures, longer daylight hours, and drier morning field conditions make scheduling and supervision easier, and teachers often perceive fewer barriers and higher enjoyment potential for outdoor lessons (Garriga et al., 2021). In early fall, mornings are typically warmer with less heavy dew than late fall and daylight is still extended after school. However, the fall marks the beginning of the school year in Ontario and teachers are just getting to know students' skill, motivation, and needs, which can delay complex off-site activities until routines and risk-management procedures are established (Garriga et al., 2021). In Ontario, winter introduces cold,

variable surfaces, transportation challenges, and heightened risk-management demands. This may be different in other parts of the world, but winter conditions can reduce the opportunity for AEA unless schools or teachers have preplanned, facility-based offerings such as indoor climbing, aquatics, or winterized orienteering routes (Robinson et al., 2021). However, winter weather should not be a reason to avoid AEA in PE programming. In fact, because physical activities such as shovelling, walking through snow and on ice, and recreational activities like sledding are common parts of life in such climates, it would seem increasingly valuable to expose students to physical activity in such environments through AEA delivery in PE. Winter AEA develop comfort and confidence moving on variable surfaces, improve balance and coordination, and can reduce injury risk by teaching safe footing and route-finding in cold conditions. Exposure to uneven, slippery terrain also trains proprioception and joint stability, helping the ankles, knees, and hips adapt to sudden shifts in footing and lowering fall and injury risk in winter environments (Gao et al., 2025).

Urban-rural comparisons did not yield significant differences in any season, suggesting that geography does not alter seasonal participation patterns. For seasonal delivery strategies, PE teachers should continue to provide AEA in fall and spring to normalize exposure, but also seek ways to integrate and embrace winter AEA where conditions and facilities permit.

Participation in AEA by Setting of Activity. Participation in AEA was highest for activities delivered at school or within walking distance to school settings. Proximity emerged as the primary factor of inclusion of AEA in PE. Vehicle-dependent AEA options were identified as less frequent; a pattern that aligns with class time,

supervision, and transportation constraints in school scheduling (Ontario Ministry of Education, 2019). The study results indicated that participation in AEAs that are within walking distance of school was higher in Grades 7-9 than in K-6, suggesting that elementary HPE programs in Ontario seem to capitalize more on immediate schoolyard assets, whereas vehicle-dependent opportunities remained flat across grades, likely reflecting stable transportation constraints (Hall et al., 2020). Furthermore, the findings indicated that the location of schools (i.e., urban or rural) did not shape access to AEAs for PE once logistics were in place, suggesting geography plays a minimal role in AEA access. These results show that prioritizing on-site and neighbourhood-based AEA options can expand access at low cost to all PE programs, regardless of location, while reducing the organizational burden that students and teachers commonly perceive (Hall et al., 2020).

On school property and within walking distance AEAs minimize some barriers to school-day programming, time lost to transport, supervision ratios for off-site, permission requirements, and competition for bus or facility bookings. These settings allow teachers to fit AEAs within typical period lengths and pivot quickly when weather shifts. Elementary timetables provide 300 minutes of daily instruction with subjects scheduled in 30-to-60-minute blocks, making lengthy off-site travel less feasible within a single PE slot (Avon Maitland District School Board, 2025). Proximity of AEAs also reduces barriers (no transport costs, minimal specialized gear) and enables repeated use of pre-approved local assets (schoolyards, nearby park/trails, community centers), improving consistency and reducing planning time across the term (Hall et al., 2020). Accordingly, teachers should establish a baseline AEA catalog deliverable on school

property or via walking distance in both elementary and intermediate grades, then add facility-dependent or vehicle-reliant offerings where feasible.

Enjoyment of AEA

Overall enjoyment of AEA was high across grades, indicating that most students found these experiences engaging and meaningful. This wide appeal is because these activities reliably encompass the core features of meaningful PE— enjoyment/fun, appropriate challenge, perceived competence, social connection and personal relevance (Beni et al., 2017; Ní Chróinín et al., 2019). AEA often provide novel, authentic experiences that can be scaled to skill level, making progress visible and competence attainable while inviting teamwork and outdoor problem-solving that students find socially rewarding (Beni et al., 2017). Many AEA often mirror activities available in communities (e.g., hiking, cycling, orienteering), which increases relevance and the sense that skills transfer beyond class time (Dai et al., 2015).

Enjoyment of AEA by Gender. Enjoyment of AEA was consistently higher among males than among females. In PE more broadly, enjoyment gaps are often linked to perceived athletic competence, social norms around activity, and prior experiences that shape confidence and interest over time (Cairney et al., 2012). Females, particularly those with lower perceived competence, tend to report lower and sometimes declining enjoyment across schooling, whereas boys' enjoyment is more stable (Cairney et al., 2012). Approaches that build visible skill progress, offer genuine choice, and reduce social-evaluation pressures can narrow the gap. All of which can be done with relative ease through AEA focused lessons.

Enjoyment of AEs by Activity Type. Student enjoyment by activity type followed a clear hierarchy, highest for dryland, moderate for water-based, and lowest for snow/ice. This is likely because dryland AEs are easiest to access during the school day, which lets teachers scale challenge, create quick success experiences, and build social connections, the features most associated with meaningful PE enjoyment and continuation (Beni et al., 2021; Decorby et al., 2005). Dryland's consistent advantage likely reflects accessibility and lesson control, less specialized gear, fewer venue and weather constraints, and more time-on-task allows teachers to scale challenge, build competence gains, and foster social connections (Robinson et al., 2021). Water-based AEs add facility access, supervision, and transport demands that can cut into time-on-task and limit choices within a single period (PHE Canada, 2020). Snow/ice AEs bring cold-weather and surface management, equipment needs, and stricter safety ratios (Limestone DSB, 2025, AP-260), leading to an increase in enjoyment in older years when students' competence and confidence better match technical seasonal tasks (Michael et al., 2016). Across activity types, neither grade-by-gender interactions nor the urban-rural contrasts reached significance, indicating that gender and geography did not meaningfully alter activity type enjoyment patterns in this sample. Reinforcing that when AEs are organized and supported, enjoyment can be maintained across contexts without heavy subgroup tailoring.

Enjoyment of AEs and Continuation of PE Post Grade 9 Intention.

Enjoyment by activity type did not predict intentions to enroll in PE after Grade 9. This pattern likely reflects the limits of focusing on discrete activity preferences rather than broader value estimates and structural course-choice dynamics in secondary school

timetables. In systems where students prioritize graduation requirements and perceived academic capital in subjects like mathematics, science, and English, elective decisions may be driven more by comparative value and scheduling trade-offs than by enjoyment of PE units (Sulz et al., 2010), which can silence predictive power from any single environment's enjoyment. In this light, AEA may still be pivotal, not because "enjoying snow, water, or dryland" alone shifts outcomes, but because well-integrated AEA programming can elevate perceived relevance, choices, and life-course utility of PE, thereby competing more effectively for elective slots against high-status academic courses.

Specific AEAs Most Participated In and Enjoyed

Across both schooling stages investigated (i.e., K-6, 7-9), beach volleyball consistently dominated students' AEA experiences and preferences, ranking most frequently participated in and most enjoyed in K-6 and 7-9 grades, with swimming, biking, and a rotating set of options (rock climbing, cross-country skiing, golf, horseback riding, kayaking/canoeing/SUP) appearing in second-hand positions depending on rank and grade level. A likely, logistical-driven explanation fits here. Beach/modified volleyball is familiar to teachers, aligns cleanly with sending/receiving and net/wall expectations in Ontario HPE, and can be run on-site with flexible setups (beach balls, low nets, grass courts), which keeps logistics light and time-on-task high (Ontario Ministry of Education, 2019). It is possible that swimming and biking frequently accompany beach volleyball because they are recognizable lifetime activities with clear skill progressions and schools may have readily available delivery partners or access (e.g., school and/or

community pools; community centers; local cycling paths or programs), making them feasible when facilities or bikes are available.

However, what is absent in participants' responses to the question of "what AEA's have they most frequently participated in?" is just as important to consider. Low-cost, near-school AEA's such as hiking, orienteering, parkour, skateboarding, and disc golf are under-represented despite being inexpensive, adaptable, and deliverable within walking distance to schools. This is surprising considering PE teachers have consistently identified perceived costs as being the biggest barrier to providing AEA's more regularly (Hall et al., 2020; Robinson et al., 2021). The aforementioned activities are also equity-friendly options that reduce transport and facility barriers, build perceived competence, and connect students to ongoing opportunities with local providers and public spaces in their own neighbourhoods. These rankings provide a template for program design: lead with a small set of highly feasible, socially engaging AEA's to stabilize participation and enjoyment, while intentionally adding under-used, low-cost, walkable options (hiking, orienteering, and disc golf) to broaden access and align with Ontario's call to diversify movement contexts beyond traditional team sport forms (Swaites, 2022). This maintains an achievable approach without defaulting to competitive, sport-centric delivery and moves the program closer to the curriculum's goal of inclusive community-relevant participation year-round (Ontario Ministry of Education, 2015).

Students' Current Viewpoints on AEA's

This section addresses Research Question two, the focus is on Grade 9 students' viewpoint on AEA's in PE. Examining student perspectives is valuable because perceptions of relevance, competence, and enjoyment shape engagement and sustained participation. These insights can guide course design and sequencing toward diverse, developmentally appropriate contexts that build lifelong participation rather than short-term unit satisfaction (Robinson et al., 2021).

Specific Characteristics that Students Think Make AEA's Valuable

Agreement clustered positively across all six value statements— fun, explore nature, new physical activity experience, field trips, freedom from the gym, and friends— indicating broad endorsement that AEA's matter. These characteristics are core ingredients that make PE feel meaningful across different learners and contexts (Beni et al., 2017). It suggests students value AEA's not just as “different PE days,” but as experiences that expand activity range, connect learning to local environments, and strengthen peer engagement, mechanisms commonly associated with increased perceived relevance and choice in diversified PE (Kuehnen, 2024). AEA's being seen as fun by students stood out well above other characteristics, signalling enjoyment as the primary reason Grade 9 students endorse AEA's and aligning with meaningful PE work that places enjoyment at the center of PE engagement and persistence (Beni et al., 2017; Krings, 2023). Fun comes from novelty, being outdoors, real choices and variety, social interaction, and quick wins that build confidence, exact features tied to meaningful experiences and stronger engagement in PE (Beni et al., 2017).

These value rankings were broadly shared across genders, with no statistically significant differences. This is consistent with work showing that when lessons foreground meaningful-experience features (enjoyment, appropriate challenge, perceived competence, social connection, relevance), positive perceptions can be sustained across subgroups (Beni et al., 2021). By contrast, several location differences emerged. Urban students reported higher agreement with AEAs being fun, offer field-trip opportunities, and provide freedom from the gym, in comparison to their rural peers. A potential explanation is program positioning and access, urban schools more often take advantage of nearby parks, community facilities, and short-walk excursions (Moore et al., 2010). Urban students may also perceive AEAs as an “escape” because these activities are more routinely organized as short, nearby excursions that use local parks and community space. This implies that the core value proposition of AEAs generalizes well, but that school context may shape how strongly certain program elements (e.g., off-site excursions, use of non-gym spaces) are recognized or emphasized by students (PHE Canada, 2020).

Perceived Barriers to AEA Inclusion in PE

Students’ perceived barriers to including AEAs in PE clustered around the mid-scale, with safety and organization rated slightly higher than cost and time, potentially indicating that students notice logistics and risk management more than outright resource or time constraints. Students are noticing the coordination load teachers carry to run AEAs— an emphasis that echoes teachers’ own reports of organization and liability demands as key hurdles (Hall et al., 2020). At the same time, teachers have commonly suggested that cost (equipment, facility fees, and transportation) was the

primary barrier to including AEA's more regularly in their PE programs (Hall et al., 2020). Students may not fully understand the direct and indirect costs of running AEA's, which are often managed by teachers and administrators rather than communicated to students (Dwyer et al., 2006). This limited financial awareness may explain why cost is not rated as highly as a perceived barrier for students. This helps explain the emphasis gap, where students are noticing the operation routines and risk-management, whereas teachers are responsible for the behind-the-scenes expenses and approvals.

Willingness to Participate in PE With or Without AEA's Present

Willingness to participate in PE class was higher when AEA's were included than when AEA's were not, which is consistent with evidence that variety, novelty, and outdoor contexts elevate perceived enjoyment and relevance (Michael et al., 2016). Framed through meaningful PE, AEA's can activate enjoyment, social connection, and perceived competence (Beni et al., 2017). The absence of gender differences suggests that willingness is delivery-dependent rather than group-specific, whereas the urban advantage when AEA's were taught likely reflects easier access to nearby venues and community partners, which makes off-school property learning smoother and more prominent. When transitions are short and close in proximity, students experience more time on activity amplifying willingness (Moore et al., 2010).

Willingness correlated most strongly with overall PE enjoyment even in non-AEA lessons, underscoring that enhancing day-to-day enjoyment (clear progressions, visible success, and social structures that work) is a foundation force regardless of context (Beni et al., 2017; Michael et al., 2016). The results point to using AEA's to give a boost to students' overall willingness to participate in PE programming. Focusing on high-impact

delivery of AEAs, such as new activities, meaningful outdoor time, clear progressions, and teamwork would all seem to be sound strategies for teachers looking to enhance student willingness to participate in their PE programs.

PE Enjoyment by Lesson Type

Students reported higher enjoyment when AEAs were taught than when non-AEAs were taught, indicating that AEA-inclusive lessons provide a moderate, consistent increase in perceived enjoyment. The pattern held across genders, suggesting the enjoyment advantage of AEAs is delivery-dependent rather than group-specific when lessons emphasize novelty, choice, social connection, and competence. Location analyses point to a setting effect; enjoyment was higher for urban students when AEAs were taught, while no reliable urban-rural difference appeared for non-AEA lessons. This implies the enjoyment boost from AEAs may be amplified where nearby venues and community assets make outdoor learning feel smooth and easy to access (Hall et al., 2022). This matters because enjoyment is a driver of willingness to participate in class, and raising enjoyment during lessons is a practical aim teachers can apply through design choices like quick progressions, choice pathways, and social structures that enable success.

Enjoyment under specific conditions is also linked to overall PE enjoyment. Both AEA-lesson and non-AEA-lesson enjoyment related positively to overall enjoyment of PE, with non-AEA enjoyment showing the stronger association. Underscoring that day-to-day lesson quality matters regardless of lesson type, while AEAs can add a boost to enjoyment of PE. However, enjoyment by lesson type did not meaningfully predict intentions to take PE after Grade 9, pointing to a familiar gap between liking a class and

choosing it for credit when other considerations are present (Barney et al., 2015; Hobin, et al., 2010).

Continuation Intentions With and Without AEA

Students indicated a higher likelihood of continuing PE when AEAs were regularly included, suggesting that access to variety, novelty, and outdoor-based contexts may shift perceived value toward sustained enrollment rather than one-off enjoyment. When AEAs are a regular feature rather than an occasional add in, students can reliably anticipate new contexts, authentic choice, peer-rich tasks, and visible progressions, conditions that make the course feel worthwhile to continue (Ontario Ministry of Education, 2019). The increase in likelihood of continuing PE when AEAs were regularly included appeared larger for males in this sample. Some evidence suggests that males may respond more strongly to perceived variety and challenge, which can elevate motivation and continuation intentions when those elements are consistently available (Michael et al., 2016). This is valuable because of the implications for course design. Making AEAs a predictable feature of the semester can help convert momentary enjoyment, especially when variety and challenge are present, into stronger intentions to continue participating.

Continuation intentions (AEA and non-AEA conditions) related positively to overall enjoyment of PE, with intentions under AEA-inclusive programming emerging as the stronger predictor, consistent with the idea that planning to keep taking PE aligns with how enjoyable the course feels (Hall et al, 2020; Kuehnen, 2024). Intentions specific to the lesson explained a larger share of variance in plans to take PE after Grade 9, with AEA-inclusive intentions showing the larger coefficient, suggesting that

expecting ongoing exposure to AEAs (novelty, choice, competence) makes students more inclined to see PE as worth continuing (White et al., 2021). Making AEAs a regular feature and dialling in delivery that reliably lifts intentions can strengthen participation intentions even as broader course-selection decisions remain influenced by scheduling and academic priorities (Sulz et al., 2010).

Value of AEAs as Part of PE Curriculum

Perceived curricular value was broadly favourable, with most students selecting upper-scale responses indicating that AEAs are widely seen by students as a worthwhile component of Ontario HPE. This aligns with guidance that varied, place-based activities can enhance perceived relevance and engagement in PE (Ontario Ministry of Education, 2019; PHE Canada, 2020). It also aligns with research that has found teachers perceive AEAs as a valuable addition to PE (Hall et al., 2020). The lack of gender differences with respect to students' perceived value of AEAs in PE suggests that favourable assessment is likely delivery-dependent rather than group-fixed, consistent with meaningful PE frameworks showing that when lessons emphasize novelty, variety, choice, relatedness, and competence, positive evaluations are shared across subgroups (Beni et al., 2017).

Location analyses indicated higher perceived value of AEAs among urban students than their rural peers, pointing to a setting effect that mirrors urban advantages observed for enjoyment and willingness when AEAs are present, possibly reflecting easier access to nearby venues and partners that make AEAs feel possible and important within the timetable (Moore et al., 2010). This difference could arise because many urban students have fewer everyday opportunities to experience certain outdoor

or land-based environments, making school-based AEAs feel novel and therefore more valuable than they do for rural students with potentially greater routine exposure to such environments. Strengthening partnerships and near-school options in rural contexts remains useful to reduce logistical friction and deepen local connections, while urban programs can emphasize regular access and skill-building in less familiar outdoor settings.

Perceived curricular value was also positively associated with overall PE enjoyment, underscoring that when students view AEAs as worthwhile, they also tend to like PE more, consistent with evidence linking perceived relevance and variety to enjoyment and motivation in adolescent PE (Michael et al., 2016). However, perceived value showed only a small association with intentions to take PE after Grade 9, indicating that while valuing AEAs supports enjoyment, elective choices also hinge on timetable fit, competing academic values, and perceived utility beyond immediate enjoyment (Sulz et al., 2010). This means program planners can use AEAs to lift enjoyment and perceived quality day-to-day, while pairing that with structural support, such as scheduling flexibility, and clear pathways communicating PE's benefits, to influence longer-term course-taking decisions and physical activity for life.

Conclusion

Integrating AEAs into the PE curriculum is valued by students and shows consistent links to higher willingness and enjoyment. These effects are strongest when delivered on-site or within walking distance in urban settings where nearby parks and community assets make outdoor learning feel worthwhile (Ontario Ministry of Education,

2019). These effects are consistent with meaningful PE, suggesting AEAs provide novelty, variety, choice, relatedness, and competence, conditions that underpin positive perceptions, immediate engagement, and stronger intentions when embedded predictably rather than intermittently (Beni et al., 2017). When these features are scheduled predictably rather than sporadically, students are more likely to develop stronger intentions to continue participating in PE (Beni et al., 2017).

Regarding Research Question 1 (Students AEA Experiences K-9), participation was uneven, with a notable subgroup reporting no prior exposure— a pattern that may be present due to implementation frictions in short blocks (time lost to transitions), perceived safety, and limited equipment or facility access (Hall et al., 2020).

Participation tended to increase with age, likely reflecting longer periods, clearer risk routines, improved teacher confidence, and access to facilities and community partners (Robinson et al., 2021). Seasonally, participation was highest in spring, when environmental conditions and supervision demands are favourable. Winter delivery required facility access or winterized designs, making it difficult for teachers to implement (Tucker & Gilliland, 2007). These patterns indicate that consistent AEA access will not emerge by chance, schools need longer blocks, regular scheduling, and secured outdoor routes and sites (e.g., established hiking loops or designated toboggan hills) to reduce exposure gaps and ensure every student experiences AEAs each term.

For Research Question 2 (Current Viewpoints), students agreed with the six value characteristics: fun, exploring nature, new physical activity, field trip opportunity, freedom from gym, and friends. These align with meaningful PE elements that drive positive perceptions across groups (enjoyment, competence, social connection and

relevance; Beni et al., 2017). Favourable views and enjoyment gains were broadly shared across genders when delivery emphasized novelty, choice, social support and competence, indicating impacts are delivery-dependent rather than fixed by group (White et al., 2021). Urban students rated several value items higher and showed larger willingness and enjoyment in AEA lessons, possibly due to ease of access in their school location (Moore et al., 2010). AEAs were associated with a moderate, reliable lift in enjoyment and willingness, maintaining core lesson quality (clear progressions, visible success, supportive social structure) as the base driver of engagement (Ontario Ministry of Education, 2019). Continuation intentions were higher when AEAs were a regular, predictable feature. Consequently, emphasizing the inclusion of AEAs in PE programming could be an asset for those seeking support for PE programs/programming.

Altogether, the findings point to a practical direction for schools and PE teachers. That is, a need for making AEAs a predictable part of the term and delivering them on school property or within walking distance so novelty, choice, relatedness, and competence become routine rather than occasional. When teachers deliver AEAs with built-in flexible time blocks, secure nearby spaces in advance, and use streamlined risk and permission routines to keep coordination light and participation steady year-round, students are more likely to experience activities as enjoyable, challenging, and socially supportive. The findings also support the notion that students perceive the most valuable reason for including AEAs in PE is that these activities are seen as fun. Because fun is a key component of meaningful PE (Beni et al., 2017; Krings, 2023), it

would therefore be beneficial if teachers embraced AEA as a more regular part of their PE programs.

To enhance inclusion of AEA in PE, teachers should more frequently consider introducing, and potentially leading with, AEA such as orienteering, hiking, and disc golf because they are low-cost, low-travel AEA that have been under-represented in PE programs but could be novel and exciting for students with little or no prior exposure. In winter, PE teachers should keep AEA momentum going with on-ground formats or indoor alternatives (e.g., skating, rock climbing, curling), guided by clear cold-weather procedures for safety and supervision. Keep lesson quality front and center with clear progressions, fast feedback, and supportive groupings so enjoyment gains come from how AEA lessons are taught and remain widely shared across settings and student groups.

Limitations

Several limitations should guide interpretation and future work. First, the study relied on a self-administered questionnaire, which is susceptible to social desirability and general response-style biases; without opportunities to probe or clarify, misinterpretation and filtered responding are possible (Armour & MacDonald, 2012; Kowalski et al., 2018). Second, although the instrument aligned with study aims and included multiple response formats (multiple choice, selection, rank order, and Likert), structured options can constrain how respondents represent experiences, potentially reducing depth and authenticity (Armour & MacDonald, 2012). Third, several items required retrospective recall of participation and enjoyment in earlier grades; recall error

and memory biases can lead to under- or overestimation of true engagement (Kowalski et al., 2018).

Fourth, participants were reflecting on PE experiences that spanned the COVID-10 pandemic period (2020-2021), when many Ontario schools faced closures, hybrid learning, and disrupted physical activity programming. This overlap introduces the possibility that pandemic-related disruptions, such as reduced AEA access or altered perceptions of enjoyment, may have influenced recall and responses, though the extent cannot be determined from the current design. Fifth, sampling limits generalizability. Participants were drawn from a small portion of Ontario schools and, later, a limited number of summer camps using convenience approaches. This raises the risk of selection bias and context-specific exposure to AEAs due to geography, climate, or local programming norms (Kowalski et al., 2018). Finally, recruitment did not reach the target, yielding an achieved sample of 94 participants, versus a planned target of 271. Reduced statistical power, wider confidence intervals, and elevated risk of type II error follow from this deficit (Lewin et al., 2018). Although diverse outreach strategies were used, questionnaires typically yield modest response rates without intensive follow-up, and breakdowns across recruitment steps can compound underrepresentation of key groups (Armour & MacDonald, 2012). Taken together, these constraints warrant cautious interpretation and generalizability of the results found within this study. At the same time, the design offered practical strengths, providing clear and actionable insights for program sequencing and delivery.

Future Directions

Future research should strengthen measurement and design while expanding the scope. Recruiting a larger sample that meets the original target will increase power to detect modest effects and support fuller models with interactions and subgroup analyses. A longitudinal design following cohorts from K-6 into secondary grades would clarify developmental trajectories, while a mixed-methods approach (brief student and teacher interviews) would add explanatory depth around barriers, value appraisals, and implementation context. To improve generalizability and policy relevance, broadening sampling beyond Ontario to include diverse regions across multiple Canadian provinces and territories. Collecting the same measures in several provinces will make the results easier to apply in more places.

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Appendix A

Surveying Students' Experiences and Thoughts Related to Alternative Environment Activities in Physical Education- Questionnaire

Note: Assent will be collected at the beginning of the questionnaire from the participant using the information on this form.

Research Project Information

You are being invited to take part in a university research study that explores Ontario grade 9 students' experiences and viewpoints regarding Alternative Environment Activities (AEAs) in Physical Education (PE) programs. Your involvement will provide valuable insights into how Alternative Environment Activities (AEAs) are experienced by students at this grade level. Alternative Environment Activities (AEAs) are defined as physical activities that occur beyond the scope of traditional uses for gymnasiums, fitness facilities (e.g., weight room, cardio center) or sporting fields (Hall et al., 2022). Examples include hiking, tobogganing, bowling, swimming, ice skating and kayaking.

We are hoping to recruit at least 271 grade 9 students currently enrolled in either a public or private school in Ontario. The students must be proficient in the English language, as the questionnaire will only be available in English. Lastly, parents/guardians must provide consent for their child to participate, and the students must provide assent. Should you wish to participate, you are being asked to complete an online questionnaire, 10 minutes in length, that asks about their experiences and viewpoints on Alternative Environment Activities (AEAs) in their PE program. We ask that you are in a space where you can perform the survey without others being around.

Assent

I have read the information about the research project called Surveying Students' Experiences and Thoughts Related to Alternative Environment Activities in Physical Education. I understand what the study is about and have asked any questions I had.

By answering the first question of the survey, I agree to be a part of the study, I know that joining is my choice. My answers will be kept private. I can skip any questions if I do not want to answer. I can also stop at any time with no consequences. My answers will be kept secret, and no one will know they are mine.

Feedback Option: I can ask for feedback on the study by email if I want. I do not have to finish the survey to ask for feedback. Anyone invited to participate can request feedback by emailing Sara Rohr at Sr17cb@Brocku.ca. The feedback will have a one-page summary of group results, there will be no individual feedback provided.

Thank you.

Dr. Nathan Hall
Associate Professor
Kinesiology
Brock University
St. Catharines, ON
L2S 3A1
nhall@brocku.ca
204-880-1385

Sara Rohr
Master's Student
Applied Health Science
Brock University
St. Catharines, ON
L2S 3A1
Sr17cb@Brocku.ca

Click **NEXT** to show that you agree to take part in this study and to start the questionnaire

1. Are you currently aged 14-15?
 - a. Yes
 - b. No

Definition of AEA's in Physical Education

AEAs are defined as physical activities that occur beyond the scope of traditional uses for gymnasiums, fitness facilities (e.g., weight room, cardio center) or sporting fields (Hall et al., 2022). Examples include hiking, tobogganing, bowling, swimming, ice skating and kayaking.

Part A. Demographic Questions

1. Gender (circle/highlight one)
 - a. Male
 - b. Female
 - c. Other
 - d. Would rather not say

2. Where did the majority of your physical education (PE) classes take place? (select the most appropriate)
 - a. Small town/Rural Schools
 - b. Large City Suburban Schools
 - c. Downtown Schools

3. What type of school did you attend for the majority of your physical education classes? (select the most appropriate)
 - a. Public
 - b. Catholic
 - c. Private
 - d. Home School
 - e. Other

4. On a scale of 1-7, how much would you say you enjoy playing/participating in sports in general?

- 1 = do not enjoy any aspect of playing/participating in sports
- 2 = mostly do not enjoy any aspect of playing/participating in sports
- 3 = somewhat do not enjoy playing/participating in sports
- 4 = neutral
- 5 = somewhat enjoy playing/participating in sports
- 6 = mostly enjoy playing/participating in sports
- 7 = completely enjoy every aspect of playing/participating in sports

5. On a scale of 1-7 how much would you say you enjoy PE as a school subject?

- 1 = do not enjoy any aspect of playing/participating in sports
- 2 = mostly do not enjoy any aspect of playing/participating in sports
- 3 = somewhat do not enjoy playing/participating in sports
- 4 = neutral
- 5 = somewhat enjoy playing/participating in sports
- 6 = mostly enjoy playing/participating in sports
- 7 = completely enjoy every aspect of playing/participating in sports

6. On a scale of 1-7 how likely are you to continue taking PE as a school subject?
(select the most appropriate)

- 1 = not likely at all;
- 2 = very unlikely;
- 3 = moderately unlikely;
- 4 = neutral;
- 5 = moderately likely;
- 6 = likely;
- 7 = extremely likely

7. Where was the majority of your **grades K-6** education completed? (select one for each statement)

- a. In Ontario
- b. In another Canadian province outside of Ontario
- c. Internationally

8. Where was the majority of your **grades 7-9** education completed? (select one for each statement)
- In Ontario
 - In another Canadian province outside of Ontario
 - Internationally

Part B. Your Experiences of AEs in Physical Education

9. On **average** across the school year, how often were Alternative Environment Activities (AEAs) incorporated into your physical education (PE) classes **during the grades K-6?** (circle/highlight one)
- Never
 - Less than ONE class per month
 - ONE to TWO classes per month
 - THREE to FIVE classes per month
 - SIX or more classes per month
10. On **average** across the school year, how often were AEs incorporated into your PE classes **during grades 7-9?** (circle/highlight one)
- Never
 - Less than ONE class per month
 - ONE to TWO classes per month
 - THREE to FIVE classes per month
 - SIX or more classes per month

- If participants answer never to either question 9 and 10, then they are done the questionnaire and will not answer any more questions

11. On a scale of 1-7 how often have AEs been incorporated into your PE classes during the following parts of the school year? (1 = never; 2 = very rarely; 3 = rarely; 4 = sometimes; 5 = often; 6 = very often; 7 = always)
- Fall (write a number 1-7) _____
 - Winter (write a number 1-7) _____

- c. Spring (write a number 1-7) _____
12. On a scale of 1-7 how often have AEAs been incorporated into your **grades K-6** PE classes in the following locations? (1 = never; 2 = very rarely; 3 = rarely; 4 = sometimes; 5 = often; 6 = very often; 7 = always)
- a. On school property (write a number 1-7) _____
- b. Within walking distance of school property (write a number 1-7) _____
- c. Requiring a bus/vehicle to take students off school property (write a number 1-7) _____
13. On a scale of 1-7 how often have AEAs been incorporated into your **grades 7-9** PE classes in the following locations? (1 = never; 2 = very rarely; 3 = rarely; 4 = sometimes; 5 = often; 6 = very often; 7 = always)
- a. On school property (write a number 1-7) _____
- b. Within walking distance of school property (write a number 1-7) _____
- c. Requiring a bus/vehicle to take students off school property (write a number 1-7) _____
14. On a scale of 1–7 how much did you enjoy AEAs that took place in the following environments across your **grades K- 6** PE experiences?
(1= do not enjoy at all; 2= mostly do not enjoy; 3 = somewhat do not enjoy; 4 = neither enjoy nor dislike; 5 = somewhat enjoy; 6 = enjoy; 7= really enjoy; 8= never participated)
- a. Snow/Ice Based Activities (e.g., skating, tobogganing) (write a number 1-7) _____
- b. Dry Land Based Activities (e.g., beach volleyball, biking,) (write a number 1-7) _____

- c. Water Based Activities (e.g., kayaking, swimming) (write a number 1-7)

15. On a scale of 1–7 how much do you enjoy AEAs that have taken place in the following environments across your **grades 7 – 9** PE experiences?
(1= do not enjoy at all; 2= mostly do not enjoy; 3 = somewhat do not enjoy; 4 = neither enjoy nor dislike; 5 = somewhat enjoy; 6 = enjoy; 7= really enjoy; 8= never participated)

- a. Snow/Ice Based Activities (e.g., skating, tobogganing) (write a number 1-7) _____

- b. Dry Land Based Activities (e.g., beach volleyball, biking,) (write a number 1-7) _____

- c. Water Based Activities (e.g., kayaking, swimming) (write a number 1-7)

16. Select **all** the AEAs listed below that you have participated in throughout your **grades K-9** PE experiences:

- a. Animal Watching (e.g., bird watching)
- b. Archery
- c. Beach Volleyball
- d. Biking
- e. Bowling / Lawn Bowling (indoor or outdoor)
- f. Cross-country Skiing
- g. Curling
- h. Disc Golf / Soccer Golf
- i. Downhill Skiing / Snowboarding
- j. Fishing
- k. Gardening
- l. Golf
- m. Hiking
- n. Horseback Riding
- o. Ice Skating / Ice Hockey (indoor or outdoor)
- p. Kayaking / Canoeing / Stand-up Paddle Board
- q. Orienteering / Geocaching

- r. Rock Climbing (indoor or outdoor) / Rappelling
- s. Rowing/Dragon boating
- t. Sailing
- u. Skateboarding / Roller Blading (indoor or outdoor)
- v. Slacklining
- w. Sledding / Tobogganing
- x. Snow Shoeing
- y. Swimming (indoor or outdoor)
- z. Other (write them in this space) _____

17. From the list above, **identify the 3** activities that you **participated in the most frequently** across your **grades K - 6** PE experiences and rank their frequency as follows:

1 for the most frequent (write activity in space provided)

2 for the second most frequent (write activity in space provided)

3 for the third most frequent (write activity in space provided)

18. From the list above, **identify the 3** activities that you **participated in the most frequently** across your **grades 7 – 9** PE experiences and rank their frequency as follows:

1 for the most frequent (write activity in space provided)

2 for the second most frequent (write activity in space provided)

3 for the third most frequent (write activity in space provided)

19. From the list above, **identify the 3** activities you **most enjoyed** participating in during your **grades K- 6** PE experiences and rank them as follows: 1 for the

most enjoyable, 2 for the second most enjoyable, and 3 for the third most enjoyable.

1 for the most enjoyable (write activity in space provided)

2 for the second most enjoyable (write activity in space provided)

3 for the third most enjoyable (write activity in space provided)

20. From the list above, **identify the 3** activities you **most enjoyed** participating in during your **grades 7- 9** PE experiences and rank them as follows:

1 for the most enjoyable (write activity in space provided)

2 for the second most enjoyable (write activity in space provided)

3 for the third most enjoyable (write activity in space provided)

Part C. Your Viewpoints on AEs in Physical Education

21. Previous research has identified that students value the following characteristics/aspects of AEs in PE. **How much** do **you** agree with the following statements? (1= strongly disagree; 2= disagree; 3 = somewhat disagree; 4= neither agree nor disagree; 5= somewhat agree; 6= agree; 7= strongly agree)

- a. AEs are valuable because they are fun
- b. AEs are valuable because they provide opportunities to be outdoors and explore/interact with nature
- c. AEs are valuable because they introduce/provide new physical activity experiences

- d. AEA's are valuable because they can be field trips (i.e., require students to leave school property)
- e. AEA's are valuable because they provide freedom from the perimeters of the gymnasium
- f. AEA's are valuable because they allow and encourage engagement with friends

22. Because previous research has identified that students value the following characteristics/aspects of AEA's in PE. **Can you** rank these characteristics/aspects of AEA's from most valuable (1) to least valuable (6)?

- a. AEA's are fun (write a number 1-6) _____
- b. AEA's provide opportunities to be outdoors and explore/interact with nature (write a number 1-6) _____
- c. AEA's introduce/provide new physical activity experiences (write a number 1-6) _____
- d. AEA's can be Field Trips (i.e., require students to leave school property) (write a number 1-6) _____
- e. AEA's provide freedom from the perimeters of the gymnasium (write a number 1-6) _____
- f. AEA's allow and encourage engagement with friends (write a number 1-6)

23. Previous research has identified that students believe the following are common barriers to including AEA's in PE class. **How large** do **you** think each barrier is to including AEA's as part of PE programs? (1= smallest barrier; 2= very small barrier; 3= small barrier; 4= moderate barrier; 5= large barrier; 6= very large barrier; 7= largest barrier)

- a. AEA's can have a cost (write a number 1-7) _____
- b. AEA's can take time to schedule and participate in (write a number 1-7) _____
- c. AEA's can have safety risks associated with them (write a number 1-7) _____
- d. AEA's can be difficult to organize for a field trip (i.e., require permission forms for students to leave school property) (write a number 1-7) _____

24. Although activities offered in PE classes vary, **on average**, on a scale of 1-7 how willing are you to **participate** in a PE class where:

- a. An **AEA** is being taught
 - 1= not willing to participate at all
 - 2 = very unwilling to participate
 - 3= moderately unwilling to participate
 - 4 = neutral
 - 5 = moderately willing to participate
 - 6 = very willing to participate
 - 7= completely willing to participate

- b. A **non-AEA** is being taught (1-7)
 - 1= not willing to participate at all
 - 2 = very unwilling to participate
 - 3= moderately unwilling to participate
 - 4 = neutral
 - 5 = moderately willing to participate
 - 6 = very willing to participate
 - 7= completely willing to participate

25. Although activities offered in PE classes vary, **on average**, how **enjoyable** do **you feel** a PE class would be where:

- a. An AEA is being taught
 - 1= not enjoyable at all
 - 2= mostly not enjoyable
 - 3= moderately not enjoyable
 - 4= neutral
 - 5= moderately enjoyable
 - 6= enjoyable
 - 7= extremely enjoyable

- b. A non-AEA is being taught

- 1= not enjoyable at all
- 2= mostly not enjoyable
- 3= moderately not enjoyable
- 4= neutral
- 5= moderately enjoyable
- 6= enjoyable
- 7= extremely enjoyable

26. How likely are you **to continue taking PE** if:

a. AEA's are regularly added into your PE classes

1= not likely at all

2= very unlikely

3= unlikely

4= neutral

5= likely

6= very likely

7= extremely likely

b. No AEA's are added into your PE classes

1= not likely at all

2= very unlikely

3= unlikely

4= neutral

5= likely

6= very likely

7= extremely likely

27. **How valuable** do **you** believe AEA's are as part of the Ontario HPE Curriculum?

a. Not valuable at all

b. Mostly not valuable

- c. Somewhat not valuable
- d. Neutral
- e. Somewhat valuable
- f. Mostly valuable
- g. Extremely valuable

Appendix B.1
Email to Principals and Camp Directors

Subject: Request for Grade 9 Students Participation in Physical Education Research Study

Dear [Principal's or Camp Director],

I hope this message finds you well. My name is Sara Rohr, and I am a master's student at Brock University, working under the supervision of Dr. Nathan Hall. We are conducting a research study titled *Surveying Students' Experiences and Thoughts Related to Alternative Environment Activities in Physical Education*.

We are seeking your assistance in inviting grade 9 students at your institution to participate in this important research. This study has received ethical approval from Brock University through the REB (file #24-051 HALL) and your school board (if applicable). The aim of the research is to explore how Ontario grade 9 students experience and perceive the Alternative Environment Activities (AEAs) within their Physical Education (PE) programs. These activities go beyond traditional gym or field sports, including options like hiking, swimming and ice skating.

Attached is a *Letter of Invitation to Principals* that includes further details on the study.

How You Can Help: If you are willing to allow your students to participate, we would kindly ask that you distribute an email invitation (sample email attached title- *Sample Email to Parents/Guardians from Principal*) to parents/guardians of grade 9 students. This email will include a brief summary and an attachment with a *Letter to Participate and Consent*.

Benefits of Participation: By taking part in this study, your students will have an opportunity to reflect on their own PE experiences, which may help improve PE programs in the future.

If you have any questions or would like more information about the research, please do not hesitate to contact me at sr17cb@brocku.ca or Dr. Nathan Hall at nhall@brocku.ca. We sincerely appreciate your support and hope that you will consider allowing your grade 9 students the chance to participate.

Thank you for your time and consideration.

Warm regards,

Sara Rohr
Master's Student, Applied Health Science | Brock University
St. Catharines, ON | L2S 3A1
Sr17cb@Brocku.ca

Appendix B.2
Attachment in the Email to Principals or Camp Directors- Letter of Invitation to Principals or Camp Directors

Title of Research: Surveying Students' Experiences and Thoughts Related to Alternative Environment Activities in Physical Education

Researchers Names:

Dr. Nathan Hall, Principal Investigator, Brock University
Sara Rohr, Principal Student Investigator, Brock University

Invitation to Participate:

You are being invited to allow grade 9 students within your institution the chance to participate in a university research study that explores Ontario grade 9 students' experiences and viewpoints regarding Alternative Environment Activities (AEAs) in Physical Education (PE) programs. Your student's involvement will provide valuable insights into how AEAs are experienced by students at this grade level. Participation is entirely voluntary, and the students may choose to withdraw at any time without any negative consequences. Below, you will find a brief description of the research followed by the requirements of the participants. If you are willing to allow your students to participate, an email *Invitation to Participate* will need to be sent out to the parent/guardians of the grade 9 students at your institution.

Description and Purpose of the Research:

This research study aims to explore the experiences and viewpoints of Ontario grade 9 students regarding AEAs in PE programs. AEAs refer to physical activities that occur beyond the scope of traditional uses for gymnasiums, fitness facilities (e.g., weight room, cardio center) or sporting fields (Hall et al., 2022). Examples include hiking, tobogganing, bowling, swimming, ice skating and kayaking. The study seeks to understand how these diverse and engaging activities are perceived by students and how they influence their overall experience with PE.

The purpose of this research is to gather insights directly from students about their interactions with AEAs, which will help in evaluating the effectiveness and inclusivity of current PE programs. By understanding students' perspectives, the study aims to provide recommendations for improving PE curricula to better cater to student interests and promote a more active and healthier lifestyle. This research is important for enhancing the quality of HPE in Ontario and ensuring that PE programs are engaging and beneficial for all students.

Participant Requirements:

We are hoping to recruit at least 271 grade 9 students currently enrolled in either a public or private school in Ontario. The participants must be proficient in the English language, as the questionnaire will only be available in English. Lastly, parents/guardians must provide consent for their child to participate, and the participants must provide assent. Participants will be asked to complete an online questionnaire, that will take approximately 10 minutes, that asks about their experiences and viewpoint on AEAs in their PE program. We ask that there is a space provided for the student to perform the survey without others being in close proximity.

Participation is Voluntary

The student's participation is entirely voluntary, and they have the right to withdraw at any time without facing any negative consequences. They may also choose not to answer specific questions. If they decide to end their participation, simply stop answering the questions and close the online survey window. There are no repercussions for choosing not to participate in this study.

Potential Benefits and Potential Harms: By participating in this research, your students could gain a greater awareness of their own experiences and preferences related to AEAs in PE. Their feedback could lead to improved and more tailored PE programs that better meet their needs and interests. Apart from the potential minor inconvenience of the time required to complete the questionnaire, there are no known risks or harms associated with your student's participation in this research.

Confidentiality: All information that is gathered will be treated as confidential. No student names will ever be collected (they remain anonymous) and therefore individual participants will not be linked to any data collected in this study. Since our focus is on the overall responses of the entire participant group, we will not be identifying individuals in any written reports of this research.

The data collected during this study will be stored on a secure server and transferred to a secure database for analysis. The data will be retained for five years after the study's completion, after which it will be permanently deleted from both the server and database. Access to this data will be restricted to the research team members involved in this study.

Feedback: Invited participants have the option to request feedback directly through email. Please note that completing the questionnaire is not required to request feedback. All invited participants, whether they complete the survey or not, are welcome to request feedback via email. Since the survey does not collect any identifiable information, researchers will not be able to determine whether the individual requesting feedback participated in the study. The feedback will include a one-page summary of group results, there will be no individual feedback provided.

The researchers also intend to present the study's findings at conferences and/or through publications.

This study has been reviewed and received ethics clearance through the REB (file #24-051 HALL).

Contact Information:

Dr. Nathan Hall
Associate Professor
Kinesiology
Brock University
St. Catharines, ON
L2S 3A1
nhall@brocku.ca
204-880-1385

Sara Rohr
Master's Student
Applied Health Science
Brock University
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Appendix B.3

Sample Email to Parents/Guardians from Principals or Camp Directors

Subject: Invitation for Your Child to Participate in Physical Education Research Study

Dear Parent/Guardian,

We are writing to inform you about an opportunity for your child to participate in a research study conducted by Brock University. The study, title *Surveying Students' Experiences and Thoughts Related to Alternative Environment Activities in Physical Education*, is being led by Dr. Nathan Hall and master's student Sara Rohr. The study has received ethical approval from both Brock University REB (file #24-051 HALL) and [school/school board name].

The purpose of this research is to explore how grade 9 students in Ontario experience and perceive Alternative Environment Activities (AEAs) within their Physical Education (PE) programs. AEAs include activities that go beyond traditional gym-based or field sports, such as hiking, swimming, and ice skating. The feedback gathered will help improve PE programs by making them more engaging and relevant to students' interests.

What Participation Involves: Your child will complete a short online questionnaire, approximately 10 minutes in lengths, about their experiences and viewpoints on AEAs. Participation is voluntary and your child can withdraw at any time without any negative consequences. The survey is anonymous; no identifiable information will be collected, ensuring that your child's responses remain confidential.

If you are interested in your child participating or are looking for more information, I have attached a *Letter of Invitation to Participate and Consent* (Appendix B.4) document that will provide you with further steps.

If you or your child have any questions about the study, you are welcome to contact the research team at the following:

Contact Information:

Dr. Nathan Hall
Associate Professor
Kinesiology
Brock University
St. Catharines, ON
L2S 3A1
nhall@brocku.ca
204-880-1385

Sara Rohr
Master's Student
Applied Health Science
Brock University
St. Catharines, ON
L2S 3A1
Sr17cb@Brocku.ca

Best regards,

[Principal's or Camp Directors Name]

[School or Camps Name]

Appendix B.4

Attachment in Email to Parent/Guardians- Letter of Invitation to Participate and Consent

Title of Research: Surveying Students' Experiences and Thoughts Related to Alternative Environment Activities in Physical Education

Researchers Names:

Dr. Nathan Hall, Principal Investigator, Brock University

Sara Rohr, Principal Student Investigator, Brock University

Invitation to Participate:

You are being invited to allow your child to take part in a university research study that explores Ontario grade 9 students' experiences and viewpoints regarding Alternative Environment Activities (AEAs) in Physical Education (PE) programs. Your child's involvement will provide valuable insights into how AEAs are experienced by students at this grade level. Participation is entirely voluntary, and your child may choose to withdraw at any time without any negative consequences. Below, you will find a brief description of the research followed by the requirements of the participants. If you are willing to participate, a link to provide parental/guardian consent for your child is attached, please fill it out and the questionnaire will be sent back for your child to complete.

Description and Purpose of the Research:

This research study aims to explore the experiences and viewpoints of Ontario grade 9 students regarding AEAs in PE programs. AEAs refer to physical activities that occur beyond the scope of traditional uses for gymnasiums, fitness facilities (e.g., weight room, cardio center) or sporting fields (Hall et al., 2022). Examples include hiking, tobogganing, bowling, swimming, ice skating and kayaking. The study seeks to understand how these diverse and engaging activities are perceived by students and how they influence their overall experience with PE.

The purpose of this research is to gather insights directly from students about their interactions with AEAs, which will help in evaluating the effectiveness and inclusivity of current PE programs. By understanding students' perspectives, the study aims to provide recommendations for improving PE curricula to better cater to student interests and promote a more active and healthier lifestyle. This research is important for enhancing the quality of PE in Ontario and ensuring that PE programs are engaging and beneficial for all students.

Participant Requirements:

We are hoping to recruit at least 271 grade 9 students currently enrolled in either a public or private school in Ontario. The participants must be proficient in the English language, as the questionnaire will only be available in English. Lastly, parents/guardians must provide consent for their child to participate, and the participants must provide assent.. Should you wish to have your child participate, they will be asked to complete an online questionnaire, 10 minutes in length, that asks about their experiences and viewpoint on AEAs in their PE program. We ask that you provide a space where your child can perform the survey without others, even yourself, being in close proximity.

Participation is Voluntary

Participation is entirely voluntary, and participants have the right to withdraw at any time without facing any negative consequences. They may also choose not to answer specific questions. If they decide to end their participation, simply stop answering the questions and close the online survey window. There are no repercussions for choosing not to participate in this study.

Potential Benefits and Potential Harms: By participating in this research, your child could gain a greater awareness of their own experiences and preferences related to AEAs in PE. Their feedback could lead to improved and more tailored PE programs that better meet their needs and interests. Apart from the potential minor inconvenience of the time required to complete the questionnaire, there are no known risks or harms associated with your child's participation in this research.

Confidentiality: All information you and your child provide will be treated as confidential. Your names will not be included or linked to any data collected in this study, and participants (your child) will not have to provide their name when completing the questionnaire (the answers they provide will be completely anonymous). Since our focus is on the overall responses of the entire participant group, you will not be identified individually in any written reports of this research.

The data collected during this study will be stored on a secure server and transferred to a secure database for analysis. The data will be retained for five years after the study's completion, after which it will be permanently deleted from both the server and database. Access to this data will be restricted to the research team members involved in this study.

Feedback: Invited participants and their parents/guardians have the option to request feedback directly through email. Please note that completing the questionnaire is not required to request feedback. All invited participants, whether they complete the survey or not, are welcome to request feedback via email. Since the survey does not collect

any identifiable information, researchers will not be able to determine whether the individual requesting feedback participated in the study. The feedback will include a one-page summary of group results, there will be no individual feedback provided. The researchers also intend to present the study's findings at conferences and/or through publications.

If you agree for your child to participate, please provide them with the link to the survey, which includes the Assent Form. This link ensures your child's anonymity and consent to participant. You do not need to return a signed consent form. By providing your child with the link you are agreeing for your child to participate in the study. You understand that they are participating voluntarily, that anonymity and confidentiality will be maintained, and that they have the right to refuse to answer any questions and/or they may withdraw from the study at any point.

Click [HERE](#) for questionnaire

This study has been reviewed and received ethics clearance through the REB (file #24-051 HALL).

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If there are any questions related to research participant's rights, please contact:

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Appendix C
Supplementary Tables

Table C1*Whole Sample (N=94) Participant Demographics*

School Location	Gender	Frequency	Percentage
Rural School	Male	27	42.2
	Female	36	56.3
	Other	1	1.6
	Total	64	100
Urban School	Male	9	30.0
	Female	21	70.0
	Other	0	0.0
	Total	30	100
Total	Male	36	38.3
	Female	57	60.6
	Other	1	1.1
	Total	94	100

Table C2*AEA Participation Frequency in PE: Grades K-6 vs. Grades 7-9*

Frequency options	Grades K-6	Percentage (%)	Grades 7-9	Percentage (%)
Never	24	25.5	15	16.0
Less than ONE class per month	14	14.9	24	25.5
ONE to TWO classes per month	21	22.3	22	23.4
THREE to FIVE classes per month	24	25.5	13	13.8
SIX or more classes per month	11	11.7	20	21.3
Total Responses	94	100.0	94	100.0

Table C3*Frequency of AEA's Participation in Urban vs. Rural Schools*

School Location	Frequency options	Grades K-6	Percentage (%)	Grades 7-9	Percentage (%)
Urban	Never	10	33.3	3	10.0
	Less than ONE class per month	8	26.7	12	40.0
	ONE to TWO classes per month	2	6.7	6	20.0
	THREE to FIVE classes per month	8	26.7	5	16.7
	SIX or more classes per month	2	6.7	4	13.3
	Total Responses		30	100	30
Rural	Frequency options	Grades K-6	Percentage (%)	Grades 7-9	Percentage (%)
	Never	14	21.9	12	18.8
	Less than ONE class per month	6	9.4	12	18.8
	ONE to TWO classes per month	19	29.7	16	25.0
	THREE to FIVE classes per month	16	25.0	8	12.5
	SIX or more classes per month	9	14.1	16	25.0
	Total Responses		64	100	64

Table C4*Subsample of Students with AEA Experience - Demographics*

School Location	Gender	Frequency	Percentage
Rural School	Male	18	43.9
	Female	22	53.7
	Other	1	2.4
	Total	41	100
Urban School	Male	6	37.5
	Female	10	62.5
	Other	0	1.8
	Total	16	100
Total	Male	24	42.1
	Female	32	56.1
	Other	1	1.8
	Total	57	100

Table C5*Enjoyment of Sports, PE, and Likelihood of Continuing PE Post Grade 9*

Scale	Enjoy Sports	Enjoy PE	Likelihood to Continue PE Post Grade 9
1	0	0	3
2	1	0	5
3	1	5	6
4	6	6	11
5	11	3	11
6	17	27	12
7	21	19	9
Total	57	57	57
Mean	5.842	5.807	4.649
SD	1.192	1.260	1.737

Note. Enjoyment rated on a 1-7 scale (1= do not enjoy at all, 7= really enjoy); likelihood rated on a 1-7 scale (1= not likely at all, 7= extremely likely).

Table C6
Seasonal Participation in AEA's

Scale	Fall	Winter	Spring
1	3	8	3
2	4	9	3
3	7	18	5
4	24	10	18
5	13	5	16
6	4	3	8
7	2	4	4
Total	57	57	57
Mean	4.053	3.351	4.421
SD	1.315	1.664	1.451

Note. Frequency of participation on 1-7 scale (1= never, 7= always).

Table C7
Frequency of AEA's by Setting of Activity and Grade Level

Scale	At School (K-6)	Walking Distance (K-6)	Requiring a Vehicle (K-6)	At School (7-9)	Walking Distance (7-9)	Requiring a Vehicle (7-9)
1	2	5	11	3	5	17
2	5	12	11	3	6	8
3	2	4	15	6	8	10
4	9	22	10	8	17	10
5	15	8	5	14	9	3
6	11	1	1	11	3	5
7	13	5	4	12	9	4
Total	57	57	57	57	57	57
Mean	5.018	3.684	3.105	4.895	4.123	3.088
SD	1.674	1.627	1.676	1.718	1.718	1.921

Note. Frequency of participation on 1-7 scale (1= never, 7= always).

Table C8*Enjoyment of AEs by Activity Type and Grade Level*

Scale	Snow (K-6)	Dryland (K-6)	Water (K-6)	Snow (7-9)	Dryland (7-9)	Water (7-9)
1	4	1	2	3	1	2
2	1	1	2	0	2	3
3	3	1	0	0	1	1
4	2	0	4	4	2	1
5	14	8	8	13	5	7
6	13	16	16	14	16	16
7	9	23	11	13	23	14
Missing	11	7	14	10	7	13
Total	57	57	57	57	57	57
Mean	5.087	6.06	5.465	5.511	5.96	5.545
SD	1.736	1.284	1.579	1.516	1.442	1.691

Note. Enjoyment rated on 1-7 scale (1= do not enjoy at all, 7= really enjoy).

Table C9*AEs Participants Most Frequently Participated in by Rank and Grade Level*

Activity	Rank 1 (K-6)	Rank 2 (K-6)	Rank 3 (K-6)	Rank 1 (7-9)	Rank 2 (7-9)	Rank 3 (7-9)
Beach Volleyball	16	19	20	13	15	19
Biking	9	-	-	14	-	-
Swimming	7	5	3	-	5	5
Gardening	-	4	3	-	-	-
Rock Climbing	-	-	4	3	4	-
Curling	-	-	3	-	-	-
Golf	-	-	-	-	3	4
Horseback Riding	-	-	-	-	-	4
Kayak/Canoe/SUP	-	-	-	-	3	3

Table C10*AEAs Participants Most Enjoyed by Rank and Grade Level*

Activity	Rank 1 (K-6)	Rank 2 (K-6)	Rank 3 (K-6)	Rank 1 (7-9)	Rank 2 (7-9)	Rank 3 (7-9)
Beach Volleyball	16	16	16	13	14	17
Biking	4	-	-	-	-	-
Swimming	7	6	-	8	5	11
Rock Climbing	-	-	5	-	8	-
Curling	-	-	3	-	-	-
Golf	-	-	-	-	3	4
Horseback Riding	-	4	5	-	-	5
Kayak/Canoe/SUP	-	-	-	-	3	3
Cross-Country Skiing	4	-	-	-	5	-
Sledding/Tobogganing	-	-	-	5	-	-

Table C11*Repeated Measures ANOVA by Activity Type p-Values and Assumptions Check (Snow, Water, Dryland)*

Panel A. Inferential tests (p-Values)			
Effect	Snow p	Water p	Dryland p
Within: Grade Level (Type)	0.030**	0.520	0.701
Within: Grade Level x Gender	0.061	0.520	0.701
Between: Gender	0.121	0.044**	0.365
Panel B. Assumption Check (Levene's Test p-Value)			
Activity Type	Grade Level	p-Value	
Snow	K-6	0.497	
	7-9	0.933	
Water	K-6	0.272	
	7-9	0.045**	
Dryland	K-6	0.661	
	7-9	0.473	

Table C12*Descriptive Statistics of Activity Type by Grade Level (Snow, Water, Dryland)*

Activity Type	Grade Level	n	Mean	SD
Snow	K-6: Male	19	5.684	1.565
	K-6: Female	24	4.625	1.789
	7-9: Male	19	5.737	1.522
	7-9: Female	24	5.292	1.601
Water	K-6: Male	16	6.188	1.047
	K-6: Female	24	5.083	1.640
	7-9: Male	16	6.000	1.265
	7-9: Female	24	5.083	1.909
Dryland	K-6: Male	22	6.227	1.232
	K-6: Female	25	5.960	1.369
	7-9: Male	22	6.227	1.110
	7-9: Female	25	5.840	1.546

Note. Enjoyment rated on 1-7 scale (1= do not enjoy at all, 7= really enjoy), higher means reflect greater enjoyment.

Table C13*Urban - Rural Comparisons in AEA Frequency by Season Descriptives*

Season	School Location	N	Mean	SD
Fall	Urban	16	4.125	1.544
	Rural	40	4.025	1.250
Winter	Urban	16	3.313	2.056
	Rural	40	3.375	1.531
Spring	Urban	16	4.750	1.438
	Rural	40	4.325	1.457

Note. Higher scores for the mean reflect more frequent participation; responses on a 1-7 scale (1= never, 7= always).

Table C14*Urban Versus Rural Comparisons in AEA Frequency by Season*

Panel A. Independent Samples Test			
Season	Test	p	Effect Size
Fall	Student	0.802	-0.075
	Mann-Whitney	0.629	0.081
Winter	Student	0.901	0.037**
	Mann-Whitney	0.553	-0.102
Spring	Student	0.327	-0.293
	Mann-Whitney	0.290	0.178
Panel B. Assumption Checks			
Season	Shapiro-Wilk p		Levene's p
Fall	0.004**		0.278
Winter	0.002**		0.097
Spring	0.013**		0.871

Note. Effect size is Cohen's *d* for Student's *t*-test and rank biserial *r* for Mann-Whitney. Significant Shapiro-Wilk *p* values indicate deviation from normality; normality is not upheld; therefore, analysis is done using a Mann-Whitney test.

Table C15*Repeated Measures ANOVA Tests by AEA Setting*

Panel A. Repeated Measures ANOVA		
AEA Setting	Effect	p-Value
At school	Grade Level	0.266
	Grade Level x School Location	0.415
	School Location	0.971
Walking Distance	Grade Level	0.004**
	Grade Level x School Location	0.063
	School Location	0.633
Requiring a Vehicle	Grade Level	0.884
	Grade Level x School Location	0.884
	School Location	0.373
Panel B. Assumption Check (Levene's Test p-Value)		
AEA Setting	Grade Level	p-Value
At school	K-6	0.132
	7-9	0.986
Walking Distance	K-6	0.899
	7-9	0.840
Requiring a Vehicle	K-6	0.618
	7-9	0.692

Table C16*Descriptive Statistics for AEA Participation by AEA Setting and Grade Level*

School Location	Statistics	At School (K-6)	Walking Distance (K-6)	Requiring a Vehicle (K-6)	At School (7-9)	Walking Distance (7-9)	Requiring a Vehicle (7-9)
Urban	Mean	5.125	3.563	2.813	4.813	4.563	2.750
	SD	2.029	1.548	1.601	1.759	1.632	1.880
Rural	Mean	4.976	3.732	3.220	4.927	3.951	3.220
	SD	1.541	1.674	1.710	1.723	1.830	1.943

Note. Higher scores for the mean reflect more frequent participation; responses on a 1-7 scale (1= never, 7= always).

Table C17*Repeated Measures ANOVA Tests by Activity Type and School Location*

Panel A. Inferential Tests (p-Values)		
Activity Type	Effect	p-Value
Snow	Within: Grade Level	0.039**
	Within: Grade Level x School Location	0.769
	Between: School Location	0.108
Water	Within: Grade Level	0.898
	Within: Grade Level x School Location	0.898
	Between: School Location	0.747
Dryland	Within: Grade Level	0.443
	Within: Grade Level x School Location	0.777
	Between: School Location	0.386
Panel B. Assumption Check (Levene's Test p-Value)		
Activity Type	Grade Level	p-Value
Snow	K-6	0.627
	7-9	0.227
Water	K-6	0.709
	7-9	0.846
Dryland	K-6	0.406
	7-9	0.593

Table C18*Descriptive Statistics for Enjoyment by Activity Type and School Location*

School Location	Statistics	Snow (K-6)	Water (K-6)	Dryland (K-6)	Snow (7-9)	Water (7-9)	Dryland (7-9)
Urban	Mean	5.857	5.625	6.444	6.429	5.625	6.222
	SD	1.464	1.598	0.726	0.787	1.506	1.093
Rural	Mean	4.892	5.395	5.974	5.324	5.455	5.872
	SD	1.792	1.619	1.386	1.6	1.787	1.542

Note. Enjoyment rated on 1-7 scale (1= do not enjoy at all, 7= really enjoy), higher means reflect greater enjoyment.

Table C19*Linear Regression Predicting Activity Type Enjoyment from PE Enjoyment*

Panel A. Model Fit			
Outcome (Activity Type)	Adjusted R²	R²	Model p-Value
Snow	0.006	0.053	0.331
Water	0.060	0.107	0.117
Dryland	0.058	0.099	0.097
Panel B. Coefficients			
Outcome (Activity Type)	Grade Level	Standardized (β)	p-Value
Snow	K-6	0.170	0.143
	7-9	0.194	0.207
Water	K-6	0.491	0.04
	7-9	-0.393	0.097
Dryland	K-6	0.134	0.490
	7-9	0.208	0.285

Table C20*Linear Regression Predicting Likelihood of Taking PE after Grade 9 From Seasonal AEA Participation*

Panel A. Model Fit			
Outcome	Adjusted R²	R²	Model p-Value
Overall	0.012	0.065	0.311
Panel B. Coefficients			
Outcome (Season)		Standardized (β)	p-Value
Fall		0.314	0.188
Winter		-0.049	0.797
Spring		-0.040	0.832

Table C21

Linear Regression Predicting the Likelihood of Taking PE After Grade 9 from AEA Participation by AEA Setting

Panel A. Model Fit			
AEA Setting	Adjusted R²	R²	Model p-Value
At School	0.008	0.028	0.459
Walking Distance	0.029	0.007	0.817
Requiring a Vehicle	0.01	0.026	0.496
Panel B. Coefficients			
AEA Setting	Grade Level	Standardized (β)	p-Value
At School	K-6	0.148	0.507
	7-9	0.026	0.908
Walking Distance	K-6	0.089	0.622
	7-9	-0.003	0.985
Requiring a Vehicle	K-6	0.207	0.271
	7-9	-0.085	0.649

Table C22

Linear Regression Predicting the Likelihood of Taking PE After Grade 9 from Enjoyment of AEA Activity Type

Panel A. Model Fit			
Activity Type	Adjusted R²	R²	Model p-Value
Snow	0.040	0.008	0.842
Water	0.006	0.056	0.337
Dryland	0.016	0.027	0.541
Panel B. Coefficients			
Activity Type	Grade Level	Standardized (β)	p-Value
Snow	K-6	0.109	0.660
	7-9	-0.025	0.921
Water	K-6	0.300	0.214
	7-9	-0.351	0.148
Dryland	K-6	-0.062	0.758
	7-9	0.199	0.322

Table C23*Paired Comparisons of AEA Participation by AEA Setting Between Grade Level*

Panel A. Paired Tests			
AEA Setting	Test	p-Value	Effect Size
At School	Students	0.397	0.113
	Wilcoxon	0.478	0.144
Walking Distance	Students	0.024	-0.307
	Wilcoxon	0.032	-0.448
Requiring a Vehicle	Students	0.927	0.012**
	Wilcoxon	0.750	0.071
Panel B. Assumption Check (Shapiro-Wilk p-Value)			
AEA Setting		p-Value	
At School		<.001**	
Walking Distance		<.001**	
Requiring a Vehicle		<.001**	

Note. Primary inference uses the Wilcoxon signed-rank test.

Table C24*Paired Comparisons of AEA Participation by Activity Type Between Grade Level*

Panel A. Paired Tests			
Activity Type	Test	p-Value	Effect Size
Snow	Students	0.011**	-0.402
	Wilcoxon	0.009**	-0.673
Water	Students	0.444	0.111
	Wilcoxon	0.553	0.158
Dryland	Students	0.793	-0.041**
	Wilcoxon	0.977	0.017
Panel B. Assumption Check (Shapiro-Wilk p-Value)			
Activity Type		p-Value	
Snow		<.001**	
Water		<.001**	
Dryland		<.001**	

Note. Primary inference uses the Wilcoxon signed-rank test.

Table C25*Descriptive Statistics for Agreement with AEA Value Statements*

Aspects/ Characteristics	Mean	SD	Rating (1-7 Scale)						
			1	2	3	4	5	6	7
Fun	5.579	1.388	1	1	3	6	10	20	16
Explore Nature	5.649	1.316	1	0	4	4	11	21	16
New Physical Activity	5.661	1.339	1	2	0	6	9	23	15
Field Trip	5.536	1.375	1	1	3	7	7	24	13
Freedom	5.393	1.545	2	3	0	7	12	18	14
Friends	5.536	1.348	1	2	1	5	13	21	13

Note. Rated on a 1-7 point scale (1= strongly disagree, 7= strongly agree).

Table C26*Ranked Importance of AEA Value Characteristics*

Characteristics	Percentage (%)						
	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Top 2
Fun	47.3	25.5	9.1	5.5	3.6	9.1	72.8
Explore Nature	14.5	36.4	25.5	12.7	10.9	0	50.9
New Physical Activity	14.5	9.1	20	36.4	12.7	7.3	23.6
Field Trip	7.3	3.6	16.4	21.8	30.9	20	10.9
Freedom	3.6	9.1	9.1	14.5	34.5	29.1	12.7
Friends	12.7	16.4	20	9.1	18.2	23.6	29.1

Note. Rankings are ordinal: 1= most important, 6= least important. Percentages are valid percentages and may not sum to 100 due to rounding. "Top 2" equals Rank 1 and Rank 2 as a priority indicator.

Table C27*Descriptive Statistics of Perceived Barriers to AEA Participation*

Barriers	Mean	SD	Response Distribution (%)						
			1	2	3	4	5	6	7
Cost	4.105	1.372	3 (5.3)	2 (3.5)	8 (14.0)	30 (52.6)	6 (10.5)	3 (5.3)	5 (8.8)
Time	3.982	1.445	1 (1.8)	7 (12.3)	15 (26.3)	15 (26.3)	12 (21.1)	2 (3.5)	5 (8.8)
Safety	4.228	1.376	3 (5.3)	2 (3.5)	6 (10.5)	27 (47.4)	11 (19.3)	3 (5.3)	5 (8.8)
Organize	4.158	1.461	3 (5.3)	3 (5.3)	13 (22.8)	14 (24.6)	14 (24.6)	7 (12.3)	3 (5.3)

Note. Rated on a 1-7 point scale (1= smallest barrier, 7=largest barrier).

Table C28*Descriptive Statistics of Willingness to Participate in PE With and Without AEA Present*

Participate	Mean	SD	Response Distribution (%)						
			1	2	3	4	5	6	7
AEA Taught	5.456	1.31	1 (1.8)	0 (0)	2 (3.5)	11 (19.3)	12 (21.1)	17 (29.8)	14 (24.6)
No AEA Taught	5.053	1.042	0 (0)	1 (1.8)	1 (1.8)	17 (29.8)	16 (28.1)	19 (33.3)	3 (5.3)

Note. Rated on a 1-7 point scale (1= not willing to participate at all, 7= completely willing to participate).

Table C29*Descriptive Statistics for PE Enjoyment by Lesson Type: AEA Versus Non-AEA*

Enjoy PE When	Mean	SD	Response Distribution (%)						
			1	2	3	4	5	6	7
AEA Taught	5.614	1.292	0 (0)	2 (3.5)	1 (1.8)	9 (15.8)	9 (15.8)	20 (35.1)	16 (28.1)
Non-AEA Taught	5.123	1.070	0 (0)	0 (0)	4 (7.0)	12 (21.1)	19 (33.3)	17 (29.8)	5 (8.8)

Note. Rated on a 1-7 point scale (1= not enjoyable at all, 7= extremely enjoyable).

Table C30*Descriptive Statistics for Likelihood to Continue Taking PE*

Continue Taking PE	Mean	SD	Response Distribution (%)						
			1	2	3	4	5	6	7
AEA Taught	5.158	1.497	2 (3.5)	1 (1.8)	4 (7.0)	9 (15.8)	16 (28.1)	13 (22.8)	12 (21.1)
No-AEA is Taught	4.357	1.531	2 (3.5)	5 (8.8)	7 (12.3)	18 (31.6)	10 (17.5)	9 (15.8)	5 (8.8)

Note. Rated on a 1-7 point scale (1= not likely at all, 7= extremely likely).

Table C31*Descriptive Statistics for Value of AEA's as Part of PE Curriculum*

Overall Value of AEA's	Mean	SD	Response Distribution (%)						
			1	2	3	4	5	6	7
Value of AEA	5.421	1.295	1 (1.8)	1 (1.8)	0 (0.0)	12 (21.1)	12 (21.1)	19 (33.3)	12 (21.1)

Note. Ratings reflect agreement that AEA's are valuable; response range 1-7 (1= strongly disagree, 7= strongly agree).

Table C32

Independent Samples T-Test for Gender Differences in Agreement with AEA Value Characteristics

Panel A. Independent Sample T-Test			
Aspects/Characteristics	Test	p-Value	Effect Size
Fun	Student	0.179	0.368
	Mann-Whitney	0.228	-0.180
Explore Nature	Student	0.953	0.016
	Mann-Whitney	0.809	0.038
New Physical Activity	Student	0.712	0.101
	Mann-Whitney	0.775	-0.040
Field Trip	Student	0.496	0.186
	Mann-Whitney	0.655	-0.070
Freedom	Student	0.62	0.135
	Mann-Whitney	0.766	-0.050
Friends	Student	0.409	0.226
	Mann-Whitney	0.321	-0.150
Panel B. Assumptions Check			
Aspects/Characteristics	Test	p-Value	
Fun	Shapiro-Wilk	<.001	
	Levene's	0.050	
Explore Nature	Shapiro-Wilk	<.001	
	Levene's	0.513	
New Physical Activity	Shapiro-Wilk	<.001	
	Levene's	0.676	
Field Trip	Shapiro-Wilk	<.001	
	Levene's	0.296	
Freedom	Shapiro-Wilk	<.001	
	Levene's	0.699	
Friends	Shapiro-Wilk	<.001	
	Levene's	0.831	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across genders.

Table C33

Descriptive Statistics on Gender Differences in Agreement with AEA Value Characteristics

Aspects/Characteristics	Gender	Mean	SD
Fun	Male	5.917	1.060
	Female	5.438	1.458
Explore Nature	Male	5.708	1.122
	Female	5.688	1.401
New Physical Activity	Male	5.750	1.260
	Female	5.613	1.430
Field Trip	Male	5.708	1.160
	Female	5.452	1.524
Freedom	Male	5.583	1.316
	Female	5.397	1.542
Friends	Male	5.750	1.260
	Female	5.452	1.362

Note. Rankings are ordinal: 1= most important, 6= least important.

Table C34*Independent Samples T-Test Barrier Versus Gender*

Panel A. Independent Sample T-Test			
Barriers	Test	p-Value	Effect Size
Cost	Student	0.585	0.148
	Mann-Whitney	0.964	0.008
Time	Student	0.892	0.037
	Mann-Whitney	0.899	-0.021
Safety	Student	0.955	-0.015
	Mann-Whitney	0.860	0.027
Organize	Student	0.269	0.302
	Mann-Whitney	0.365	-0.141
Panel B. Assumptions Check			
Barriers	Test	p-Value	
Cost	Shapiro-Wilk	<.001	
	Levene's	0.631	
Time	Shapiro-Wilk	0.008	
	Levene's	0.728	
Safety	Shapiro-Wilk	<.001	
	Levene's	0.369	
Organize	Shapiro-Wilk	0.309	
	Levene's	0.677	

Note. Shapiro-Wilk tests of residuals indicated non-normality for cost, time and safety but not for organize, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across genders.

Table C35*Descriptive Statistics for Barriers Versus Gender*

Barriers	Gender	Mean	SD
Cost	Male	4.167	1.404
	Female	3.969	1.282
Time	Male	3.958	1.488
	Female	3.906	1.353
Safety	Male	4.167	1.465
	Female	4.188	1.256
Organize	Male	4.375	1.377
	Female	3.938	1.501

Note. Rated on a 1-7 point scale (1= smallest barrier, 7=largest barrier).

Table C36*Independent Samples T-Test for Willingness to Participate Versus Gender*

Panel A. Independent Sample T-Test			
Participate	Test	p-Value	Effect Size
AEA Taught	Student	0.201	0.349
	Mann-Whitney	0.243	-0.180
No AEA Taught	Student	0.144	0.400
	Mann-Whitney	0.191	-0.198
Panel B. Assumptions Check			
Participate	Test	p-Value	
AEA Taught	Shapiro-Wilk	0.004	
	Levene's	0.817	
No AEA Taught	Shapiro-Wilk	0.024	
	Levene's	0.183	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across genders.

Table C37*Descriptive Statistics for Willingness to Participate Versus Gender*

Participate	Gender	Mean	SD
AEA Taught	Male	5.708	1.197
	Female	5.25	1.391
No AEA Taught	Male	5.292	0.908
	Female	4.875	1.129

Note. Rated on a 1-7 point scale (1= not willing to participate at all, 7= completely willing to participate).

Table C38*Independent Samples T-Test for Enjoyment Versus Gender*

Panel A. Independent Sample T-Test			
Enjoy PE When	Test	p-Value	Effect Size
AEA Taught	Student	0.549	0.163
	Mann-Whitney	0.266	-0.169
Non-AEA Taught	Student	0.044	0.556
	Mann-Whitney	0.066	-0.280
Panel B. Assumptions Check			
Enjoy PE When	Test	p-Value	
AEA Taught	Shapiro-Wilk	<.001	
	Levene's	0.220	
Non-AEA Taught	Shapiro-Wilk	0.013	
	Levene's	0.645	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across genders.

Table C39*Descriptive Statistics for Enjoyment Versus Gender*

Enjoy PE When	Gender	Mean	SD
AEA Taught	Male	5.792	1.414
	Female	5.594	1.043
Non-AEA Taught	Male	5.458	1.103
	Female	4.875	1.008

Note. Rated on a 1-7 point scale (1= not enjoyable at all, 7= extremely enjoyable).

Table C40*Independent Samples T-Test Continuation Likelihood Versus Gender*

Panel A. Independent Sample T-Test			
Continue Taking PE	Test	p-Value	Effect Size
AEA Taught	Student	0.045**	0.553
	Mann-Whitney	0.026**	-0.342
No-AEA Taught	Student	0.251	0.318
	Mann-Whitney	0.193	-0.204
Panel B. Assumptions Check			
Continue Taking PE	Test	p-Value	
AEA Taught	Shapiro-Wilk	0.002**	
	Levene's	0.941	
No-AEA Taught	Shapiro-Wilk	0.277	
	Levene's	0.071	

Note. Residuals violated normality when AEAs are regularly added, but not when no AEAs are added; therefore, Mann-Whitney interpreted for when AEA are taught.

Table C41*Descriptive Statistics of Continuation Likelihood Versus Gender*

Continue Taking PE	Gender	Mean	SD
AEA Taught	Male	5.625	1.469
	Female	4.813	1.469
No-AEA Taught	Male	4.609	1.751
	Female	4.125	1.338

Note. Rated on a 1-7 point scale (1= not likely at all, 7= extremely likely).

Table C42*Independent Samples T-Test for Perceived Value of AEAs Versus Gender*

Panel A. Independent Sample T-Test			
Overall Value of AEAs	Test	p-Value	Effect Size
Value of AEAs	Student	0.329	-0.266
	Mann-Whitney	0.607	0.079
Panel B. Assumptions Check			
Overall Value of AEAs	Test	p-Value	
Value of AEAs	Shapiro-Wilk	0.002	
	Levene's	0.093	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across genders.

Table C43*Descriptive Statistics of Perceived Value of AEs Versus Gender*

Overall Value of AEs	Gender	Mean	SD
Value of AEs	Male	5.250	1.567
	Female	5.594	1.043

Note. Ratings reflect agreement that AEs are valuable; response range 1-7 (1= strongly disagree, 7= strongly agree).

Table C44

Independent Samples T-Test School Location Difference in Agreement with AEA Value Characteristics

Panel A. Independent Sample T-Test			
Aspects/Characteristics	Test	p-Value	Effect Size
Fun	Student	0.021**	-0.699
	Mann-Whitney	0.005**	0.471
Explore Nature	Student	0.140	-0.442
	Mann-Whitney	0.113	0.262
New Physical Activity	Student	0.332	-0.289
	Mann-Whitney	0.145	0.241
Field Trip	Student	0.069	-0.548
	Mann-Whitney	0.003**	0.489
Freedom	Student	0.202	-0.382
	Mann-Whitney	0.041**	0.342
Friends	Student	0.160	-0.421
	Mann-Whitney	0.082	0.289
Panel B. Assumptions Check			
Aspects/Characteristics	Test	p-Value	
Fun	Shapiro-Wilk	<.001**	
	Levene's	0.622	
Explore Nature	Shapiro-Wilk	<.001**	
	Levene's	0.312	
New Physical Activity	Shapiro-Wilk	<.001**	
	Levene's	0.622	
Field Trip	Shapiro-Wilk	<.001**	
	Levene's	0.764	
Freedom	Shapiro-Wilk	<.001**	
	Levene's	0.492	
Friends	Shapiro-Wilk	<.001**	
	Levene's	0.821	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across school locations.

Table C45

Descriptive Statistics of School Location Difference in Agreement with AEA Value Characteristics

Aspects/Characteristics	School Location	Mean	SD
Fun	Urban	6.250	1.238
	Rural	5.317	1.368
Explore Nature	Urban	6.063	1.124
	Rural	5.488	1.362
New Physical Activity	Urban	5.938	1.436
	Rural	5.550	1.300
Field Trip	Urban	6.063	1.692
	Rural	5.325	1.185
Freedom	Urban	5.813	1.721
	Rural	5.225	1.459
Friends	Urban	5.938	1.340
	Rural	5.375	1.334

Note. Rated on a 1-7 point scale (1= strongly disagree, 7= strongly agree).

Table C46*Independent Samples T-Test of Barriers Versus School Location*

Panel A. Independent Sample T-Test			
Barriers	Test	p-Value	Effect Size
Cost	Student	0.257	-0.338
	Mann-Whitney	0.391	0.137
Time	Student	0.173	0.407
	Mann-Whitney	0.092	-0.284
Safety	Student	0.775	-0.085
	Mann-Whitney	0.813	-0.040**
Organize	Student	0.019**	0.715
	Mann-Whitney	0.018**	-0.399
Panel B. Assumptions Check			
Barriers	Test	p-Value	
Cost	Shapiro-Wilk	<.001**	
	Levene's	0.184	
Time	Shapiro-Wilk	0.036**	
	Levene's	0.919	
Safety	Shapiro-Wilk	<.001**	
	Levene's	0.838	
Organize	Shapiro-Wilk	0.038**	
	Levene's	0.285	

Note. Shapiro-Wilk tests of residuals indicated non-normality for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across school locations.

Table C47*Descriptive Statistics of Barriers Versus School Location*

Barriers	School Location	Mean	SD
Cost	Urban	4.438	1.459
	Rural	3.976	1.332
Time	Urban	3.563	1.413
	Rural	4.146	1.442
Safety	Urban	4.313	1.250
	Rural	4.195	1.436
Organize	Urban	3.438	1.672
	Rural	4.439	1.285

Note. Rated on a 1-7 point scale (1= smallest barrier, 7=largest barrier).

Table C48*Independent Samples T-Test of Willingness to Participate Versus School Location*

Panel A. Independent Sample T-Test			
Participate	Test	p-Value	Effect Size
AEA Taught	Student	0.049	-0.593
	Mann-Whitney	0.047**	0.332
No AEA Taught	Student	0.377	-0.261
	Mann-Whitney	0.486	0.116
Panel B. Assumptions Check			
Participate	Test	p-Value	
AEA Taught	Shapiro-Wilk	0.001**	
	Levene's	0.349	
No AEA Taught	Shapiro-Wilk	0.003**	
	Levene's	0.598	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across school locations.

Table C49*Descriptive Statistics of Willingness to Participate Versus School Location*

Participate	School Location	Mean	SD
AEA Taught	Urban	6.000	1.095
	Rural	5.244	1.338
No AEA Taught	Urban	5.250	1.065
	Rural	4.976	1.037

Note. Rated on a 1-7 point scale (1= not willing to participate at all, 7= completely willing to participate).

Table C50*Independent Samples T-Test of Enjoyment Versus School Location*

Panel A. Independent Sample T-Test			
Enjoy PE When	Test	p-Value	Effect Size
AEA Taught	Student	0.019**	-0.713
	Mann-Whitney	0.019**	0.390
Non-AEA Taught	Student	0.097	-0.498
	Mann-Whitney	0.101	0.273
Panel B. Assumptions Check			
Enjoy PE When	Test	p-Value	
AEA Taught	Shapiro-Wilk	0.001**	
	Levene's	0.027	
Non-AEA Taught	Shapiro-Wilk	0.038	
	Levene's	0.995	

Note. Shapiro-Wilk tests of residuals were significant for all items, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant for non-AEA taught, indicating comparable variances across school location; however, they were significant when AEAs are taught, indicating heterogeneity of variance between urban and rural groups.

Table C51*Descriptive Statistics for Enjoyment Versus School Location*

Enjoy PE When	School Location	Mean	SD
AEA Taught	Urban	6.250	0.856
	Rural	5.366	1.356
Non-AEA Taught	Urban	5.500	0.966
	Rural	4.976	1.084

Note. Rated on a 1-7 point scale (1= not enjoyable at all, 7= extremely enjoyable).

Table C52*Independent Samples T-Test Continuation Likelihood Versus School Location*

Panel A. Independent Sample T-Test			
Continue Taking PE	Test	p-Value	Effect Size
AEA Taught	Student	0.143	-0.435
	Mann-Whitney	0.092	0.281
No-AEA Taught	Student	0.806	-0.101
	Mann-Whitney	0.649	0.096
Panel B. Assumptions Check			
Continue Taking PE	Test	p-Value	
AEA Taught	Shapiro-Wilk	<.001	
	Levene's	0.443	
No-AEA Taught	Shapiro-Wilk	0.036	
	Levene's	0.599	

Note. Residuals violated normality both times; therefore, Mann-Whitney was used for interpretation.

Table C53*Descriptive Statistics of Continuation Likelihood Versus School Location*

Continue Taking PE	School Location	Mean	SD
AEA Taught	Urban	5.625	1.586
	Rural	4.976	1.440
No-AEA Taught	Urban	4.438	1.711
	Rural	4.325	1.474

Note. Rated on a 1-7 point scale (1= not likely at all, 7= extremely likely).

Table C54*Independent Samples T-Test for Perceived Value of AEAs Versus School Location*

Panel A. Independent Sample T-Test			
Overall Value of AEAs	Test	p-Value	Effect Size
Value of AEAs	Student	0.034**	-0.642
	Mann-Whitney	0.030**	0.363
Panel B. Assumptions Check			
Overall Value of AEAs	Test	p-Value	
Value of AEAs	Shapiro-Wilk	<.001**	
	Levene's	0.487	

Note. Shapiro-Wilk tests of residuals were significant, so Mann-Whitney tests are interpreted as primary. Levene's tests were nonsignificant, indicating comparable variances across school locations.

Table C55*Descriptive Statistics of Perceived Value of AEAs Versus School Location*

Overall Value of AEAs	School Location	Mean	SD
Value of AEAs	Urban	6.000	1.095
	Rural	5.195	1.308

Note. Ratings reflect agreement that AEAs are valuable; response range 1-7 (1= strongly disagree, 7= strongly agree).

Table C56*Linear Regression Enjoy PE Differences in Agreement with AEA Value Characteristics*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Characteristics vs. Enjoy PE	-0.067	0.050	0.858
Panel B. Coefficients			
Characteristics		Standardized (β)	p-Value
Fun		-0.069	0.828
Explore Nature		-0.010	0.972
New Physical Activity		0.069	0.805
Field Trip		0.064	0.738
Freedom		0.318	0.333
Friends		-0.192	0.546

Table C57*Linear Regression Barriers of AEAs that Predict PE Enjoyment*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Barriers vs. Enjoy PE	0.004	0.075	0.390
Panel B. Coefficients			
Barriers	Standardized (β)	p-Value	
Cost	0.108	0.462	
Time	-0.012	0.948	
Safety	-0.265	0.072	
Organize	0.018	0.911	

Table C58*Linear Regression on Willingness to Participate in PE Predicting PE Enjoyment*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Participate vs. Enjoy PE	0.213	0.241	<.001**
Panel B. Coefficients			
Participate	Standardized (β)	p-Value	
AEA Taught	0.259	0.050**	
No AEA Taught	0.326	0.015**	

Table C59*Linear Regression of Enjoyment of PE Under Specific Conditions Prediction Overall PE Enjoyment*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Enjoy (conditions) vs. Enjoy PE	0.207	0.236	<.001**
Panel B. Coefficients			
Enjoy	Standardized (β)	p-Value	
AEA Taught	0.236	0.097	
No AEA Taught	0.318	0.027	

Table C60*Linear Regression of Continuation Likelihood— Overall PE Enjoyment*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Continue Taking PE vs. Enjoy PE	0.169	0.199	0.003**
Panel B. Coefficients			
Continue Taking PE		Standardized (β)	p-Value
AEA Taught		0.306	0.024**
No AEA Taught		0.233	0.082

Table C61*Linear Regression of Perceived Curricular Value of AEAs*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Value of AEAs vs. Enjoy PE	0.173	0.188	<.001**
Panel B. Coefficients			
Value of AEAs vs. Enjoy PE		Standardized (β)	p-Value
To the Curriculum		0.434	<.001**

Table C62*Linear Regression of Post-Grade 9 PE Continuation Likelihood Influence on Agreement with AEA Value Characteristics*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Characteristics vs. PE Post Grade 9	-0.083	0.035	0.934
Panel B. Coefficients			
Characteristics		Standardized (β)	p-Value
Fun		-0.134	0.675
Explore Nature		0.066	0.821
New Physical Activity		-0.004	0.988
Field Trip		0.216	0.269
Freedom		0.055	0.868
Friends		-0.136	0.67

Table C63

Linear Regression of Barriers of AEAs Predicting Post-Grade 9 PE Continuation Likelihood

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Barriers vs. PE Post Grade 9	0.027	0.097	0.249
Panel B. Coefficients			
Barriers	Standardized (β)	p-Value	
Cost	0.203	0.164	
Time	0.046	0.796	
Safety	-0.112	0.437	
Organize	-0.239	0.133	

Table C64

Linear Regression of Willingness to Participate in PE Predicting Post-Grade 9 PE Continuation Likelihood

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Participate vs. PE Post Grade 9	0.105	0.137	0.019**
Panel B. Coefficients			
Participate	Standardized (β)	p-Value	
AEA Taught	0.191	0.171	
No AEA Taught	0.249	0.076	

Table C65

Linear Regression of Enjoyment of PE Predicting Post-Grade 9 PE Continuation Likelihood

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Enjoy vs. PE Post Grade 9	0.050	0.084	0.094
Panel B. Coefficients			
Enjoy	Standardized (β)	p-Value	
AEA Taught	0.141	0.360	
No AEA Taught	0.189	0.221	

Table C66

*Linear Regression of Continuation Intentions Under AEA and Non-AEA Contexts
Predicting Post-Grade 9 PE Continuation Likelihood*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Continue Taking PE vs. PE Post Grade 9	0.368	0.391	<.001**
Panel B. Coefficients			
Continue Taking PE		Standardized (β)	p-Value
AEA Taught		0.445	<.001**
No AEA Taught		0.307	0.01**

Table C67

*Linear Regression of Perceived AEA Curricular Value Predicting Post-Grade 9 PE
Continuation Likelihood*

Panel A. Model Fit			
Regression	Adjusted R²	R²	Model p-Value
Value of AEAs vs. PE Post Grade 9	0.045	0.062	0.061
Panel B. Coefficients			
Value of AEAs vs. Enjoy PE To the Curriculum		Standardized (β)	p-Value
		0.249	0.061