A cross-sectional examination of Costa Rican adolescents' motivation toward physical education

by

Elisa B. Sosa Nicora
B.PE, University of Costa Rica, 2010
Professional Master in Educational Administration, University of San Isidro Labrador S.A, 2017

A Thesis Submitted in Partial Fulfilment of the
Requirements for the Degree of

MASTER OF ARTS

in the School of Exercise Science, Physical and Health Education

© Elisa B. Sosa Nicora, 2025
University of Victoria

All rights reserved. This thesis may not be reproduced in whole or in part, by photocopy or other means, without the permission of the author.

We acknowledge and respect the Lək^{w}əŋən (Songhees and Esquimalt) Peoples on whose territory the university stands, and the Lək^{w}əŋən and W̱ SÁNEĆ Peoples whose historical relationships with the land continue to this day.

A cross-sectional examination of Costa Rican youths' motivation toward physical education

by

Elisa B. Sosa Nicora
B.PE, University of Costa Rica, 2010
Professional Master in Educational Administration, University of San Isidro Labrador S.A, 2017

Supervisory Committee

Dr. Viviene Temple, School of Exercise Science, Physical and Health Education

Supervisor

Dr. Jennifer Gruno, School of Exercise Science, Physical and Health Education

Departmental Member

Abstract

Background: Adolescents are becoming less physically active around the world. Physical Education can support students' physical activity levels and encourage active lifestyles both in school and throughout life. The Self-Determination Theory (SDT) has been widely used in physical education research to understand students' motivation toward physical education as well as their basic psychological needs in physical education settings. However, previous research on Costa Rican adolescents' motivational profiles in physical education remain limited. The primary aim of this study was to examine grade 9 Costa Rican students' motivation toward physical education and how their basic psychological needs influenced their intrinsic motivation in physical education. The secondary aim was to understand students' leisure time physical activity levels, personal experiences in physical education and whether motivation and psychological basic needs satisfaction predicted participation in physical activity outside of school.

Method: Grade 9 Costa Rican (n = 118) students in the Guápiles region participated in this mixed-method study. Quantitative data were collected using the Physical Education Motivation Scale (PEMS), the Physical Education Autonomy, Relatedness and Competence Scale (PE-ARCS); and the Physical Activity subsection of the Global School-Based Student Health Survey (GSHS). Qualitative data were collected from one of the two-part open-ended question included in the PEMS and from students' responses to a checklist of preferred physical education activities included in the PE-ARCS.

Results: Descriptive statistics demonstrated that students' intrinsic and extrinsic motivation levels were relatively strong, and amotivation was low. A multivariate analysis of variance (MANOVA) revealed that boys were significantly more intrinsically and less extrinsically motivated than girls. A second MANOVA showed that there were no gender-based differences in

autonomy, competence, or relatedness. Students' perceived competence predicted intrinsic motivation toward physical education. A small proportion of students met the guidelines for MVPA (11.0%), strength (40.7%), sleep (39.8%) and sedentary time (32.2%). Only one student met all four guidelines, and 37 students did not meet any guidelines. Linear regression revealed that perceived competence was a significant positive predictor of days of MVPA per week, while extrinsic motivation was a significant negative predictor. Two major themes emerged from the qualitative analysis. The first was that "Students' Experience in Physical Education Could Be Better" and the second theme was that "The Physical Environment Undermines Experiences in Physical Education".

Conclusions: Students showed positive motivation levels, their levels of amotivation were low and no gender-based differences in their basic psychological needs for physical education were found. While girls were more extrinsically motivated, boys showed lower extrinsic motivation and higher intrinsic motivation toward physical education. The more competent students felt in physical education, the more intrinsically motivated they felt toward physical education. A large proportion of students did not meet the minimum requirements of MVPA, sleep, strength and sedentary time for individual 24-hour movement behaviours guidelines or combinations of these behaviours. Students who focused more on achieving good grades and being liked by their physical education teacher were likely to engage in lower levels of MVPA outside of school. Students' perceptions of their competence was the only positive predictor of the number of days of MVPA outside of school. In general, findings from this study highlight the importance of fostering students' perceptions of their competence not only to improve their intrinsic motivation toward physical education, but also to help promote levels of MVPA outside of school.

Keywords: Adolescents, Motivation, Self-Determination Theory, Basic Psychological Needs, Physical Education, Physical Activity.

Table of Contents

List of Tables

List of Figures

Dedication

To my mom: your love, resilience, strength, and support have shaped the woman I am today. This achievement would not have been possible without you. Thank you, from the bottom of my heart. Te quiero mucho Mami.

Acknowledgement

First and foremost, I would like to acknowledge God for granting me with the health, strength, and wisdom throughout this journey. Amid the many changes and unforeseen circumstances I encountered, it was through faith that I found the courage to persevere, the resilience to continue moving forward, the clarity to navigate moments of uncertainty and the strength to remain grounded in purpose. I am profoundly grateful for God's constant presence and grace, which guided and sustained me in every step of the way. To Him be the glory for this accomplishment.

To my family, my mom and siblings. Thank you for your endless support throughout my life and this journey. Your constant encouragement and reminders that you are always with me, even from afar, have meant the world to me. Mom, you have taught me that I have no limits to what I can achieve when I put my heart and soul into it. I will be forever grateful for your warm heart; love and the values you have instilled in me. Koki, thank you for your wisdom and guidance. Your steady presence has helped keep me grounded and focused, your consistent support at any time and in any place has been a source of strength and clarity. Chris and Kai, thank you for your companionship, support, patience and dedication during our journey. Your presence and encouragement during challenging times have meant more than words can express. I am deeply grateful for both of you. To my dear friends F. Portuguez, A. Ortíz A., J. Morales, P. Chang, Y. Rosales, E. España, S. Túa, M. Sánchez and 'Las Frulas'; your presence and support has not gone unnoticed and is sincerely valued.

I would like to express my sincere gratitude to my supervisor, Dr. Viviene Temple, from whom I have learned a great deal throughout my academic journey. Thank you for constantly supporting me and challenging me to "push through" and strive for excellence in both my

academic and professional endeavors. Your professionalism, mentorship and dedication have greatly inspired me. I am truly grateful for your guidance during my graduate studies. I highly appreciate Dr. Jennifer Gruno's thoughtful guidance, and enduring patience throughout the course of this research. I highly value the time and effort you devoted to reviewing this thesis and providing insightful feedback which encouraged me to think more critically and improve my ideas. Witnessing your passion and dedication to supporting students, and girls in particular, in developing a positive experience in physical education has been truly inspiring. It has motivated me to grow as an educator and to foster that sense of enthusiasm for physical education and physical activity in my own students. Dr. Lara Lauzon, thank for your unwavering support, consistent check-ins, and for instilling in me the importance of prioritizing health and wellness while navigating my responsibilities as a mother, international graduate student, and educator. Your guidance and encouragement have been invaluable in helping me progress throughout these years.

I sincerely appreciate the time and contributions of M. Chacón Mora, E. Chacón Valdez, and M. Hamilton-Barriff to this study. Your input has been integral to the development and completion of this research. I acknowledge with gratitude the support of all staff members from Costa Rica's Ministry of Public Education who contributed to this process, particularly J. Prendas, H. Quirós and G. Araya. Your guidance and collaboration were instrumental in shaping this study. I would also like to acknowledge the administrative staff of the Ministry of Public Education, including the Vice Minister of the Academic Office, the Guápiles' Education Directorate, the Guápiles Supervisor for School Circuit 01, the Regional Physical Education Advisor for Guápiles, as well as the school directors and the physical education teachers of each

of the participating schools. I extend my heartfelt thanks to all the students who participated in this study, with the sincere hope that their voices will be acknowledged and valued.

Chapter 1. Introduction

The World Health Organization (WHO, 2020) recommends that children and adolescents aged 5-17 years engage in at least an average of 60 minutes of moderate-to-vigorous physical activity (MVPA) per day to achieve positive health outcomes. However, Guthold and colleagues' (2020) synthesis of cross-sectional survey data from 298 school-based populations involving 1.6 million adolescents between the ages of 11 and 17 years revealed that 81.0% of students worldwide were insufficiently physically active in 2016. Guthold et al.'s synthesis was also reported by world region. The proportion of insufficiently active students in the Latin America and Caribbean region was somewhat higher than the global average (84.3% compared to 81.0%). Further, the proportion of inadequately active students in Costa Rica (the focus of this study) was 82%. Physical activity/inactivity data from the Latin America region also reveals gender-related disparities (Aguilar-Farias et al., 2018; Guthold et al., 2020; Marques et al., 2020). Available evidence demonstrates that more girls (88%) are insufficiently physically active than boys (76%) in Costa Rica (Guthold et al., 2020) and only 12% of Costa Rican girls meet the WHO MVPA guideline compared with 18.5% of boys (Aguilar-Farias et al., 2018).

A key element of school curricula that encourages students to be physically active and healthy throughout their lives is physical education. The Centers for Disease Control and Prevention (2022) defined physical education as a planned, sequential (kindergarten – 12) curriculum based academic subject that offers instruction and cognitive content aimed at fostering the development of motor skills, knowledge and behaviours necessary for physical activity and fitness. By having the potential to reach the majority of children in schools, physical education can be seen as an opportunity to enhance physical activity by ensuring access to and acknowledgement of physical activities that improve health (WHO, 2022).

School-based physical education can directly impact children's and adolescents' physical activity through in-class activities (Fairclough & Stratton, 2005) and indirectly influence their short term out-of-class activity and long-term adult active lifestyle (Slingerland & Borghouts, 2011). Although there is the potential for physical education experiences to positively impact students' physical activity levels, this is not always the case. Beltrán-Carrillo et al. (2012) provided an opportunity for active and inactive Spanish adolescents to voice their negative experiences in physical education. These authors concluded that "…some of these negative experiences clearly fed into these adolescents, removing themselves from all contexts of organized physical activity" (p.22). Negative experiences in physical education can also affect participation in physical activity later in life (Cardinal et al., 2013). These negative experiences include feelings of humiliation and embarrassment for lacking athletic skills (Beltrán-Carrillo et al., 2012; van Daalen, 2005), as well as forms of symbolic violence such as being mocked by their peers for being overweight and not able to perform at the same level as others (Beltrán-Carrillo et al., 2012). Other reported issues involve inappropriate pedagogical practices like harassment from peers after the teacher punished the entire class when an individual slowed down to a walking pace during a one-mile run (Trout & Graber, 2009) and picking teams using a 'pecking order' (Cardinal et al., 2013). Perhaps it is not surprising that students have doubts about the purpose and nature of physical education (Flintoff & Scraton, 2001) and they may be unenthusiastic and reluctant to engage in physical education class (Cockburn & Clarke, 2002).

A lack of enjoyment and negative experiences in physical education are more commonly reported by girls than by boys (Hortigüela-Alcalá et al., 2021; Youth Sport Trust, 2023, 2024). National survey data from the United Kingdom reveal that 64% of girls report enjoying physical education compared to 86% of boys (Youth Sport Trust, 2023). This gap is more pronounced at

the secondary school level. The United Kingdom's Youth Sport Trust reported that 86% of girls aged 7 to 8 years enjoyed physical education compared to 56% of girls aged 14 – 15 years and that there was an 11% increase from 2017 to 2024 in the number of girls who say that low confidence prevents them from being more active at school (Youth Sport Trust, 2024). These "big picture" data are supported by qualitative data from girls aged 15 to 16 years in Spain (Hortigüela-Alcalá et al., 2021). Hortigüela-Alcalá and colleagues interviewed seven girls in their final year of mandatory physical education. Their findings revealed that girls' negative experiences were linked to several factors including body concerns that hindered participation, feelings of inadequacy related to physical performance that led to frustration, and a sense of being underestimated or dismissed by both peers and teachers. The girls' families expressed concern that these negative experiences in physical education extended beyond the classroom, affecting their personalities and social interactions.

While poor experiences can lead to alienation from physical education, Cox et al. (2008) found that enjoyment of physical education and how active students were in physical education, mediated by students' self-determined motivation, predicted participation in leisure-time physical activity. Cox and colleagues also found that satisfaction of students' basic psychological needs of autonomy, relatedness, and competence directly predicted students' enjoyment of physical education; and autonomy and relatedness predicted students' motivation toward physical education. These findings by Cox et al. illuminate a path between satisfying basic psychological needs to motivation for physical education to higher rates of physical activity in physical education as well as during leisure time. The constructs examined by Cox and colleagues were grounded in Self-Determination Theory (SDT; Deci and Ryan, 2000).

Deci and Ryan's SDT (1985, 2000) has been extensively used in research in many domains of human endeavour such as health, education, parenting, and work over the past 40 years. The theory posits that an individual's motivation drives people to "act, think, and develop" (Deci & Ryan, 2008a, p. 14). Unlike several other theories of motivation which treat motivation as a single construct that individuals have more or less of, Deci and Ryan distinguished different types of motivation. Motivation in SDT is differentiated along a continuum from amotivation, which denotes a lack of motivation; to extrinsic motivation, where the driver is external rewards; to intrinsic motivation, which is a completely volitional type of motivation in which actions are completed because they are interesting or enjoyable. This latter type of internal or autonomous motivation is associated with better outcomes in terms of persistence and development (Deci & Ryan, 2008). Conversely, using extrinsic rewards, evaluations of punishments to directly influence achievement outcomes frequently leads to lower motivation and performance (Ryan & Deci, 2020).

An individual's autonomous intrinsic motivation is affected by their proximal social environment (Deci & Ryan, 2008). Specifically, the authors of SDT advance that individuals have three basic psychological needs that need to be met: autonomy (having a sense of choice); competence (feeling capable of successfully engaging with the task or environment) and relatedness (the need to feel connected to significant people). Intrinsic motivation is increased when these needs are met. On the other hand, amotivation will result if these needs are only met partially or not met at all (Deci & Ryan, 1985; Ryan & Deci, 2000b).

In the context of physical education, Ntounamis (2005) found that more positive self-determined motivation (an index formed by assigning positive values to more autonomous forms of motivation and negative values to more extrinsic forms of motivation) predicted both actual

participation in physical education and students' intention to engage in optional physical education in the future. Ntounamis also found that satisfaction of psychological needs (as per SDT) predicted students' intrinsic motivation. These findings are consistent with a more recent systematic review and meta-analysis of SDT as applied to physical education (Vasconcellos et al., 2020). Vasconcellos and colleagues' synthesis of 265 articles (and 252 articles for the meta-analysis) revealed that students with higher levels of autonomous motivation had more positive experiences and adaptive outcomes in physical education, whereas amotivated students had fewer positive experiences. These authors also found that more positive feelings of autonomy, competence, and relatedness had a direct positive effect on students' autonomous motivation.

When gender was examined as a moderator of relationships within the SDT model, Vasconcellos and colleagues (2020) reported considerable heterogeneity and that few studies separated boys and girls in their analyses. However, Vasconcellos et al. did find that gender moderated the relationship between autonomous motivation and feelings of competence. When gender was examined as a covariate in SDT models, Mouratidis et al. (2015), found that compared with boys, girls had lower levels of competence and autonomy need satisfaction, and less motivation (both autonomous and controlled) for physical education. There were no differences in relatedness need satisfaction.

Ecological models provide a framework for examining the diverse and interconnected factors that shape adolescents' engagement in physical activity. Rather than suggesting that behaviour is determined by a limited set of psychological factors, ecological models include a wide range of influences across levels (McLeroy et al., 1988; Sallis & Owen, 2002). The central idea of an ecological model is that behaviour is affected by various levels of influence; from intrapersonal factors such as biological and psychological aspects, to interpersonal factors

including social and cultural influences, as well as to more distal factors such as community, environmental, and policy-level elements (Sallis & Owen, 2002). Supporting this perspective, Humbert et al. (2006) found that having accessible, affordable, and high-quality facilities are essential to youths' engagement in physical activity. In addition, Hu et al. (2021) found that support from friends, teachers and parents was a positive predictor of students' participation in physical activity at the interpersonal and organizational levels. Further, a key element that influenced children and adolescents' physical activity engagement at the community level was the accessibility of facilities and secure neighborhoods.

Research focused on physical education in Latin American, and more specifically on Costa Rican physical education, is scarce. This study, grounded in Deci and Ryan's (1985, 2000) SDT, is the first to examine Costa Rican high school students' motivation toward physical education. SDT is a well-used theory in many contexts and cultures, including the field of physical education research (Lindahl et al., 2015). By incorporating the key principles of SDT into this study, there is the potential to gain valuable insights into adolescents' needs in physical education, in hopes that this understanding could aid in future developments of more effective teaching strategies and policies for high school physical education programs.

1.1 Aim

The primary aim of this study was to examine grade 9 Costa Rican students' motivation toward physical education, and how their feelings of competence, autonomy, and relatedness influenced their intrinsic motivation toward physical education. The secondary aim was to gain an understanding of students' physical activity levels, to explore their personal experiences in physical education, and to examine whether motivation and students' basic psychological needs predicted participation in physical activity outside of school.

1.2 Research Questions

This study focused on six research questions:

1. What are students' intrinsic, extrinsic and amotivation levels for physical education?
   1.1. Do motivation levels differ by gender?
2. What are students' levels of basic psychological needs of autonomy, relatedness and competence for physical education?
   2.1. Do students' basic psychological needs differ by gender?
3. Do students' basic psychological needs predict intrinsic motivation toward physical education?
4. What are physical activity behaviours of grade nine Costa Rican students?
   4.1 What is the proportion of students meeting individual 24-hour movement behaviour guidelines?
5. Does motivation and basic psychological needs predict the number of days per week students meet the national physical activity guidelines?
6. What are students' experiences in physical education?
   6.1. What changes would students make to physical education to make it more appealing?
   6.2. How do students' responses relate to Sallis et al.'s (2006) ecological model within the four domains of active living?

1.3 Delimitations

The study is delimited to grade 9 Costa Rican students in canton Pococí, Guápiles and to subjective measures of motivation and physical activity.

1.4 Operational Definitions

24-hour movement behaviours: The recommended levels of physical activity (light, moderate, vigorous), sedentary behaviour and sleep across a 24-hour period (the whole day) (CSEP, 2025).

- **Moderate-to-vigorous physical activity (MVPA):** The intensity of moderate physical activity is high enough to raise heart rate. During such intensity, the person may speak but not sing. Examples of moderate physical activity for children and youth include cycling or brisk walking (CSEP, 2025)**.** In contrast, when engaging in vigorous physical activity, a person's body temperature rises rapidly, and the heart rate increases substantially. It becomes difficult to say more than a few words without pausing and taking a breath. Some examples of vigorous physical activity for children and youth include running, jumping rope or playing basketball (CSEP, 2025) In this study, students' self-report of the number of days they meet 60 minutes of MVPA, as measured by the WHO's (2021a) physical activity guidelines was used.
- **Sedentary Time:** The amount of time engaged in sedentary behaviours (any waking activity performing in a sitting, reclining or laying position) whether measured by duration (e.g., minutes per day) or context (e.g., at school or work) (CSEP, 2025)**.** In this study, students' self-report of the number of hours they typically spent each day engaged in sedentary activities such as sitting and watching television, playing computer games, using a mobile phone, talking with friends, or doing other sitting activities such as using a tablet or playing board games (WHO, 2021a) was used.
- **Sleep:** A state of unconsciousness in which the brain enters a relative state of rest and responds only to internal stimulus (Brinkman et al., 2025); a basic human need necessary for optimal health, a high quality of life and ensuring optimal daily performance (WHO,

2004). In this study, students' self-report of the number of hours of sleep they get on an average school night as measured by the World Health Organization's (WHO, 2021a) physical activity guidelines was used.

- **Strength:** A muscle or muscle's group capacity to exert force (U.S. Department of Health and Human Services, 2018). In this study, students' self-report of the number of days they did exercises to tone or strengthen their muscles (e.g., push-ups, sit-ups, or weightlifting) as measured by the World Health Organization's (WHO, 2021a) physical activity guidelines was used.

Adolescent: People aged 10 to 19 years that go through a crucial development stage as they transition from childhood to adulthood (UNICEF, 2024).

Amotivation: Indicating the lack of motivation to act (Deci & Ryan, 2008a).

Autonomous motivation: Engaging in behaviour willingly and by choice (i.e. intrinsic motivation) (Deci & Ryan, 2008a).

Controlled motivation: Involves acting under pressure or obligation due to external demands that are perceived as originating outside the self (e.g., extrinsic motivation) (Deci & Ryan, 2008a).

Gender: Attitudes, behaviours, and feelings that a particular culture typically links to an individual's biological sex (APA, 2012). In this study, the terms *boy*s and *girls* are used to refer to male and female participants, as no participants identified with another gender.

Motivation: The process by which goal-directed activities are initiated and maintained (Skunk et al., 2014).

Physical education: A structured, sequential academic subject from kindergarten to grade 12 that provides cognitive content and instruction to promote the development of knowledge,

behaviours, and motor skills for physical activity and fitness (CDC, 2022; Siedentop & van der Mars, 2023). An integral part of education, that emphasizes organized physical activity through sports, exercises, and movements with the primary objective of promoting comprehensive individual development (Ministerio de Educación Pública [MEP], 1996).

Sex: Biological sex assignment (i.e., sex assigned at birth) (APA, 2020)**.**

Chapter 2: Literature Review

The literature reviewed in this chapter is organized thematically beginning with an overview of adolescence as an important developmental stage, contextualizing the focus on Grade 9 students. The following sections address adolescents' physical activity behaviours and associated health benefits which includes both global data and Costa Rican trends and gender differences to inform the study's secondary aim of understanding students' physical activity levels. Central to the literature review, is an overview of the SDT, which underpins the study's primary aim of examining how the three basic psychological needs influence intrinsic motivation toward physical education. The final sections include historical and curricular insights specific to Costa Rica and highlight gender disparities in physical education, thus grounding the study in its local educational and cultural context.

2.1 Adolescence: A Period of Change

In 2024, there were more adolescents (10 – 19 years) than at any other time in history, with 1.3 billion across the globe, signifying 16% of the total population (UNICEF, 2024; United Nations Population Fund, 2024). The United Nations International Children's Emergency Fund (2024) defines adolescents as people between the ages of 10 and 19 years who go through a crucial developmental stage while transitioning from childhood to adulthood. Adolescence is an important stage characterized by major changes in an individual's physical, emotional, and psychosocial states. During this period, adolescents go through puberty, develop a stronger sense of identity, they explore their autonomy, form meaningful relationships, and build skills that will allow them to shape future behaviours during their transition into adulthood.

The developmental changes during adolescence are multifaceted. Cognitively, adolescence involves changes in abstract and multidimensional thinking along with important

changes in brain structure and organization; biologically, puberty involves changes in sex organs, height, weight, and muscle mass mark; and socially, it is a period of preparation for adulthood (Arnett, 2007). Adolescents' social and emotional transformations are marked by an increased attention to relationships among peers, improved understanding of social dynamics, and more complex relationships involving their search for autonomy.

2.1.1 Biological and Physical Development

Puberty is considered one of the most important biological changes in an individual's life (Susman & Rogol, 2004). This stage is characterized by physical changes. In boys, it is marked by the descent and enlargement of testicles whereas girls experience their first menstrual cycle and breasts start to develop; and both grow in stature (Porta & Last, 2018), accompanied by other secondary traits such as hair growth, appearance of acne and changes in their voice (Marshall & Tanner, 1969, 1970). The pubescent growth spurt takes place during early adolescence, just before puberty begins. This is important in terms of sex differences and motor performance (Gabbard, 2021). The increased levels of androgen hormones throughout the later stages of adolescence are principally responsible for the emergence of sex differences, such as greater physical size and strength in males (Gabbard, 2021).

2.1.2 Cognitive Development

During adolescence, the pre-frontal cortex changes (Blakemore, 2018). This region of the brain is involved in making decisions and is in charge of an adolescent's capacity to plan ahead, think through the possible outcomes of their actions, and control impulses (Choudhury et al., 2008). Thanks to the development of high-level cognitive processes, adolescents should be equipped with the mental skills necessary to reflect on themselves and others, and to navigate

social networks that begin as unreliable and less reciprocal and progressively become more sophisticated and reciprocal as they enter adolescence (Burnett et al., 2015).

2.1.3 Emotional Development

Emotional reactivity refers to arousal and dysregulation of adolescents' feelings like distress, preoccupation with a stressor, fear and an inability to calm oneself down in the face of interpersonal stressors (e.g., disagreement between parents) (Buehler & Welsh, 2009). Ahmed et al. (2015) stated that an increased emotional reactivity, unstable mood, and risk-taking and reward seeking behaviours are characteristics of adolescence. Udom and Udongwo (2022) indicated that adolescents display emotional instability, sensitivity and a propensity for outbursts, and that they are susceptible to feelings and can be easily influenced by others as well as experience an increase in sexual feelings engaging in sexual behaviour without thinking through the repercussions.

2.1.4 Psychosocial Development

Adolescence is a period of profound psychological and social changes that occur in parallel with the hormonal and biological changes of puberty. Interactions with peers and the social world become extremely important as adolescents spend more time with their peers rather than with their families and they develop deeper peer relationships (Lam et al., 2014). Consequently, peer influence and gaining social acceptance from peers are increasingly important (Albert et al., 2013; Foulkes et al., 2018; Knoll et al., 2015), with greater demands for social connections with peers and greater commitments to social aspects of their identity while seeking autonomy, especially from their parents (Meeus et al., 2005).

2.1.5 Motor Development

Motor development is the age-related ongoing process of movement change, as well as the interacting constraints (or factors) in the task, environment, and person that cause these changes (Haywood & Getchell, 2024). Clark and Metcalfe's (2002) Mountain of Motor Development framework which emphasized the importance of biological and environmental factors in shaping skillful movement and sports performance included five fundamental periods: reflexive, preadapted, fundamental motor patterns, context specific, and skillful. At the basis of the mountain and in the reflexive period, infants rely on primitive reflexes (e.g., rooting and sucking) necessary for survival and protection while they adapt to a new environment. The preadapted period follows by the simultaneous achievement of feeding oneself and achieving motor independence (e.g., walking). As children progress to the fundamental motor pattern period, they develop basic coordination patterns for manipulation and locomotion, which later refine into context-specific motor skills. In the context-specific period, children develop and integrate foundational motor skills, like object control and locomotor skills to more context-specific movement patterns as they start to adapt these skills to youth sports. Skillfulness is mostly determined by the individual's level of practice and experience, with the skillful period typically emerging around puberty (ages 11 – 13 years). During this time, adolescents experience significant changes in body size, strength and cognitive-emotional abilities, leading to clearer distinctions between competent and highly skilled movers. Clark and Metcalfe (2002) argued that it may take years of practice and training with specific motor skills before one may reach the mountain's skilled period.

The period of later childhood and adolescence is generally the phase 'sport specific' development characterized by increased physical prowess and skill refinement (Gabbard, 2021).

During this stage, many adolescents begin approaching their potential for peak motor performance characterized by enhanced strength, endurance, and fine motor skills that become more apparent as coordination improves. The first systematic review and meta-analysis of the associations between motor competence and physical activity, fitness, and psychosocial characteristics of adolescents was recently undertaken by Burton and colleagues (2023). Their review included 61 studies with data from more than 22,000 adolescents. Despite the very wide range of methodologies used in the studies included in the review, Burton et al. were able to confirm that motor competence was significantly and positively associated with engagement in physical activity, muscular strength, perception of competence, self-efficacy, and motivation. In general, adolescents with better motor skill competence are more physically active than those with lower levels of motor competence (Chagas & Batista, 2017). But, as Goodway and Branta (2003), Logan et al. (2012), Robinson (2011), and Robinson and Goodway (2009) have demonstrated, a lot of practice and instruction are necessary to develop these skills.

2.2 Physical Activity and Adolescence

2.2.1 Physical Activity

A variety of definitions for physical activity have been used throughout time. Early on, Caspersen and colleagues (1985) noticed that concepts like physical activity, exercise and physical fitness were frequently used synonymously, often causing confusion among researchers attempting to study these behaviour (Strong, 1986). Consequently, Caspersen et al. (1985) provided a distinct definition for each one of these concepts. They referred to (a) physical activity as any type of movement executed by the body resulting in energy expenditure whether it is of light, moderate or high intensity; (b) exercise as a subcategory of physical activity which is repetitive structured, planned and is positively correlated with physical fitness; and (c)

physical fitness as composed by health and skilled related elements resulting in a set of attributes individuals achieve or have. However, the definition of physical activity has evolved over time and is now used as an umbrella term which includes other dimensions like sports, dance, exercise and leisure activities (Corbin et al., 2000).

Over decades, the core concept of physical activity as *any bodily movement* has remained similar (Bouchard et al., 2012), however some authors and organizations have made minor modifications to the definition (World Health Organization, 2018) or have added new elements. For example, Piggin's (2019) critical analysis of physical activity added a political lens to global and national physical activity policies. Whereby Piggin defined physical activity as "involves people moving, acting and performing within spaces and contexts, and influenced by a unique set of interests, emotions, ideas, instructions and relationships" (Piggin, 2019, p. 8). Further, the World Health Organization (WHO) (2024) emphasizes the health and well-being benefits of physical activity as well as broadening the conception of sources of physical activity such as part of individual's work or domestic activities. These wider definitions encompass the health benefits of physical activity as well as its social and emotional value and contextual influences.

2.2.2 Health Outcomes of Engaging in Physical Activity During Adolescence

Adolescence is a period of life when the foundations of healthy lifestyles for adulthood are laid (Walsh & Nicholson, 2022). Numerous non-communicable diseases that arise in later years can be connected, at least in part, to alterable behavioural risk factors during this formative time; including smoking, unhealthy food habits, and inadequate physical activity (Sawyer et al., 2012; WHO, 2014). Evidence suggests that precursors of cardiovascular diseases originate during childhood and adolescence (McGill et al., 2000; Raitakari et al., 2003; Strong et al., 1992). Among 2,229 Finish adults, Raitakari and colleagues (2003) found that cardiovascular

risk factors such as dyslipidemia, obesity, high blood pressure, and unhealthy lipid levels during adolescence were associated with atherosclerosis in adulthood. Further, these authors found that these risk factors during adolescence predicted atherosclerosis independently of the participants' adult risk factors. Raitakari et al. consequently recommended that interventions focusing on adolescent lifestyle behaviours such as eating habits and physical activity would help to prevent atherosclerosis later in life.

There are numerous benefits of participating in physical activity during adolescence. Janssen and LeBlanc's (2010) systematic review of research examined the relationship between fitness, health, and physical activity in school-aged children and youth aged 5 – 17 years. The authors found that physical activity is associated with several health benefits. For example, aerobic activity was associated with lower levels of triglycerides and higher levels of HDL-cholesterol when 60 to 240 minutes of weekly MVPA was undertaken. In addition, both aerobic and resistance training were associated with improvements in insulin-related factors (e.g., fasting insulin and insulin resistance); with resistance and circuit training showing the stronger positive impact on these variables. The review also indicated a reduction of 6% to 11% in systolic blood pressure among participants who engaged in 60 to 180 minutes of weekly moderate-to-vigorous aerobic physical activity. Further, MVPA was associated with lower levels of adiposity and symptoms of depression; and high impact weight bearing activities positively impacted bone health.

Janssen and LeBlanc's (2010) findings are supported by a more recent systematic review that synthesized over 30 years of research, highlighting the benefits of physical activity on different health outcomes in children and adolescents (Tambalis, 2022). Tambalis concluded that musculoskeletal and cardiorespiratory system development and growth, lower levels of body fat,

improved bone health, positive risk profiles for metabolic and cardiovascular diseases (type 2 diabetes, obesity blood pressure and lipid), fewer symptoms of depression, anxiety, and stress; and higher chances for academic success and social interaction were the most important health benefits of physical activity among children and adolescents who engaged in at least 60 minutes of daily MVPA.

In addition to the physical health benefits during adolescence, physical activity is positively linked to enhanced mental health by reducing symptoms of depression (Li et al., 2024); and emotional health by improving emotional regulation skills which are vital when dealing with stress and emotional challenges (Martinez et al., 2024). Furthermore, children and adolescents' social skills and self-esteem have been positively linked to participation in sports (Findlay & Coplan, 2008), as well as positive associations between youth development and individual or team participation (Zarrett et al., 2009). Research also highlights increased confidence among girls aged 10-16 years (Tirlea et al., 2016), positive links between youths' physical activity and/or friend variables (Fitzgerald et al., 2012), and a lack of development of social anxiety symptoms (Schumacher Dimech & Seiler, 2011). Evidence also indicates that children and adolescents who play sports and belong to clubs reported better social skill scores than those who did not engage in any extracurricular activities (Howie et al., 2010).

2.3 Global Trends in Physical Activity Among Adolescents

Despite the demonstrated benefits of practicing regular physical activity during adolescence (Al Zaki et al., 2023; D'Agostino & Neshteruk, 2023; Li et al., 2024; Pires et al., 2021; Silva, 2018; Tambalis, 2022; Thaqi et al., 2023), the majority of adolescents do not meet the recommended minimal levels of daily physical activity. At a global level, Guthold and colleagues' (2020) synthesis of nearly 300 studies from 146 countries demonstrated that among

students aged 11 – 17 years, 78% of boys and 85% of girls were insufficiently active in terms of meeting the WHO's recommendation of 60 minutes of daily MVPA. Further, temporal trends in Europe and North America have shown a decline in physical activity levels measured using wearable technology among adolescents between 1995 and 2017 (Conger et al., 2022). Contrastingly, Reilly et al. (2022) found that global longitudinal trends of children's and youths' levels of physical activity using data from the Active Healthy Kids Global Alliance Global Matrices report cards 1.0 (Tremblay et al., 2014), 2.0 (Tremblay, Barnes, et al., 2016), 3.0 (Aubert et al., 2018) and 4.0 (Aubert et al., 2022) remained stable between 2014 and 2022. The differences in these longitudinal trends may be the result of the measurement tools used, where Conger et al. used wearable devices (e.g., pedometers and/or accelerometers) and Reilly et al. relied on self-report data; and/or due to variations in geographic context and characteristics of the population. Conger et al.'s analysis involved participants from developed countries (e.g., Denmark, United States and Canada) where declining trends may be more evident due to factors like increased screen time, sedentary lifestyles and urban living. Meanwhile, Reilly et al.'s synthesis included a more diverse global sample, including countries where physical activity levels may be maintained through active transportation, informal play, or physical labour, potentially compensating for overall global declines.

Despite these large reviews (Conger et al., 2022; Reilly et al., 2022) being considered global references for children's and youths' physical activity levels, Latin America countries were poorly represented. Central American countries, Costa Rica in particular, was not represented at all. However, Guthold et al. (2020) did provide estimates of the prevalence of insufficient physical activity in Costa Rica in 2001 and 2016 (83% and 82%, respectively) which

were similar to the regional Latin America and Caribbean estimates of 81% and 80% in those years.

2.4 An Ecological Approach to Physical Activity

Ecological models offer a framework for understanding the complex interactions of multiple layers of factors influencing decisions to be active (Zhang & Solmon, 2013), by developing a deeper understanding of the variables influencing specific behaviours and what might be required to change them (Glanz et al., 2015). Because physical activity takes place within defined environments that could influence a person's participation, a socio-ecological model is especially suitable for studying physical activity.

Ecological models of physical activity frequently include levels of variables such as intrapersonal (biological, psychological), interpersonal (cultural, organizational), physical environment (natural, built), and policy (laws, rules, regulations, codes) (Sallis et al., 2006). One of the most cited models applied to physical activity is Sallis et al.'s (2006) ecological model. Cited over 4000 times, Sallis et al. (2006) examined potential environmental and policy implications on four domains of active living: recreation, transport, occupation, and household activities. For this study, only the domain of occupation activities was considered, specifically the school environment where physical education classes occur. Table 1 describes the five levels of influence on physical activity behaviour in Sallis and colleagues' occupational domain, from the most proximal to the individuals (intrapersonal) to the more distal level of influence (policy environment).

Table 1

Levels of Influence within the Occupational Domain of Sallis et al.'s (2006) Ecological Model of Active Living

Levels	Defined
1. Intrapersonal	Attributes of the individual such as genetics, attitudes, gender, and age.
2. Perceived environment	The individual's perceptions of the environment. For example, in terms of safety or attractiveness.
3. Behaviour	The level and type of physical activity within four domains of active living: active recreation, household activities, active transport, and occupational activities (school).
4. Behaviour settings (school environment)	Characteristics of activity environment such as facilities, equipment, and the physical education program.
5. Policy environment	Physical education policies and funding, facility budgets and access policies e.g., access to school grounds.

2.5 Physical Activity in Costa Rica

Literature documenting physical activity levels among children and adolescents in Costa Rica is in its infancy. However, there is some early work, that is not currently publicly accessible, that has been documented by Araya and Claramunt's (2020) in their historical and contemporary treatise of physical activity participation in Costa Rica. Araya and Claramunt noted that the concept of physical activity has been operationalized in many different ways and was not clearly defined until 1990, when the Instituto sobre Alcoholismo y Farmacodependencia first introduced a formal definition. Between 1990 and 2009, the term '*physical exercise'* that was used to describe any physical activity performed for at least 15 minutes per day, two or more times per

week, with the goal of enhancing physical appearance and/or overall health (Araya & Claramunt, 2020; IAFA, 2003, 2009).

However, it was not until 2011 that Costa Rica's Ministerio de Salud and Ministerio de Deporte y Recreación (2011) officially adopted a broader definition of physical activity. This broader definitions was developed by Escobar in 2008, who distinguished physical activity from exercise by emphasizing that, in addition to planned, structured, and repetitive movements intended to improve physical fitness, physical activity also includes daily movements related to work, play, active transportation recreational activities and household chores (Ministerio de Salud & Ministerio de Deporte y Recreación, 2011). Despite ongoing efforts to assess physical activity levels among Costa Ricans, the Consejo Nacional de la Persona Jóven (2013, 2018) has not provided a standardized definition of either physical activity or exercise. In contrast, the Ministerio de Salud and Ministerio de Educación (2020), in their collegiate survey of nutritional surveillance and physical activity conducted in 2018, used the World Health Organization's definition of physical activity of any movement of the body made by the skeletal muscles that demands the use of energy.

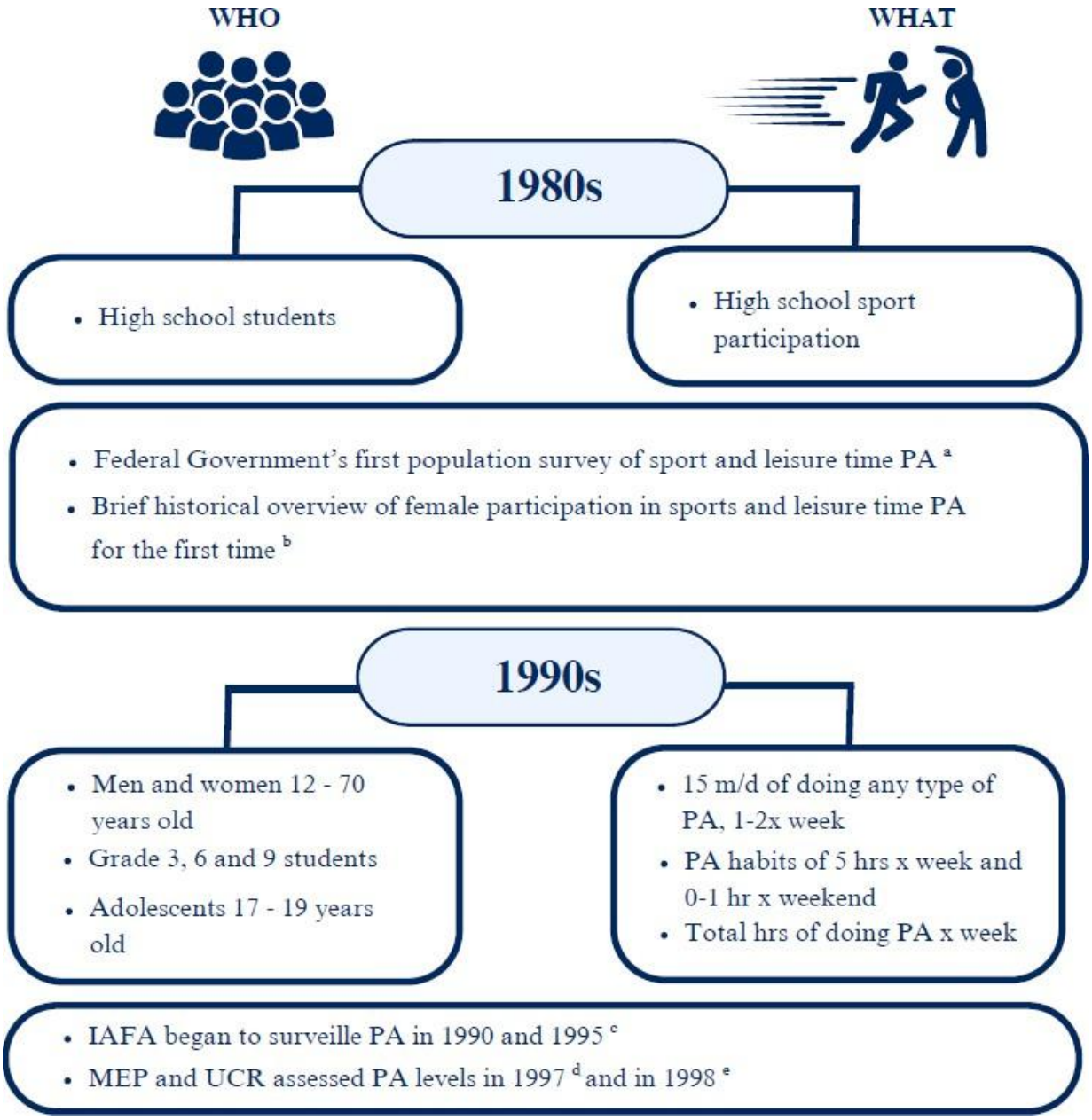
Regarding the initial measurement of physical activity, Araya and Claramunt (2020) stated that in one of the earliest studies, conducted by Sabean in 1984, assessed high school students' participation in organized sports. In addition, the authors mentioned that although this study did not focus on measuring the amount of any type of physical activity practiced, this was the first documentation in this regard. Araya and Claramunt (2020) noted that in 1986, the General Directorate of Physical Education and Sports (currently known as ICODER) published Costa Rica's national report, based on a population survey that assessed the participation of both men and women in organized sports and leisure time activities. This was the first study to

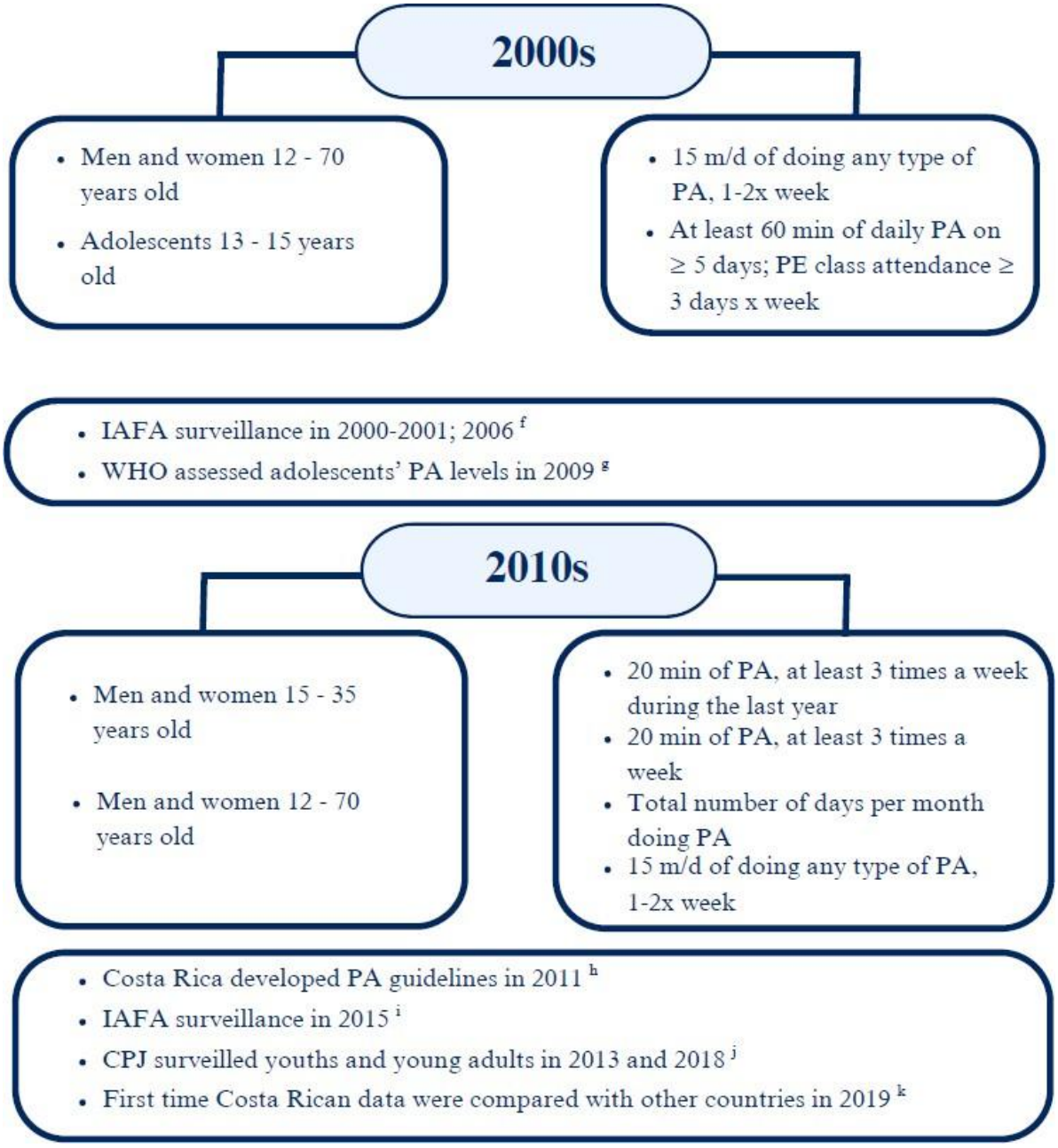
provide an overview of female participation in sports and physical activity during leisure time (Araya & Claramunt, 2020). Figure 1 illustrates some of the major events related to the measurement of physical activity in Costa Rica since the 1980s.

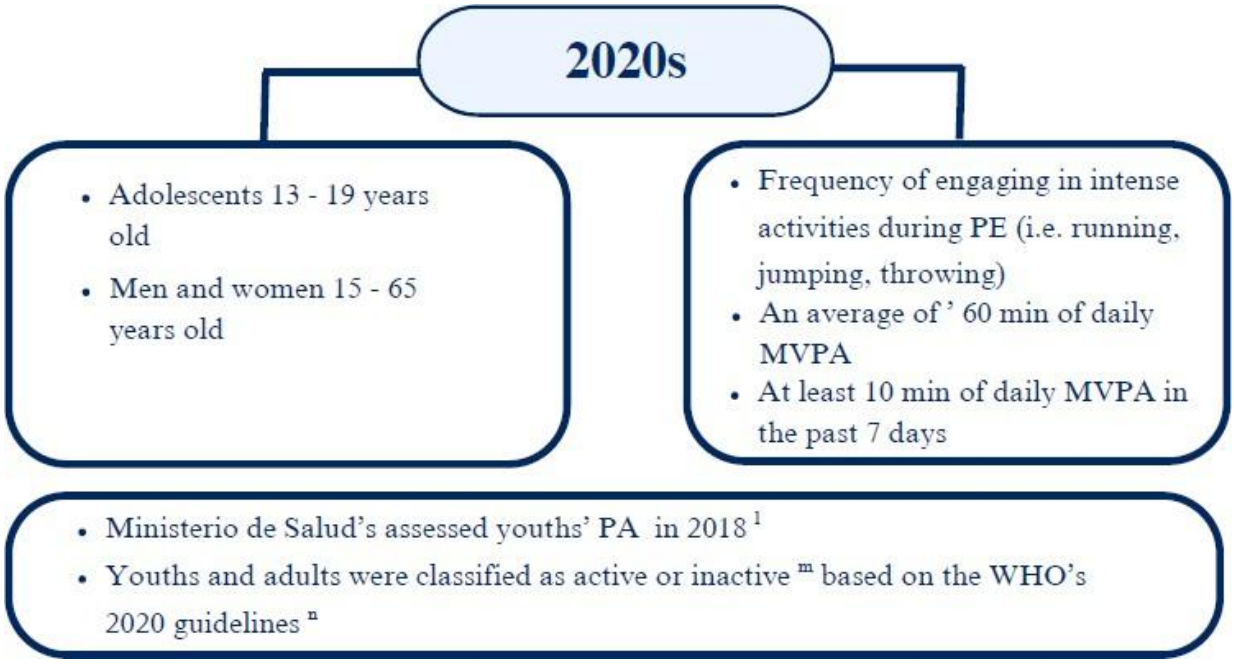
As shown in Figure 1, the measurement of physical activity has evolved from initially focusing on participation in organized sports to more contemporary approaches. Over time, both the definition of physical activity and how it was measured have changed greatly. For example, measures varied from: at least 15 minutes of any type of physical activity, once or twice per week (IAFA, 2003, 2009, 2018); 20 minutes of physical activity at least three times per week (CPJ, 2013, 2018); at least 60 minutes of daily physical activity on ≥ 5 days (WHO, 2009); an average of 60 minutes of daily MVPA, active transportation and leisure time physical activity (De Moraes Ferrari et al., 2019; Gómez et al., 2023); attending physical education classes ≥ 3 days per week (WHO, 2009); to active participation in physical education (engaging in intense activities such as running, jumping and throwing) (Ministerio de Salud & MEP, 2020). These varying measures highlight the considerable inconsistencies, making it difficult to accurately assess how active youth are. Although youth are often included in study samples, the results are reported by gender across the broader population rather than by age groups or by region.

Figure 1

Physical Activity Measurement in Costa Rica: Major Events Over Time




2000s
Men and women 12 - 70 years old
Adolescents 13 - 15 years old
15 m/d of doing any type of PA, 1-2x week
At least 60 min of daily PA on ≥ 5 days; PE class attendance ≥ 3 days x week
IAFA surveillance in 2000-2001; 2006 [f]
WHO assessed adolescents' PA levels in 2009 [g]
2010s
Men and women 15 - 35 years old
Men and women 12 - 70 years old
20 min of PA, at least 3 times a week during the last year
20 min of PA, at least 3 times a week
Total number of days per month doing PA
15 m/d of doing any type of PA, 1-2x week
Costa Rica developed PA guidelines in 2011 [h]
IAFA surveillance in 2015 [i]
CPJ surveilled youths and young adults in 2013 and 2018 [j]
First time Costa Rican data were compared with other countries in 2019 [k]



Note. IAFA, Instituto sobre Alcoholismo y Farmacodependencia; PA, Physical activity; MEP, Ministerio de Educación Pública; UCR, Universidad de Costa Rica; WHO, World Health Organization; CPJ, Consejo de la Persona Jóven. [a] (Sabean, 1984 as cited in Araya & Claramunt, 2020). [b] (Ministerio de Cultura, Juventud y Deporte, 1986 as cited in Araya & Claramunt, 2020). [c] (IAFA, 1990, 1995 as cited in Araya & Claramunt, 2020). [d] (MEP & UCR, 1997). [e] (Araya & Claramunt, 2020). [f] (IAFA, 2003, 2009). [g] (WHO, 2009). [h] (Ministerio de Salud & Ministerio de Deporte y Recreación, 2011). [i] (IAFA, 2018). [j] (CPJ, 2013, 2018). [k] (Guthold et al., 2020). [l] (Ministerio de Salud & MEP, 2020). [m] (Gómez et al., 2023). [n] (Bull et al., 2020; WHO, 2020).

Along with the variation in the measurement of physical activity, early studies did not provide details of the number of child and adolescent participants nor stratify by gender. Moreover, findings were only reported for a broad age range, not for specific age groups such as children and adolescents. For instance, Araya and Claramunt (2020) highlighted that in 1984, Sabean surveyed 934 students from 33 schools; however, the results were not distinguished

between gender or age range. Similarly, the authors claimed that from 1990 to 2009, IAFA conducted surveys on the Costa Rican population aged 12 to 70 years, but they did not report the total number of participants. Again, these data were not stratified by age or gender, and the findings from these studies did not correspond to cohorts that have been studied longitudinally, but rather reflected trends in national samples of the Costa Rican population at the time of each study (Araya & Claramunt, 2020). In addition, findings from the IAFA's studies conducted in 2010 and 2015 were not publicly available (Araya & Claramunt, 2020).

Araya and Claramunt (2020) further noted that in 1997 the Ministerio de Educación and Universidad de Costa Rica's surveillance assessed grade 3, 6, and 9 students' daily physical activity habits on weekdays and weekends, but results did not report gender-based data. On the other hand, the institutions mentioned previously conducting a similar study in 1998, and although this time, an age group was identified (16 - 17 years), overall findings were reported by the number of hours adolescents spent engaging in weekly physical activity. In contrast, Araya and Claramunt (2020) noted that in 1986, the Ministerio de Cultura, Juventud y Deporte published results from their surveillance that assessed Costa Ricans' participation in organized sports and recreational physical activities which included men and women within a broad age range (7 – 50 years). Despite reporting findings by gender and age groups (e.g., 7 – 12 years old, 13 – to 18 years old, 19 – 30 years old, and 31 – 50 years old) for participation in organized sports, findings from Costa Ricans' participation in recreational physical activity were reported only by gender and no age sub-groups. Furthermore, a common theme in most of these studies mentioned previously is the emphasis on reporting findings regarding sedentary behaviour (IAFA, 2003, 2009) and trends in adolescents' insufficient levels of physical activity (Guthold et al., 2020) rather than the actual physical activity levels of the population.

Overall, variations in the definitions and measurements of physical activity, the use of broad age ranges, reporting methods, and limited data accessibility restrict the ability to make direct comparisons of Costa Ricans' physical activity levels across different periods. Consequently, these inconsistencies hinder a comprehensive understanding of physical activity patterns in Costa Rican youth.

2.5.1 Trends in Costa Rican Youths' Physical Activity Patterns Over Time

Over the past 20 years, only a few studies have examined the physical activity levels of Costa Rican children and adolescents. However, due to the previously discussed inconsistencies, determining the physical activity levels of youth in Costa Rica over time has been challenging. Although some studies have included children and adolescents, data from the earlier studies are either unavailable or reported primarily for broad age groups (CPJ, 2013; IAFA, 2018), often without gender-specific analysis within the study population (CPJ, 2018). This gap highlights the need for more comprehensive and consistent research on youth physical activity patterns in Costa Rica. Appendix A provides an overview of the physical activity levels of children and adolescents in Costa Rica. Overall, the data from 1984 to 2010 indicate a concerning level of insufficient levels of physical activity among adolescents and a lack of detailed demographic information that hinders the understanding of these trends. While the period from 2010 to 2023 shows slight progress in adolescents' physical activity levels, more specific data (e.g., gender distribution for adolescents 15-17 years, type of MVPA reported) are still needed to better interpret this improvement.

Given the complexity of how and with whom physical activity has been measured, I have chosen to focus on more contemporary studies (De Moraes Ferrari et al., 2019; Gómez et al., 2023; Ministerio de Salud & MEP, 2020) as an indication of how active youths are in Costa

Rica. De Moraes Ferrari et al. (2019) examined sociodemographic trends in physical activity and sedentary behaviour across eight Latin American countries including, Costa Rica. While the data was primarily reported in general for a population aged 15-65 years, the study also provided insights by age subgroups: 15-29 years, 30-59- years and 60 years and older. The results indicated that among Costa Ricans aged 15-29 years, the average time spent on leisure time physical activity was 307.1 minutes per week, ranking the second lowest among the countries studied, just ahead of Peru with an average of 296.2 minutes peer week. In contrast, data from Costa Rica reported the highest average weekly time spent on active transport with 288.5 minutes compared to Venezuela with the lowest average of 182.2 minutes per week. Furthermore, one of the main focuses of Gómez et al.'s (2023) study was to describe Costa Rica's urban population's level of physical activity. The study involved 798 Costa Rican residents between the ages of 15 and 65. Among the 70 participants aged 15 – 17, 78.6% met the WHO's (2010) recommendation of engaging in an average of 60 minutes of moderate-to-vigorous daily physical activity. In 2018, Costa Rica's Ministry of Health and Ministry of Public Education (2020) conducted the Collegiate Survey of Nutritional Surveillance and Physical Activity. The study included 8,294 adolescents aged 13 to 19. Results indicated that 83.9% of participants engaged in physical activity during physical education, while only 23.2% reported playing games or participating in physical activity more than four times per week outside of school hours.

Despite offering a more recent perspective on Costa Rican youths' levels of physical activity, the reporting of results across these studies remained somewhat inconsistent including age group classifications. For instance, De Moraes Ferrari et al. (2019) reported on the 15-29 age group while Gómez et al.'s (2023) focused on a younger 15-17 subgroup, and the Ministry of

Ministry of Health and Ministry of Education's (2020) study included adolescents aged 13-19. Additionally, most data focused on specific settings such as urban areas or school environments, potentially limiting the generalizability of the results to the broader adolescent population in Costa Rica.

2.6 Existing Physical Activity Guidelines for Children and Adolescents

Physical activity guidelines have been created in many parts of the world as a response to growing scientific evidence demonstrating positive linkages between physical activity and good health as well as a reduction in the risks of chronic diseases like obesity, type 2 diabetes, and cardiovascular disease (Blair, LaMonte, & Nichaman, 2004). In late 1990 and early 2000, the United Kingdom developed one of the first physical activity guidelines for children and adolescents (Biddle et al. 1997 as cited in Chalkley & Milton, 2021) followed by Canada (Health Canada & Canadian Society for Exercise Physiology, 2002). Shortly after, other countries such as the United States (U.S. Department of Health and Human Services (HHS), 2008), Australia (Australian Government Department of Health and Aged Care, 2019), and the World Health Organization (WHO, 2020) subsequently launched guidelines for more targeted segments of the population, specifically: 0 - 4 years, 5 - 17 years, 18 - 64 years, and 65 years and older. The aim of these guidelines was to offer health recommendations to all age groups regarding the minimum amount of physical activity required for good health and to lower risks for non-communicable diseases (e.g., diabetes, obesity, cardiovascular disease, cancer) The guidelines also help governments create policies to promote physical activity and provide tools for effective implementation (WHO, 2020). The WHO guidelines have become a global reference for promoting health in all phases of life tailored to specific needs of each nation.

Since 2016, physical activity guidelines have been updated based on new scientific evidence stating the benefits of engaging in MVPA and bone and muscle strengthening activities among children and adolescents 5 – 17 years (Carson et al., 2016; Poitras et al., 2016). For instance, Tremblay et al. (2016) included recommendations for behaviours such as sleep and sedentary behaviour in the Canadian 24-Hour Movement Guidelines for Children and Youth (5 – 17 years) based on evidence on the benefits of engaging in physical activity (Poitras et al., 2016), taking into account sleep duration (Chaput et al., 2016), limiting sedentary time (Carson et al., 2016), and how the integration of all these behaviours were positively associated with important health indicators in children and adolescents (5 – 17 years) (Saunders et al., 2016). Tremblay et al. recommended that children aged 5 to 13 years get 9 to 11 hours of continuous sleep each night while adolescents aged 14 to 17 should get 8 to 10 hours of sleep, maintain regular bedtime and wake-up time and limit recreational screen time to ≤ 2 hours per day.

While the guidelines from the WHO, Australia, Canada, United States, and the United Kingdom share some commonalities, there are also notable differences. A common trend includes that children and adolescents aged 5-17 years should engage in at least 60 minutes of daily MVPA, mostly aerobic activities, with muscle and bone strengthening activities included at least three times per week which are essential for physical development during the stages of childhood and adolescence (Bull et al., 2020). However, the guidelines from Australia and Canada follow the recommendation in which children and adolescents should engage in ‘an average’ of at least 60 minutes of physical activity per day (Janssen & LeBlanc, 2010).

In terms of differences, recommendations in Australia’s (Australian Government Department of Health and Aged Care, 2019) and Canada’s (CSEP, 2021) guidelines suggest limiting recreational screen time to ≤ 2 hours per day and avoiding long periods of sitting.

Although, the United Kingdom and the WHO also advise limiting sedentary time, these guidelines do not provide specific details on how much screen time should be minimized.

Australia (Australian Government Department of Health and Aged Care, 2019) and Canada (CSEP, 2021) have broadened their national physical activity guidelines to address a full 24 – hour period. These guidelines outline recommended daily physical activity levels, suggest limiting screen time; and advise that adolescents 14-17 years get 8-10 hours of sleep per night. Although both sets of guidelines encourage children and adolescents to engage in 'several' hours of light-intensity physical activity each day, none of the guidelines specify the number of hours nor the type of structured and unstructured light physical activity.

Saunders et al. (2016) argued that more attention had to be given to measuring the integration of all these behaviours e.g., physical activity, sleep, and sedentary time rather than limiting measures to a single healthy movement behaviour. They highlighted that children and adolescents meeting the combination of high levels of physical activity and sleep, and low sedentary behaviour typically show healthier measures of adiposity and cardiometabolic health compared to peers who engage in low physical activity, insufficient sleep and high levels of sedentary behaviour. This was later confirmed by Wilhite et al. (2023) after reviewing 141 studies from 57 different countries and concluding that future studies should consider studying physical activity, sedentary behaviour, and sleep duration in conjunction rather than separately, due to the positive associations of sleep with numerous health outcomes in children and adolescents (5 – 17 years).

2.6.1 Sleep Duration and Health in Children and Adolescents

Chaput et al. (2016) provided supporting evidence of the benefits of sleep duration in children and adolescents (5 – 17 years). In their review of 141 studies from 40 different

countries, the authors examined associations between objectively and subjectively measured sleep duration and several health indicators (e.g., adiposity, emotional regulation, academic achievement, quality of life, cardiometabolic markers, and harms/injuries). Findings revealed positive associations between longer sleep duration and positive measures of quality of life, adiposity, academic achievement, and emotional regulation, whereas results were unclear or insufficient for associations between cardiometabolic markers, academic achievement, harms/injuries, and sleep duration. The authors concluded in that shorter sleep duration was negatively associated with physical activity and mental health outcomes and suggested that to better understand dose-response relationships and determine the ideal sleep thresholds, higher quality research designs with more reliable measures were required (Chaput et al., 2016).

2.6.2 Importance of Limiting Sedentary Time Among Children and Adolescents

Regarding the effects of engaging long hours of sedentary behaviour, Carson et al. (2016) reviewed the associations between objectively and subjectively measured sedentary behaviour and various health indicators e.g., body composition, fitness, metabolic/cardiovascular disease risk factors, behavioural conduct/pro-social behaviour, academic achievement, and self-esteem in children and adolescents (5 – 17 years). In total, 235 studies from 71 different countries were considered for this systematic review. Overall results showed that higher durations and frequencies of screen time were linked to unfavourable body composition (e.g., waist circumference and body mass index). Similarly, a higher cluster of metabolic diseases was linked to longer and/or more frequent TV viewing. In other words, the more time children and adolescents spend watching TV, the greater their risk of developing conditions such as high blood pressure, elevated blood sugar and abnormal cholesterol and insulin levels. In addition, higher duration and frequencies of watching TV and using video games were also linked to

unfavorable behavioural conduct/pro-social behaviour markers. On the other hand, Carson et al. found that higher academic success was linked to increased time reading and doing schoolwork, and there was an association between lower fitness and longer screen times. Although in their review, Carson et al. incorporated search terms to include emerging technologies such as tablets and smartphones; only two studies indicated that increased cell phone use was associated with higher social self-concept (Jackson et al., 2010) or social self-esteem (Jackson et al., 2011). These forms of technologies were included based on the assumption that children and adolescents predominantly use these technologies while in seated position. Carson et al. concluded that this assumption has yet to be empirically validated and warrants further investigation in future research on emerging forms of sedentary behaviour. In summary, these findings emphasize the importance of decreasing screen time (specially the duration and frequencies of TV viewing and video games) to help promote children's and adolescents' overall health.

2.6.3 Physical Activity Guidelines for Costa Rican Children and Adolescents

Although guidelines may differ in terms of age groupings, type, time, and frequency of physical activity, 62% of countries in Africa, Europe, the Americas, Eastern Mediterranean, Western Pacific, and South-East Asia have established their own national physical activity guidelines (Klepac et al., 2020). Some countries have no identifiable guidelines and other countries have adopted the WHO's recommendations (Budzynski-Seymour et al., 2021). While Budzynski-Seymour et al. noted that Costa Rica had their own national physical activity guidelines, the guideline these authors cite refers to the Food guidelines for Costa Rica (Ministerio de Salud, 2010) which recommend at least 30 minutes of daily moderate-intensity physical activity which can be done in two bouts of 15 minutes or three bouts of 10 continuous

minutes. A key objective of this dietary guideline is to help consumers adopt dietary habits that promote a healthy lifestyle (Ministerio de Salud, 2010). While the physical activity recommendation within the dietary guidelines was intended for all individuals over the age of two, the authors did not clearly explain the rationale behind this age threshold or the basis for the recommendation.

This lack of clarity and specificity in the 2010 Food guidelines for Costa Rica highlighted the need for more tailored and evidence-based physical activity recommendations, ultimately prompting the development of the national physical activity guidelines. In August 2011, Costa Rica's Ministry of Health in collaboration with the Ministry of Sports and Recreation, along with financial assistance from the Pan American Health Organization (Ministerio de Salud & Ministerio de Deporte y Recreación, 2011) developed and published Costa Rica's National Plan of Health and Physical Activity for 2011 to 2021. This physical activity guideline included recommendations for children and adolescents. The main purpose of developing a national physical activity guideline was to identify specific activities catered to different age populations (5 -7 years, 18 – 64 years, and 65 years and older) and to raise awareness of the benefits of engaging in daily physical activity from an early age (Ministerio de Salud & Ministerio de Deporte y Recreación, 2011). These guidelines suggest similar physical activity levels recommended for children and adolescents aged 5 – 18 years as the WHO's (2010) guidelines of accumulating a minimum of 60 minutes of daily MVPA and incorporating strength and muscle activities of at least three days per week. Recommendations on limiting hours of sedentary time or getting sufficient sleep, such as those of the contemporary Australian (Australian Government Department of Health and Aged Care, 2019) and Canadian (CSEP, 2021) guidelines, have not been added since Costa Rica's physical activity guideline was published in 2011.

A more recent publication of Costa Rica's (2022) food guidelines based on food systems for the adolescent and adult population (12 – 65 years) suggests that all individuals over the age of 12 years should engage in at least 30 minutes of daily physical activity (either walking, jogging, dancing or climbing stairs). Although this recommendation is not consistent with the WHO's (2020) guidelines on physical activity which suggests that children and adolescents aged 5 to 17 engage in at least 60 minutes of daily physical activity, it is the first Costa Rican guideline to include age-specific recommendations for sleep behaviour where adolescents aged 14 to 17 should get 8 to 10 hours of sleep per night (Hirshkowitz et al., 2015).

While the recommendation for individuals to engage in muscle-strengthening activities such as squats, push-ups, or resistance-based exercises also aligns with the WHO's (2020) guidelines, the statement from the Ministerio de Salud's (2022) guidelines lacks specific details regarding frequency (e.g., two or three times per week) and intensity (e.g., moderate or vigorous intensity). Furthermore, current recommendations include minimizing sedentary behaviour such as standing and moving for at least five minutes for every hour spent sitting (e.g., walk, stretch or perform brief activities such as using the restroom). The inclusion of a five-minute recommendation per hour may be too strict and is not directly supported by evidence. While this recommendation may reflect good practice, it goes beyond the WHO's (2020) guidelines which do not specify an exact frequency or duration for sedentary breaks. Instead the WHO (2020) advises that youths 5 – 17 years should limit the amount of sedentary time particularly in terms of recreational screen time and adults 18 – 64 years are encouraged to limit and replace sedentary time with any physical activity of any intensity (e.g., light, moderate or vigorous).

The latest food guidelines based on food systems for the adolescent and adult population (2022) are the most recent guidelines for young people 14 to 17 years in Costa Rica. While the

recommendations from the Ministerio de Salud's (2022) guidelines generally align with the WHO's (2020) guidelines for adults, it does not align for young people. Overall, this guideline could be improved by providing more detailed guidance on activity intensity, frequency and evidence-based justification, particularly regarding sedentary behaviour. Additionally, it would also be beneficial to include age-specific recommendations for the other three behaviours (physical activity, strength, and sedentary time) to better address the needs of all four behaviours across different age groups.

2.7 Gender Differences in Physical Activity Levels Among Adolescents

Gender differences in physical activity levels among adolescents are common; with boys generally being more physically active than girls (Ackah et al., 2022; Araujo et al., 2024; Biadgilign et al., 2022; Brazo-Sayavera et al., 2021; Kretschmer et al., 2023; Ricardo et al., 2022; Rosselli et al., 2020). Most of the studies were primarily focused on adolescent populations from Africa (Ackah et al., 2022; Araujo et al., 2024; Biadgilign et al., 2022), Europe (Araujo et al., 2024; Rosselli et al., 2020), and various regions including East Asia and the Pacific, Central Asia, the Middle East, North America, South Asia, Sub-Saharan Africa, and the Caribbean (Araujo et al., 2024; Brazo-Sayavera et al., 2021), as well as Brazil (Kretschmer et al., 2023). Although Araujo et al. (2024) included data from 19 Latin American countries, and Brazo-Sayavera et al. (2021) reported data from 14 Latin American countries, both authors relied on Costa Rican data from the GSHS 2009 survey. Furthermore, while Ricardo et al. (2022) studied 64 Global South countries, only 6.4% of the sample represented Latin America, excluding Costa Rica. This underscores the lack of research on Latin America and the need for updated data to better understand adolescents' current physical activity levels and how these differ by gender.

In 2016, 81% of 1.6 million adolescents globally aged 11-17 years were insufficiently active, girls having higher rates (84.7%) compared to boys (77.6%). Longitudinal evidence shows that girls' physical activity levels remained the same between 2001 and 2016, while boys became somewhat more active (Guthold et al., 2020). Moreover, other authors have highlighted the alarming gender gaps in physical activity as girls showed considerably lower levels of physical activity (12.6%) compared to boys (22.1%) after adolescents were surveyed on the number of days they engaged in at least 60 minutes of daily physical activity in the past week (Marques et al., 2020). Furthermore, a systematic review conducted by Chen et al. (2023), investigated the changes of physical activity levels in children in preschool age to adolescence while exploring differences in gender for MVPA, and concluded that MVPA starts to rapidly decrease from preschool age onward, with girls showing significantly lower levels of MVPA than boys across all age ranges. Moreover, this gap widens with age, emphasizing the persistent and increasing disparity in physical activity levels between genders.

2.8 Motivation Theories for Physical Education

Motivation "is the process whereby goal-directed activities are instigated and sustained" (Skunk et al., 2014, p. 5). Motivation entails energy, direction, and persistence (Ryan & Deci, 2000b). Theories of motivation have emerged in psychology due to the need to understand what drives human beings to perform certain actions and how these impulses affect their behaviour, development, and well-being (Deci & Ryan, 1985). The main purpose of motivational research is to answer questions of 'how' and 'why' to explain human behaviours (Heckhausen & Heckhausen, 2018).

Lirgg (2013), a social psychology expert, emphasized the importance of social psychological research in the field of physical education. The author noted that several theories

have been used to study specific behaviours within this field. These include need achievement theory (Atkinson, 1957; McClelland, 1961), attribution theory (Heider, 1958; Weiner, 1979), social learning (Bandura, 1977b), social cognitive (Bandura, 1986), and self-efficacy theory (Bandura, 1977a), competence motivation theory (Harter, 1978), expectancy-value theory (Eccles & Harold, 1991), achievement goal theory (Nicholls, 1984), and the cognitive evaluation theory embedded in SDT (Deci & Ryan, 1985). The latter (SDT) has been widely applied to study human motivation behaviours across diverse contexts including education, physical activity, sports and exercise, in the workplace, and health care (Ryan & Deci, 2022).

SDT has been widely used in physical education research (Gibbons, 2014; Gibbons et al., 2010; Gruno et al., 2018; Sulz et al., 2020), as a theoretical framework for understanding the motivational process in physical education (Lindahl et al., 2015), as well as a foundation for effective interventions aimed at improving both in-class experiences and physical education learning outcomes (Vasconcellos et al., 2020). The following sections outline the SDT's basic constructs and its application within high school physical education settings.

2.8.1 Overview of SDT

The authors of SDT (Deci & Ryan, 1985; Ryan & Deci, 2000b, 2017) attempted to understand the foundation of motivation and set intrinsic motives rather than outcome expectations at the forefront of why humans regulate their behaviour through different regulatory styles (e.g., external forms of regulations to internal regulation). In addition, they suggest that motivation exists on a continuum, ranging from the least autonomous form of motivation, amotivation, to the most autonomous form, intrinsic motivation, and that gains in cognition, behaviour, and affect are evident once an individual's motivational state shifts towards intrinsic motivation. Further, Deci and Ryan (2000) claimed that play, exploration and curiosity-driven

activities are good examples of intrinsically motivated behaviours as they come from personal interest and enjoyment rather than external rewards or pressure.

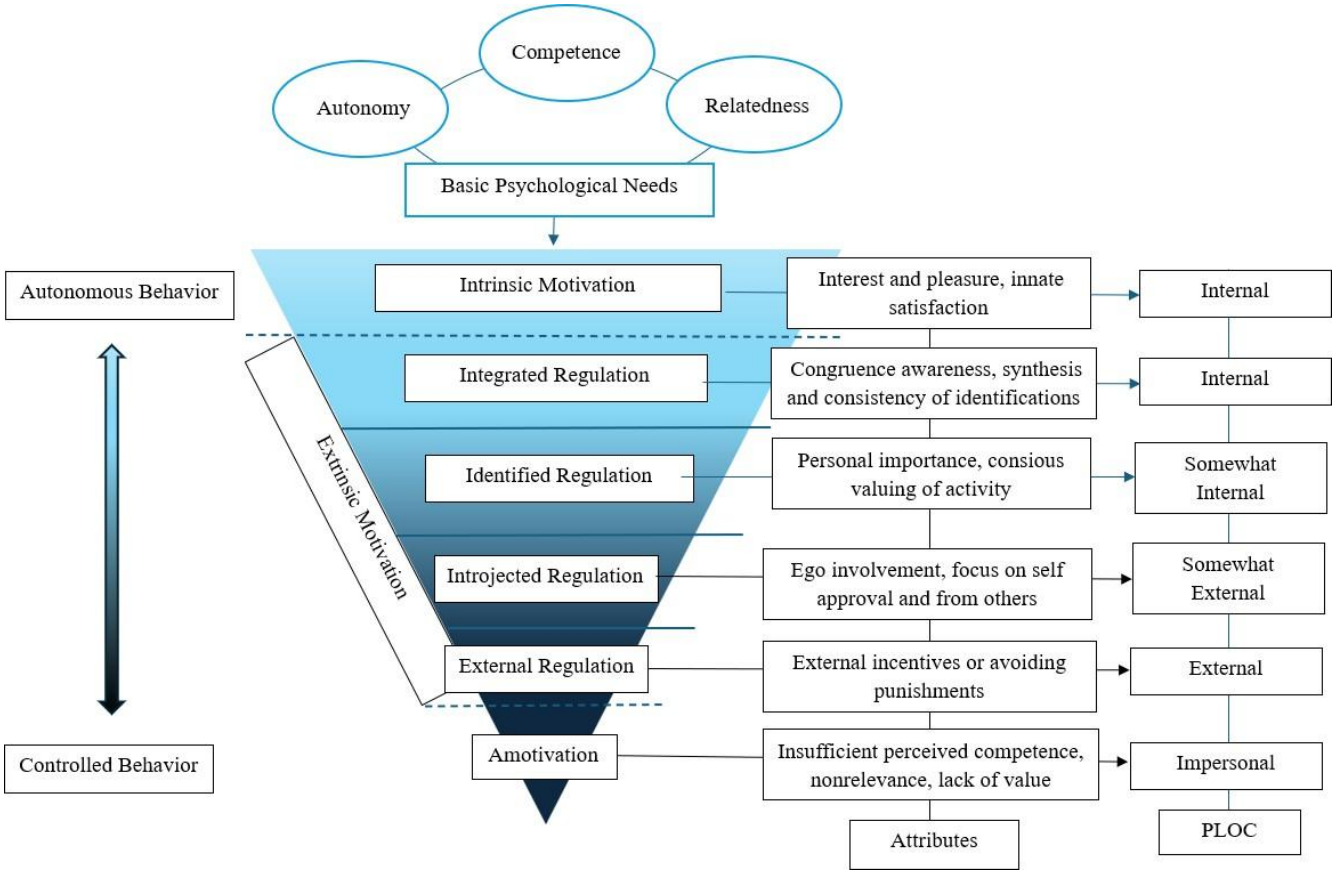
I created Figure 2 based on Ryan and Deci's (2000) SDT's taxonomy of motivation. The three basic psychological needs (autonomy, relatedness, and competence) are positioned at the peak, as they are essential for fostering intrinsic motivation in students. Deci and Ryan (2000) stated that when all three basic needs are met, students are more likely to have higher levels of intrinsic motivation. Conversely, when needs are not met, low motivation or avoidance will occur. The model further outlines that intrinsic and extrinsic motivation levels are characterized by different attributes, regulatory bases, and degrees of self-determination, including perceived locus of causality (see Figure 2).

As depicted in Figure 2, a core construct of SDT is that people have three basic psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 1985). Autonomy is the desire to have volition and feel free to make decisions without feeling controlled, perceived competence is the ability to effectively attain desired goals, and relatedness is the need to feel linked to significant persons (for example, classmates, peers, and teachers) (Ryan & Deci, 2000b). Satisfying these three needs increases an individual's autonomous motivation encouraging behavioural involvement. On the contrary, if these needs are only met partially or not met at all, this will result in low motivation (Deci & Ryan, 1985; Ryan & Deci, 2000b).

Below the three basic psychological needs and within the triangle shape of Figure 2, there are three overarching types of motivation: intrinsic, extrinsic and amotivation. Deci and Ryan (2000) suggested that students' behaviours can be categorized as intrinsically motivated, extrinsically motivated, and amotivated. Intrinsic motivation is autonomous and refers to engaging in an activity solely for the satisfaction and enjoyment of doing it (Deci & Ryan, 1985).

Figure 2

The Self-Determination Continuum: Basic Psychological Needs, Types of Motivation, Perceived Locus of Causality, and Main Characteristics



Note. Adapted from Ryan and Deci (2020), PLOC: Perceived Locus of Causality.

For example, a person who is intrinsically motivated is more likely to join in a particular activity simply because they enjoy it, find it fun, and feel satisfied just by doing it and being in that setting. Higher levels of intrinsic motivation in school settings have been positively correlated with self-esteem, confidence, academic success, school engagement, subjective well-being (Ryan & Deci, 2020). In physical education in particular, intrinsic motivation correlates with enjoyment, perceived value of physical education, and intentions to engage in physical activity outside of school (Sanchez-Oliva et al., 2014).

Extrinsic motivation refers to acting for a reason unassociated to the activity itself, a separate result, such as external rewards, pleasurable psychological states, or even avoiding unpleasant psychological states (Hagger & Chatzisarantis, 2007; Ryan & Deci, 2000b). For example, a student may participate in physical activity to earn a good grade, receive praise from others or avoid feeling guilty, rather than for the enjoyment of the activity itself.

There are different types of extrinsic motivation, and each has a different level of autonomy or self-determination. Ranging from high to low levels of autonomy, these are: integrated regulation, identified regulation, introjected regulation and external regulation (Ryan & Deci, 2000b). Integrated and identified regulation are considered of higher quality as they are closer to a more autonomous behaviour, while introjected and external regulation are more controlled forms of motivation (Deci & Ryan, 2008b; Ryan & Deci, 2000b, 2020) (see Figure 2). Integrated regulation, the most autonomous form of extrinsic motivation, occurs when identified regulations are fully assimilated into the self. This process occurs when individuals reflect on new regulations and seek to align them with their own personal values and needs. The more an individual comprehends and internalizes the motives for an action, the more it is perceived as a personal choice rather than an imposed obligation (Ryan & Deci, 2000a). Identified regulation occurs when individuals recognize and accept the motives for engaging in a behaviour or consider it personally meaningful (Guay, 2022). For example, a student might participate in physical activity because they believe it enhances their health, which they consider vital for their life. Although integrated forms of regulations are autonomous and share characteristics with intrinsic motivation, they are still regarded as extrinsic as actions are goal-driven rather than for intrinsic joy and pleasure (Ryan & Deci, 2000a).

Considered as a form of a more controlled behaviour, introjected regulation occurs when people's actions are performed under pressure to avoid feeling guilty or anxious, or to gain ego enhancements or pride (Ryan & Deci, 2000a). Lastly, external regulation is considered the least autonomous form of extrinsic motivation, people engage in behaviour to meet external demands or obtain rewards set by someone else (Ryan & Deci, 2000a). Amotivation is considered the least self-determined motivation as one is driven by external incentives or to avoid punishment (Deci & Ryan, 2000). Ntoumanis (2005) argued that an unmotivated student sees no connections between their activities and results; therefore, they are unwilling to participate and will only contribute minimally or not at all.

Another fundamental concept of SDT, is perceived locus of causality, which is a measure of a person's sense of behavioural autonomy (Ryan & Connell, 1989). Perceived locus of causality is a conceptualization of the reasons behind one's actions, ranging from internally to externally motivated behaviour along a continuum. According to SDT, people will put more effort and become more satisfied when they perform a behaviour if they have higher internal perceived locus of causality in comparison to those who have higher external perceived locus of causality (Deci & Ryan, 2000; Ryan & Deci, 2002).

2.8.2 SDT and Motivation in Physical Education and School-Based Physical Activity

For several decades, researchers have employed SDT to study motivational processes among children and adolescents in school physical education settings. For instance, in their longitudinal study, Barkoukis et al. (2014) measured high school students' motivational regulations in physical education to examine the relationship between motivation and grades. In their study, the authors considered identified and intrinsic motivation as autonomous types of motivation, while introjected and external regulations were considered as controlling types of

motivation. Their results showed that physical education grades were lower for students and classes with higher levels of controlling motivation, whereas higher levels of autonomous motivation were associated with higher physical education grades. These findings suggested a strong correlation between students' motivation at both individual and class levels and their physical education grades (Barkoukis et al., 2014). Furthermore, in their review of qualitative research, White et al. (2021) highlighted psychological need satisfaction by indicating that students showed higher levels of motivation for physical education when novelty, variety, choice and praise based on efforts were present; positive affective outcomes and a greater sense of relatedness were linked to competence satisfaction, and satisfying needs of relatedness resulted in positive peer relationships.

Evidence suggests that teachers can learn to better support students' psychological needs during physical education lessons, and that providing this type of support has numerous benefits for both students and teachers (Lonsdale, 2024). For example, students who had less controlling and more autonomy supportive teachers reported improvements in their skill development, course achievement, classroom engagement, and future intentions (Cheon et al., 2012). Moreno-Murcia and Sánchez-Latorre (2016) further noted that students who receive higher levels of autonomy from their physical education teachers throughout the pre-adolescent stage feel more like they are in control of their education, which in turn increases their intrinsic motivation and sense of physical education's value which may enhance their desire to engage in physical activity outside of the classroom and, as a result, strengthen their dedication to sports.

Beyond physical education, need satisfaction and autonomy support across other life domains are also important. For example, recent findings from Ryan et al. (2022) revealed strong evidence of the advantages of autonomy support as well as the satisfaction of all three basic

psychological needs in several domains, including health care, work, education, and physical education. Given the benefits, it is not surprising that research based on support of basic needs or autonomous motivation has dramatically increased over the past two decades (Slemp et al., 2024). For example, Gruno and Gibbons (2020) conducted a systematic review of 33 studies published between 2010 and 2020. Their analysis focused on research applying SDT in the context of school-based curricular physical activity, particularly focused on examining the needs of adolescent girls within these settings. The authors highlighted the need for further research on SDT in school-based curricular physical activity, specifically studies that focus solely on female participants and examine gender differences to better address the unique needs of girls. Plus, from a practical point of view, teachers in school-based curricular physical activity should create a supportive social environment that encourage students' initiative, volition, choice, and understanding to help them meet their innate psychological needs for competence, autonomy, and connectedness with others (Ryan & Deci, 2002). Gruno and Gibbons also suggested that teachers must also recognize that students may not be innately motivated to participate in all school-based curricular physical activities, thus, they must accept students' opinions and negative reactions as valid responses to school-based curricular physical activity's requirements, structures, and uninteresting learning activities. Overall, they concluded that all analyzed studies supported SDT's motivational framework, indicating that its principles can be effectively applied to real-life physical activity programs in schools.

2.9 Measuring Motivation Toward Physical Education

A variety of tools have been developed to measure motivation in different settings such as sports (e.g., Sports Motivation Scale, Pelletier et al., 1995) ; exercise (e.g., the Behavioural Regulation in Exercise Questionnaire, Mullan et al., 1997); and to inquire about why people

engage in certain activities (e.g., the Situational Motivation Scale, Guay et al., 2000). In the context of physical education, researchers have adapted existing questionnaires to use in physical education settings. For instance, Goudas et al. (1994) adapted Ryan and Connell's (1989) Self-Regulation Questionnaire which was designed to measure intrinsic motivation, identified regulation, introjected regulation, external regulation in the general classroom. They also incorporated the amotivation subscale from Vallerand et al.'s (1992) Academic Motivation Scale. To ensure relevance to physical education and sport, Goudas et al. (1994) reworded the items. As a result, their adapted questionnaire included items such as *'I take part in gymnastics lessons because I want to learn new skills'* (intrinsic motivation); *'I don't see why we should have football lessons'* (amotivation).

More recently, researchers have focused on developing and validating instruments to measure intrinsic motivation and the three psychological needs outlined in SDT within the physical education context. For instance, Cocca et al. (2022) created and validated the Intrinsic Motivation Inventory in Physical Education, an adaptation of the Intrinsic Motivation Inventory originally developed for competitive sports (McAuley et al., 1989). This new tool measured intrinsic motivation in physical education with 14 items spread across four factors. For example: interest-enjoyment (the degree in which a person is interested in doing an activity and their enjoyment in participating in it), competence (whether someone believes they are capable and skillful at performing a given task), effort-importance (how much work the individual has put into completing the task and thus how significant they think it is), and tension-pressure (whether a person feels tense or pressured when engaging in a specific activity). The final version's validity scores agreed with those of McAuley et al. (1989) confirming that the four-factor structure accurately reflected participants' motivation in the physical education context. Although

this study was performed with a sample of physically active adults who answered the questionnaire based on their overall recalled experiences of physical education throughout different educational levels, the authors suggested that the Intrinsic Motivation Inventory in Physical Education should be applied in populations such as elementary or secondary school aged children and adolescents to help assess motivational levels in physical education classes., Despite this suggestion, no recent research has yet validated the Intrinsic Motivation Inventory in Physical Education for the use with school-aged children or adolescents.

For this study, I used Sulz et al.'s (2016) Physical Education Motivation Scale (PEMS) and the Physical Education Basic Psychological Need Scale (PE-ARCS). Sulz et al. specifically designed these questionnaires to measure SDT constructs in physical education and stated that the PEMS and PE-ARCS were validated and reliable tools for measuring motivational levels and satisfaction of the three basic psychological needs among high school students. Furthermore, subsequent research has demonstrated that the PEMS and PE-ARCS were effective for use with older participants, including Grade 10 students (15 years old) (Sulz et al., 2020), as well as Saudi Arabian university students up to 22 years of age enrolled in physical education programs (Frikha et al., 2024). The authors further demonstrated that the Arabic version of the PEMS and PE-ARCS were shown to be valid and reliable tools for measuring Saudi Arabian students' levels of motivation and basic psychological needs.

2.10 Motivation in Physical Education and its Impact on Leisure-Time Physical Activity

Research has demonstrated that positive attitudes toward physical activity in adulthood can be influenced by providing students with positive experiences in physical education (Ladwig et al., 2018). In their study, Ladwig and colleagues employed a retrospective online survey to 1,028 participants aged 18 to 45 years to examine whether present-day adult attitudes and

intentions, physical activity and sedentary behaviour were related to previous memories of enjoyment or a lack of enjoyment in physical education. Participants also responded to open questions concerning their best and worst memories in physical education. The results revealed that greater retrospective enjoyment of physical education was significantly associated with more current attitudes and intentions toward physical activity and was negatively associated with weekend sedentary time. The most frequently positive memories included enjoying the class activities (56%), feeling physically competent (37%) and surprisingly skipping or not having to do participate in physical education anymore (7%). In contrast, the most common negative memories involved feelings of embarrassment (34%), lack of enjoyment in class (18%), bullying (17%), injury (16%), social-physique anxiety (e.g., anxiety from changing in front of others, or having their body evaluated in front of peers). A small percentage (2%) recalled being punished by teachers through physical tasks due to poor performance in class. Therefore, motivational processes need to be taken into account, since motivation is linked to more positive cognitive and affective outcomes and predicts engagement in intentional behaviours such as physical activity during physical education and adulthood (Ryan & Deci, 2017).

It is important to note that young people participate in various types of physical activities through physical education, and that these experiences may influence their participation in future leisure time physical (Hagger et al., 2003). Results from Hagger and Chatzisarantis' (2016) meta-analysis revealed that autonomous motivation in physical education was positively correlated with autonomous motivation toward leisure time physical activity. In addition, Lochbaum and Jean-Noel (2016) focused on physical education outcomes e.g., in-class and physical activity during leisure time and how these were directly affected by autonomy support of students. The review was ultimately comprised of 39 articles, from 15 different countries. Although the review

included one sample in which the data collected was in Spanish, none of the analyzed studies were performed in Latin America. The authors compiled a comprehensive list of all the student outcomes assessed across the studies to facilitate structured analysis and categorized specific areas in which perceived autonomy had the biggest influence, including motivational processes (e.g., intrinsic motivation), motivated behaviours (e.g., physical activity, effort), emotional outcomes (e.g., negative and positive emotions), self-related perceptions (e.g., physical and general self-esteem and self concept) and basic needs (i.e. autonomy, relatedness, competence). Although results showed that the effects of autonomy support of students in class activities were very strong and positively correlated with students' intrinsic motivation and basic psychological needs (i.e. autonomy, competence and relatedness), the relationship between autonomy support and students' physical activity levels were not significantly correlated. This suggests that while autonomy support is beneficial on students' intrinsic motivation and basic psychological needs, its direct impact on increasing physical activity may be limited.

Motivation for engaging in behaviours in one context (e.g., physical education at school) can transfer to another related context (e.g., leisure-time physical activity) (Hagger et al., 2003; Hagger & Chatzisarantis, 2016). Hagger et al. (2003) found that young people's perceptions of autonomy support in physical education will influence their perceived locus of causality, and intentions when engaging in leisure time physical activity behaviour. Similarly, Hagger and Chatzisarantis' (2012) findings indicated that modifying students' perceptions and attitudes toward physical activity within the context of school physical education can influence their motivation and engagement in leisure time physical activity. Their results revealed that, in comparison to the normal teaching style condition, students who received autonomy support from their teachers reported significantly higher levels of perceived autonomy support and

autonomous motivation in both physical education and leisure-time physical activity. Similarly, Hagger et al. (2007) concluded that there was a significant correlation between autonomy support and students' forms of autonomous motivation (i.e. intrinsic motivation and identified regulation). Moreover, results from their study also demonstrated that compared to perceived autonomy support from teachers, there was a tendency for a stronger correlation between perceived autonomy support from parent and peers. This suggests that while the influence of physical education teachers is mostly limited to school settings, that of peers and parents frequently takes place outside of the classroom and may therefore promote activity in similar settings.

2.11 Historical Overview of Physical Education and Quality Physical Education

A long-standing cultural trend with roots in historical practices is reflected in physical education's emphasis on performative and competitive games. For example, since the 1950's, teachers' practices in the USA, United Kingdom, and Australia have mostly involved sports (Green, 1998). Between 1950 and 2000, play and sport education, experiential and adventure education, human movement, and physical education and humanistic sport were the four different philosophical orientations that shaped physical education (Siedentop & van der Mars, 2023). Humanistic sport represents an approach to participation that emphasizes cooperation, inclusivity, enjoyment, and self-expression, with a focus on the learning process rather than on competition or outcomes (Scott, 1974, as cited in Siedentop & van der Mars, 2023). Moreover, after examining the objectives of physical education curricula worldwide, Hardman and Green (2011) indicated that the main goals of physical education were to promote (1) motor competence and the refinement of sport-specific skills, (2) health-related fitness, (3) active lifestyles, and (4) moral, personal, and social development.

Consistent with the goals articulated by Hardman and Green (2011), there is a shift toward a more contemporary, skills-based, inclusive and holistic approach to physical education known as Quality Physical Education that emphasizes students' mental, social, and physical health, preparing them for lifelong health and fitness education. Physical and Health Education Canada (2024) defines Quality Physical Education as a well designed mandatory physical education program delivered on a regular basis to all students from kindergarten to grade 12 during the school year. In addition, the Centers for Disease Control and Prevention activity (2013) suggests that a Quality Physical Education program should accommodate every student's needs, provide a joyful experience for every student, keep students engaged for the majority of the physical education lesson, teach students self-discipline and develops skills to optimize movement competence while instilling the essential knowledge and skills required for a lifetime of physical activity. In addition, Quality Physical Education should serve as the basis for a lifetime of participation in sports and physical activity by helping children and adolescents develop the psychomotor skills, cognitive understanding, and social and emotional skills necessary to lead an active life (UNESCO, 2015).

Despite the acknowledgement of physical education as an essential component of the school curriculum in Latin American countries, Ho et al. (2018) found that the implementation of Quality Physical Education remains limited. In their study involving 468 physical education teachers from six Latin American countries, the authors highlighted the importance of enhancing the quality of physical education beyond the school curriculum, instruction and evaluation. Their findings emphasized the importance of addressing other issues such as gender equality, supportive policies for inclusion, extra curricular activity opportunities and the availability of well-qualified professionals in the field.

2.11.1 Physical Education in Costa Rica

In attempts to make physical education more universally accessible, the Costa Rican Sports Institute (ICODER) was established through Law 7800, which came into effect on August 1st, 1998. Alongside the creation of ICODER, Title II, Chapter 1, Article 17 of this law stipulates that, "…in accordance with current legislation, physical education will be mandatory in both public and private schools from kindergarten through diversified education, special education and adult education levels…" (Creación del Instituto Costarricense del Deporte y la Recreación y del régimen jurídico de la educación física, el deporte y la recreación, 1998, Article 17). Conversely, in 2016 the Ministry of Public Education stated that physical education was considered a complementary subject in Costa Rican schools, only taught if a school had the necessary human resources, such as a qualified physical education teacher. When available, physical education would be allotted two periods of 40 minutes each week for students in grades 7 to 9 (MEP, 2016). In this regard, Araya (2023) reported that in Costa Rica, physical education coverage in both public and private high schools remained inconsistent despite Law 7800, with approximately 58% of elementary and 82% of high schools offering it in 2018 and a slight increase to 61.3% and 83.3%, respectively in 2022.

2.11.2 The Evolution of Costa Rica's Physical Education Curriculum.

Costa Rica's physical education curriculum has evolved in attempts to incorporate a broader range of activities over time. The first physical education plan was implemented in 1887 with the foundation of Costa Rica's High School (Urbina, 2001). In 1942, during World War II, the country introduced its first primary school physical education program. The main goal of this program was to monitor children's healthy development assuming that most elementary students suffered from anemia (Urbina, 2001). However, its implementation faced considerable challenges, including economic constraints, inadequate infrastructure, and a shortage of trained physical education teachers (Urbina, 2001).

Historically, Costa Rica's high school physical education programs were primarily

focused on team and individual sports, track and field, and gymnastics (MEP, 1987, 1996, 2005). By 1996, Costa Rica's Ministry of Public Education (1996) defined physical education as an essential component of the educational process, emphasizing organized physical activity through exercises, sports, and movements. Its main goal was to foster comprehensive individual development. Therefore, physical education was positioned as a means to promote both motor skills and values that benefit individuals and society as a whole.

The shift toward a new physical education curriculum was driven by evidence highlighting that program modifications were necessary to change adolescents' and young adults' perceptions of their physical education experiences (MEP, 2009). According to the Ministry of Public Education (2009), Araya conducted a survey in 2009 involving 236 students from various programs at the University of Costa Rica. The results indicated that most students expressed a desire to change aspects of physical education, based on their memories of elementary and high school experiences, particularly in high school where negative experiences became more frequent especially among girls. Among the most frequently mentioned areas that needed improvements were:

(a) having more time allotted to physical education per each lesson or times per week,

(b) having more varied options for sports and physical exercises, and

(c) ensuring better qualified teachers.

Findings from Araya and from Monge-Rojas et al. (2009) were one of the main reasons behind a new curricular approach in physical education (MEP, 2009). Monge-Rojas et al. (2009)

analyzed how adolescents perceived the barriers and motivators affecting their decision to live an active lifestyle. One hundred and eight students in grades 7th to 11th from one rural and two urban schools located in the province of San José participated in three sessions of focus group discussions where they answered questions related to their perception of, barriers to, and the motivators for a healthful active lifestyle. Results showed that the main barriers were that (a) the content from the physical education program did not encourage them to adopt healthy and active lifestyle habits, (b) school and community environments did not provide conducive conditions for physical activity, and (c) the family environment did not provide safe and beneficial behavioural patterns for them to engage in healthy lifestyle habits. In response to these barriers, Monge-Rojas et al. (2009) proposed that the key motivators for students to adopt a healthy lifestyle were to (a) change the physical education program's focus to more recreational and free-time activities instead of competitive sports, (b) increase the access to facilities and places that benefit the practice of physical activity at school and in the community, and (c) seek greater social support from peers and family members to adopt a healthy and active lifestyle. Considering these motivators, sports would still be considered as a key component in the physical education curriculum:

> "However, the approach should be based on the promotion of sports practice for recreational purposes, with the aim in that students in general fall in love with sports and practice them on their daily lives, both in and out of school; and that those students who have the minimum interest and aptitude to practice performance sports can enroll in sports clubs and representative sports teams of their schools, where they can train and improve holistically" (MEP, 2009, p. 43).

In summary, the curriculum had been updated since 2005 to include movement skills, dance, and a wider variety of games and team sports (MEP, 2009). However, a strong focus on traditional sports remains evident. The physical education program for the Basic (i.e. Grades 7 to 9) and Diversified (i.e. Grades 10 to 12) General Education (MEP, 2009) was designed based on the core concepts of ethics, aesthetics, and citizenship. By interconnecting these themes in physical education, ethics is intended to promote justice, equity, respect, and responsibility, aesthetics is intended to foster creativity and appreciation of human movement, and citizenship is intended to encourage cultural identity and social responsibility (MEP, 2009). In addition, the program comprised conceptual contents (e.g., facts, data, phenomena, concepts and theories from which each student builds their learning), procedural contents that promote the development of skills and behaviours that align with the intended learning outcomes and simultaneously enhance the learning process, and attitudinal concepts that encourages student to act in alignment with ethical, aesthetic and civic values. Moreover, the curriculum was based on three thematic axes (a) human movement, (b) games and sports, and (c) dance activities or movement with music. Additionally, three transversal axes that should be integrated into all physical education classes, in each unit and at each level: (a) health, aimed at promoting healthy lifestyles by encouraging the effective use of free time; (b) transfer, intended to facilitate the application of knowledge and skills learned in class to other physical and temporal contexts of daily life; and (c) coexistence, which emphasized practicing what was in a way that fosters harmony with the natural and social environment (MEP, 2009). These guiding principles were reflected in the specific content outlined for each grade level in all three trimesters. As for the grade 9 physical education curriculum content, it was designed to deepen students' understanding of physical training, team sports (i.e. baseball, softball, handball), and individual racket sports (i.e. table tennis, tennis,

badminton); as well as learning about activities involving music such as Pilates and aerobic dance. For a detailed overview, see Appendix B for MEP's (2009) current physical education program for grade 9.

Although efforts have been made to improve physical education, secondary school level lessons have been traditionally guided on a sport-based approach that prioritized the measurement and quantification of physical abilities (e.g., the standardization of jumping and running abilities, sit-ups and aerobic endurance such as the One Mile Test or the Cooper test) (Pereira Hidalgo, 2011). Moreover, in many cases, physical education lessons have become a recreational space for both students and teachers (Pereira Hidalgo, 2011).

High school physical education in Costa Rica has faced challenges that have affected student engagement and raised concerns about the effectiveness of the updated curriculum. In this physical education curriculum, the Ministerio de Educación Pública (2009) introduced a new approach to student assessment through project-based learning. These projects were defined as student-driven activities (preferably to be conducted in groups to promote teamwork) that integrated conceptual, procedural and attitudinal contents. In addition, teachers were encouraged to dedicate a part their class time to project planning and to provide ongoing support through short follow-up sessions in following classes.

Portillo-Torres et al. (2016) conducted a qualitative descriptive study to gather insights from teachers and students regarding high school physical education classes. The authors aimed to highlight the most relevant aspects of implementing the updated curriculum in practice. They collected opinions of 38 teachers and 27 students from public schools across four of Costa Rica's educational regions: Central San José, Alajuela, Cartago, and Pérez Zeledon. Data were gathered through eight focus groups during which sessions were recorded, and notes were taken for

analysis. Portillo-Torres et al. identified two major themes: the role of projects and changes in class activities. Results showed students' strong dissatisfaction with the projects, describing them as overly theoretical and detracting from physical activity and that the high grading weight assigned to these projects (i.e. submission of an academic paper comprised of a cover page, main objectives, introduction, main body and conclusion as well as delivering a practical presentation on a specific topic selected by the students) led to them to disengagement from regular classes. Moreover, the findings revealed that both students and teachers viewed the introduction of a variety of activities as a positive change in physical education classes. However, concerns were raised about the effectiveness of their execution and evaluation, particularly due to the limited time available for practical experiences, often reduced by scheduling conflicts with other school events. Despite this initiative, information on Costa Rica's high school physical education programs remains limited as there has not been an updated curriculum since 2009.

2.12 Physical Education and Gender Inequities

Since physical education has the potential to reach the majority of school-aged children and adolescents, it has been suggested as one of the most affordable methods of increasing regular MVPA at the population level (Bassett et al., 2013). However, many young girls have been shamed in class about their athletic abilities and ultimately about themselves causing them negative self image leading to a decision of opting out due to forced humiliating evaluation, and both peer and teacher harassment related to size and sexuality (van Daalen, 2005). Evidence suggests that girls are more likely to lose interest in physical education as they enter adolescence (Azzarito et al., 2006; Camacho-Miñano et al., 2011; Kirby et al., 2012; Youth Sport Trust, 2024).

More contemporary research continues to highlight girls' negative experiences that contribute to their disengagement from physical education. For example, Eizagirre-Sagastibeltza et al. (2024) found that the combination of teachers' negative attitudes, prevalence of hegemonic masculinity and the girls' internalized sense of inferiority discouraged their active involvement and enjoyment in physical education during their childhood and adolescence, ultimately affecting their self-esteem and long-term participation in sports. Similarly, Hortigüela-Alcalá et al. (2021) reported that girls' negative experiences in physical education were associated to a sense of being undervalued or rejected by peers and teachers, body concerns that prevented them from participating in class and feelings of inadequacy related to physical performance caused them to get frustrated. This evidence has supported van Daalen's (2005) and Gruno and Gibbon's (2016) findings in that, many girls stop taking physical education classes as soon as they earn the required number of credits.

Studies have shown that when girls' needs and interests are taken into consideration, they will willingly participate in physical education programs. For example, to better understand the needs, interests and abilities of a group of young women, Gibbons and Gaul (2004) examined girls' experiences in a senior elective physical education course. From the first stages of planning to the final assessment, the students in this course participated in every stage of its development. Their findings demonstrated the importance that female students attributed to the opportunity for personal accomplishment by allowing them to use personal goal setting and evaluation methods, being part of a respectful and supportive class environment in which they can foster relationships among classmates and lessen the focus on competition and being given the opportunity to choose from a variety of long-life physical activities. In addition, Gibbons and Humbert (2008) used focus group interviews, individual interviews, and questionnaires to analyze girls' experiences in

mandatory physical education classes at a middle-school level (grades 6 and 7). Similarly, they identified common themes that have been found to be relevant at the senior level. These included being given a wider range of lifelong physical activities (e.g., dancing, walking or swimming) to choose from in their physical education programs emphasizing their dislike on the predominance of team sports; and the importance of developing competence in physical skill performance as they felt awkward and incompetent in comparison to more skilled peers. In terms of realizing the importance of the link between health and physical activity, it was evident that the girls did not apply this knowledge to positively influence their own behaviour despite knowing that regular physical activity enhances health outcomes. Finally, the authors pointed out the need of including gender-equitable teaching strategies as many girls expressed how they frequently felt harassed, intimidated and mocked and even more concerning, that their teacher did not seem to do much to address the boys' behaviours.

To address the challenges discussed earlier and aid young girls find greater meaning in physical education, Gibbons, Humbert, and Temple (2010) developed a comprehensive resource manual for teachers. Grounded in Deci and Ryan's (1985, 2000) SDT's constructs which highlight the importance of fulfilling three basic needs (autonomy, competence and relatedness) in fostering individuals' motivation, the authors identified specific actions and strategies to create a more engaging physical education environment for girls in grades 5 to 12. This was achieved through a formative research process that involved teachers actively. The study's first phase consisted in familiarizing teachers with SDT and its application to physical education. In phase two, the authors created a resource manual that teachers could use to record their practice in one or more physical education classes which included an easy-to-understand action checklist. Findings showed that when giving middle school girls a variety of choices (autonomy) in a

walking unit, and when given the opportunity to select their own activities, their intrinsic motivation increased. In addition, the authors provided teachers with high impact actions that could implement in their classes to help improve students' engagement during physical education (e.g., using community resources and asking about their preferences for physical activity, providing opportunities for peer teaching and incorporating activities aimed at increasing their fitness levels, and including cooperative games as well as establishing a secure class environment). By equipping teachers with actionable strategies, this study provided a useful framework for developing a motivating and encouraging physical education environment to girls. In addition, further studies on this matter have also demonstrated the importance of providing young women with a choice in lifelong physical activities (Gibbons, 2009; Gruno & Gibbons, 2016; Wilkinson & Bretzing, 2011).

2.13 Participation of Costa Rican Girls in High School Physical Education

In Costa Rica, physical education is co-educational due to educational policies originated in education as a right for all (Ballestero et al., 2013). Costa Rica's Ministry of Public Education (2009) encourages that physical education classes be constituted by co-educational groups while still maintaining pedagogical group sizes, integrating boys and girls as much as possible. However, in special cases, when a sport is taught in which there may be a risk of accidental strong contact (i.e. football, basketball) it is recommended that the practices be carried out with separation of genders (as would normally occur in sports practice) (MEP, 2009).

Without undervaluing the great advancements in the legal field, in terms of material, social and political barriers that limit women's equality, Costa Rica has made slow progress due to the absence of public policies aimed at the cultural transformation required for full equality between men and women (Araya Umaña, 2003). Although the literature shows some evidence of

Costa Rican girls' and women's involvement in physical activity (Araya & Claramunt, 2020; Revuelta-Sánchez & Araya-Vargas, 2021; Sojo Mora, 2023), literature regarding girls' participation in high school physical education remains limited. Therefore, further research on the topic of female involvement in physical education classes, its development and the documentation of the data collected are required to prevent the lack of records containing specific information (Ballestero et al., 2013).

2.14 Summary

Despite research showing that engaging in at least 60 minutes of MVPA during adolescence provides substantial cardiometabolic, musculoskeletal and psychosocial benefits, the proportion of adolescents who meet the WHO's (2020) physical activity recommendations remains alarmingly low. Global prevalence estimates have changed little over the past decade, and girls consistently report even lower activity levels than boys. Concerningly, most of the literature about physical activity of adolescents arises from North America, Europe, and Asia, with little work conducted in Latin American countries, including Costa Rica. Thus, there is a notable geographical and cultural gap in the physical activity literature. Furthermore, the current literature on Costa Rican youths' physical activity levels is marked by inconsistent variance in the methodology and insufficient and/or irregular reporting of findings which restrict the generalizability of school-based findings and impede making direct comparisons across decades.

Although ICODER's Law 7800 mandates compulsory physical education across all school levels in Costa Rica, implementation in high schools remains uneven and constrained by an outdated curriculum. The subject is formally offered only when a qualified teacher is available and is allocated with two 40-minute periods per week in grades 7 to 11. As a result, 17.9% of

secondary schools in 2018 and 16.7% of them in 2022 offered no physical education at all (Araya, 2023).

The latest curriculum update in Costa Rica was introduced in 2009. This revision expanded the existing syllabus to include dance, health-promoting content, and project-based assessment. However, activities in class remain predominantly sport-centered, and students view the assessment projects as overly theoretical. Moreover, no comprehensive curricular update or system-wide evaluation has occurred since 2009. Consequently, limited physical education materials and equipment, irregular teacher availability, and an outdated curriculum hamper efforts to foster life-long physical activity habits among adolescents.

The SDT provides a strong theoretical lens through which motivation in high school physical education settings can be examined. Empirical evidence indicates that secondary students display all SDT's constructs ranging from intrinsic motivation to more controlled extrinsic forms and amotivation. Previous research has confirmed that autonomous forms of motivation (i.e. intrinsic, identified regulation) are linked to higher enjoyment in physical education and intentions to be physically active outside of school, whereas more controlled forms of behaviours (i.e. introjected, identified regulation) and amotivation are linked to predict disengagement among adolescents. However, although most large-scale studies on the topic include data from male and female students, systematic reviews highlight the importance of conducting gender-based analyses to examine in more depth variation in motivational profiles in physical education. In addition, fulfilment of the basic psychological needs (i.e. autonomy, competence, relatedness) is considered a primary predictor of autonomous motivation, particularly in classes where teachers provide students with choice, competence-affirming

feedback, and a supportive peer environment. However, findings regarding gender disparities in need satisfaction vary.

Overall, the literature highlights several critical gaps that require attention for more contextually relevant and methodological studies. Therefore, in this study I will address (a) the lack of consistent research targeted on Costa Rican adolescents' physical activity levels, (b) the absence of gender-specific motivational profiles in adolescents, and (c) the use of students' responses to inform potential improvements in high school physical education. Such evidence can aid in the development of inclusive, psychologically supportive physical education programs that encourage lifelong physical activity among Costa Rican youths.

Chapter 3: Method

The following sections outline the mixed method design of this study, which combined both quantitative and qualitative data collection and was guided by an Integrated Knowledge Translation (iKT) approach. This chapter highlights the role of knowledge users in shaping research focus. In addition, it provides a detailed description of the sampling process, recruitment stage, data collection tools including those which required a translation and cross-cultural adaptation to Costa Rican Spanish, as well as the overall procedures, and data treatment and analysis.

3.1 Design

A mixed-method, cross-sectional, descriptive study design was used; with the quantitative and qualitative data collection occurring at the same time. In addition, an iKT approach (Government of Canada, 2015) was also embedded in this study's design. Guided by the Canadian Institutes of Health Research guidelines, my study involved iKT in the following aspects of the research 1) the actual topic, 2) the research approach, 3) the viability of the project, and 4) the project outcomes (see Table 2).

As iKT is embedded in this project, input was sought about which grade level to include as the population of interest from potential knowledge users, specifically from Costa Rica's Ministerio de Educación Pública administrative staff, physical education advisors, and teachers. Knowledge users also helped shape the focus of this study. In cooperation with a former physical education colleague, we were able to identify a problem that was expressed by several Guápiles' high school physical education teachers. These teachers expressed that Costa Rican high school students were becoming more uninterested or amotivated toward physical education.

Table 2

Integrated Knowledge Translation (iKT) Approach and Project Involvement

iKT Approach	Knowledge users' involvement in the project
Actual topic of the study	A former Guápiles' physical education Regional Advisor, Jose Prendas, advised that physical education teachers reported they were dealing with student apathy during his visits to high schools in the 2021-2022 post-pandemic years. Jose Prendas reported that teachers felt that students sought excuses to avoid attending physical education class or participating in class activities.
Research approach	The choice of studying students' motivation levels rather than measuring physical activity levels was informed by the national physical education advisor in addition to how students would be recruited.
Viability of the project	The viability of the project was enhanced by addressing concerns raised by various knowledge users in the Guápiles' 01 School Circuit about low participation and student apathy toward physical education. Additionally, I worked to reduce teacher and participant burden by being on-site to disseminate and collect consent materials and by recruiting students and collecting data in a short (4 weeks) period of time (see section 3.2.2).
Project outcomes	Potential knowledge users involved from Costa Rica's Public Ministry of Education, included (a) the national physical education advisor, (b) the education supervisor for all schools located within Guápiles' 01 School Circuit, (c) Guápiles' physical education regional advisor, (d) school principals, and other administrators, and (e) physical education teachers from public and private schools located in Guápiles' 01 School Circuit. The national physical education advisor suggested that findings from this study could be shared with other Costa Rican physical education colleagues through an asynchronous online webinar. In addition, these results may be presented in a radio diffusion program where people who carry out different investigations in the field of physical activity and physical education participate.

The decision to focus on grade 9 students was made because teachers felt that most grade 7 and 8 students were still engaged during physical education classes, but a lack of interest was more evident among grade 9 students. Further, grade 9 is a stage of early adolescence where physical activity levels and interests are known to decrease (Caspersen et al., 2000; Sallis et al., 2000; Telama & Yang, 2000; Trost et al., 2002). So, a better understanding of students' lack of motivation toward physical education was warranted.

This study was approved by the University of Victoria's Human Research Ethics Board (Protocol Number 24-0078) (see Appendix C), and the Vice Minister of Costa Rica's Ministry of Public Education Academic Office (see Appendix D). Additional approvals were obtained from the Guápiles' Education Directorate (see Appendix E), the Guápiles' Regional Physical Education Advisor, and school directors and physical education teachers of each of the participating schools.

3.2 Participants

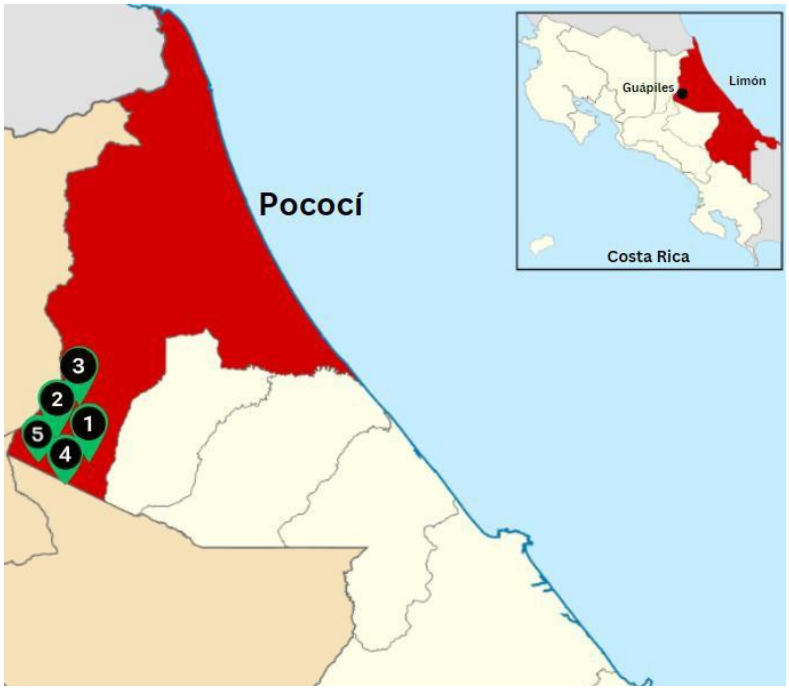
3.2.1 Sampling Frame

This study took place in Guápiles, Costa Rica. The district of Guápiles is located in canton Pococí in the province of Limón (see Figure 3). As part of the Ministry of Public Education, the Regional Education Directorates (27 in total, within all seven provinces) serve as the Costa Rican educational system's regional representative and integrating body, as well as a formal link between the central administrative office of the Ministry of Public Education and the educational communities (e.g., schools) (MEP, 2020). In Limón there are three main Regional Education Directorates (a) Limón, (b) Sulá, and (c) Guápiles. The Regional Education Directorate of Guápiles includes School Circuits 01 to 08 comprising of a total of 230 public and private elementary, daytime high schools and night schools (Dirección Regional de Educación

Guápiles, n.d.). A total of six public and three private daytime high schools are located only within Guápiles' School Circuit 01. School Circuit 01 was selected due to my prior experience working in its schools. As such, I had already established professional relationships with the principals and physical education teachers, which facilitated access and made the research process more efficient.

Figure 3

Location of the District of Guápiles in Canton Pococí, Province of Limón in Costa Rica



Note. The map includes the five participating schools' location in Guápiles' School Circuit 01 in canton Pococí, province of Limón, Costa Rica. (1) Pococí Vocational High School, (2) Bilingual Experimental High School, (3) San Rafael High School, (4) Green Valley High School, (5) San Francisco of Assisi Bilingual School.

(https://es.wikipedia.org/wiki/Cant%C3%B3n_de_Pococ%C3%AD) in the public domain.

According to the amendment to Article 78 of Costa Rica's Political Constitution for the strengthening of the right to education (2011) preschool, general basic (i.e. grades 1 to 9), and diversified (i.e., grades 10, 11 and 12) education are mandatory. Education in the public system is free of charge and funded by the State. In contrast, students attending private schools are required to pay an annual enrollment fee and monthly tuition for educational services (MEP, 1995). For this study, three public and two private high schools within School Circuit 01 from Guápiles' Regional Education Directorate were included as they serve more than half of the high school student population in Guápiles and are clustered geographically (see Figure 3). This decision was made for reasons of feasibility and cost.

For the 2024 school year and prior to the recruitment stage, principals from each of the participating schools provided me with the class list of all grade nine sections. The total number of grade 9 students attending the 3 public schools was $N = 586$. The sample was stratified by school and based on confidence limits of 90% (Baumgartner & Hensley, 2013). My aim was to recruit 235 students, however, due to recruitment difficulties, grade nine students from two additional private schools were also invited to participate. The total number of grade 9 students attending these 2 private schools was $N = 60$.

3.2.2 Recruitment

I visited each of the schools to recruit students. This stage involved information sessions, handing out consent forms, and collecting consent forms signed by students and their parents. One week prior to meeting with the students an infographic promoting the study (see Appendix F) was posted on each of the schools' official social media and grade nine group chats (Facebook, and/or WhatsApp), as students had only one physical education class per week. I personally contacted the students from the three public and two private schools by going to the

classrooms and giving a brief presentation on the study. During the information session, I explained the project and the process to the students and gave each of them the consent materials to take home to their parents/guardians. The following day, I greeted each grade nine class to collect the signed consent forms.

Of the 646 eligible participants in all three public and two private schools, the final sample was $N = 118$ grade nine students comprising (a) Pococí Vocational High School ($n = 59$); (b) Pococí Experimental Bilingual School ($n = 19$); (c) San Rafael High School ($n = 22$); (d) Green Valley High School ($n = 6$), and (e) San Francisco of Assisi Bilingual School *(*$n = 12$). Students' average age was 14.7 years *(*$SD = 0.6$*)*, 43% were male and 57% were female.

3.2.3 Measures

Three questionnaires were used in this study (see Appendices G, H, and I). The Physical Education Motivation Scale (PEMS) (Sulz et al., 2016) was used to assess students' levels of motivation toward physical education, the Physical Education Autonomy Relatedness Competence Scale (PE-ARCS) (Sulz et al., 2016) examined students' basic psychological needs, and the physical activity module of the Global School-Based Students Health Survey (GSHS) (WHO, 2013b, 2013a, 2021a, 2021b) was used to assess physical activity levels and 24 – hour movement behaviours.

One open-ended question comprising of two parts was added to the end of the PEMS and a checklist with an opportunity to add a response was added at the end of the PE-ARCS questionnaire. The purpose of these questions was to gather qualitative data that sought students' personal feelings toward physical education as well as to gauge the students' interest in a variety of activities. This provided students with the opportunity to give suggestions on how physical education can be improved in the future (see Appendices H and I). Open-ended questions can be

used to supplement social survey instruments by including dimensions not captured using numerical scales (Fielding et al., 2012).

At the end of the PEMS, students were asked the following two-part open-ended question: (1) 'Think about your experiences in physical education, what would you change to make physical education more appealing to you?, and (1.a) why would you make these changes?'(see Appendix G). This question was intended to gain more in-depth information regarding students' personal feelings and preferences in physical education. For the PE-ARCS, the checklist focused on inquiring about what students' ideal physical education class may look like. They answered the following question 'If you had the opportunity to design your ideal physical education class, what activities would you include? 'Check all the boxes that apply.' Different types of physical activities that they may find appealing were listed such as outdoor recreation, sports, dance fitness, parkour, skateboarding, yoga and mindfulness, activities that incorporate the use of technology, fitness challenges, circus arts and/or team-building games (see Appendix H). Lastly, age and gender questions were included in the consent form to collect relevant demographic data.

3.3 Validity and Reliability of the PEMS and PE-ARCS

Sulz and colleagues (2016) followed DeVellis' (2012) eight step approach to the development of a measurement scale when they created the English language versions of the PEMS and PE-ARCS (see Appendices H and I). In the latter stages of development, exploratory factor analysis was undertaken with a validation sample of 14–18-year-old high school students (N = 309). Factor analysis of both the PEMS and PE-ARCS demonstrated acceptable fit, accounting for 57.3% and 64.1% of the model variance, respectively. Both scales fit with the theoretical model underpinning the scale, resulting in a 3-factor solution for PEMS (with 3 items

each for intrinsic motivation, extrinsic motivation, and amotivation) and a 3-factor, 12-item solution for PE-ARCS (4 autonomy, 4 relatedness, and 4 competence items).

Test-retest reliability of both the PEMS and PE-ARCS scales was established with a sample of 14 to 18-year-old students from two schools ($N = 131$) (Sultz et al., 2016). The sample was separate from the validation sample and the time between the test and the re-test was five days. Strong intraclass correlation coefficients (ICC) were reported for PEMS (ICC = .75) and PE-ARCS (ICC = .84) (Sulz et al., 2016).

3.3.1 Structure and Scoring of PEMS and PE-ARCS

Questions on both the PEMS and PE-ARCS are presented on a 7-point Likert type scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Both scales intersperse sub-scale items. For example, in the PE-ARCS a question on relatedness is followed by a question on competence, followed by a question on autonomy, and so on. Questions on both scales ask students to focus on ‘When I am in PE’ and are written in the first person, for example ‘I participate in PE because it is fun’ (PEMS intrinsic motivation question) and ‘My classmates seem to like me’ (PE-ARCS relatedness question). The range of possible scores range is 9 to 63 for PEMS and 12 to 84 for PE-ARCS.

3.4 Global School-Based Student Health Survey (GSHS)

The GSHS was created by the WHO with technical support from the US Centers for Disease Control and Prevention (CDC), and cooperation from the United Nations International Children's Emergency Fund, the United Nations Educational, Scientific and Cultural Organization, and the Joint United Nations Programme on HIV/AIDS UNAIDS (WHO, 2025). The GSHS, also known as the Encuesta Mundial de Salud Escolar in Spanish, is a youth health and risk behaviour survey carried out in low- and middle-income countries around the world by

national ministries of health and/or education. It has been used globally since 2003 for cross-national comparisons or to assess the prevalence of adolescent health needs and behaviours in a country (Ani et al., 2016; Badr et al., 2017; Beck et al., 2016). The GSHS is available in many languages including English, Spanish, French, Deutsch, and Portuguese. It is a country-specific self-administered school-based questionnaire predominantly designed for adolescents aged 13 to 17 years of age that can be completed in a typical class period.

One of the primary strengths of the GSHS is the publicly accessible, nationally representative databases from 104 different countries around the world; and that there is currently no other comparable collection of datasets comprising both nationally and globally representative data on adolescent behaviour and risk factors (Bischops et al., 2023). The 2009 version of the GSHS has been used in Costa Rica to measure all ten core modules (e.g., alcohol use, dietary behaviours, physical activity, tobacco use etc.) (Guthold et al., 2020; WHO, 2009) where a total of 2,679 grade 7, 8, and 9 grade students aged 13 – 15 years participated in the study with a 100% school rate and a 72% overall response rate. To date, this has been the only dataset generated by the GSHS that has been applied in Costa Rica.

The GSHS has a set of core questions and optional questions referred to as the core-expanded questions. The standardized core questionnaire contains validated survey items chosen from 10 core modules, including hygiene, nutrition, physical activity, alcohol use, sexual behaviours, mental health, drug use, tobacco use, violence/injury, and protective factors. For this study, only the physical activity module of the GSHS was used to address specific questions regarding the level of physical activity Costa Rican students do in their daily lives (see Appendix I). The questions from the GSHS core questionnaire can be paired with core-expanded questions. For example, ‘During this school year, did any of your teachers provide short physical activity

breaks during regular class time?' (WHO, 2021a) and 'During the past seven days, on how many days did you do stretching exercises, such as toe touching, knee bending or leg stretching?' (WHO, 2013b, 2021b). Moreover, country-specific questionnaires are created by combining core, core-expanded and questions that are unique to the context in the respective language (Bischops et al., 2023). These core and core expanded questions of the 'physical activity' module focus on more than what has traditionally been measured in terms of physical activity. Rather, items are included that measure physical activity, sedentary behaviour, strength activities, and sleep. These behaviours reflect what are now built into contemporary 24-hour movement guidelines (see Tremblay, Carson, et al., 2016; Wilhite et al., 2023).

3.4.1 Validity and Reliability of the GSHS

Despite the widespread use of the GSHS in health behaviour surveillance, evidence of the validity and reliability of the GSHS is scarce. Two studies have examined both the validity and reliability of the GSHS (Alkhraiji et al., 2022; Ziaei et al., 2014) and one study examined reliability only (Becker et al., 2010). Alkhraiji et al. (2022) assessed both the validity and reliability of the GSHS for measuring 24-hour movement behaviours among Saudi adolescents. One hundred and twenty students aged 12-15 years from eight Saudi public middle schools participated and completed the GSHS survey twice with two weeks apart, wore GENEActiv accelerometers for seven consecutive days, and kept a diary log. Reliability coefficients for all 24-hour movement behaviours were moderate in strength. In males, the intraclass correlation coefficients (ICC) were .60 for MVPA, .56 for sedentary behaviour, and .47 for sleep duration. The ICCs were stronger among the females, specifically: MVPA = .62, sedentary behaviour = .72, and sleep = .79. Kappa agreements for the reliability of meeting individual 24-hour movement guidelines two weeks apart were: MVPA, k = 0.37 for males and 0.47 for females;

sedentary behaviour, k = 0.30 for males and 0.44 for females; and sleep, k = 0.41 for males and 0.50 for females. Percent agreement for meeting each guideline ranged from 66.1% for sedentary time to a high of 94.9% for MVPA. Test-retest reliability (Kendall's tau_b) of the core movement behaviour questions, also examined two weeks apart, was higher in the Persian version of the GSHS, ranging from .73 to .81 (Ziaei et al., 2014).

Comparing diary logs with GSHS items to investigate concurrent validity, Alkhraiji et al. (2022) found significant rank order correlation coefficients for each movement behaviour ranging from .287 to .632; the strongest correlations were for MVPA. When accelerometry was compared with GSHS items, there was a significant relationship for MVPA among the females only, Spearman's $r = .276$, $p = .036$. Although the coefficients regarding validity were not strong, Alkhraiji et al. concluded that single items for the 24-hour movement behaviours were acceptable and comparable to other measures with more items measuring the same construct. This view is supported by Ziaei et al. (2014), who found that the content validity of the core movement behaviours of the Persian version of the GSHS was 1 (indicating the items were highly relevant).

3.4.2 Structure and Scoring of the Global School-Based Student Health Survey – Physical Activity Module (GSHS-PA)

As mentioned previously, the physical activity module included sedentary behaviour, strength exercises, physical activity, and sleep. Students answered the questions in the GSHS-PA questionnaire in the following order (a) items 1–8 which measured the physical activity patterns in terms of habitual MVPA, physical activity, and sports participation, (b) item 9 measured sleep duration on average school nights, (c) item 10 measured sedentary behaviour; (d) items 11–14 assessed physical activity knowledge, attitudes, and abilities linked to physical activity; and (d)

item 15 examined students' exposure to the media and advertising related to physical activity (see Appendix I).

3.5 Translation and Cross-Cultural Adaptation to Costa Rican Spanish

The term cross-cultural adaptation refers to a process that considers both language (translation) and cultural adaptation issues when developing a questionnaire for use in a different context (Beaton et al., 2007). The terms adaptation and translation have different meanings. Adaptation refers to all cultural aspects of an instrument, while translation only refers to the translation process (Hambleton, 2004). A proper translation requires a balanced treatment of linguistic, cultural, contextual, and scientific information (Tanzer et al., 2005). Translated versions can significantly reduce time and work by utilizing pre-existing questionnaires avoiding inaccurate comparisons of findings across multiple translated versions (Beaton et al., 2000). It is also important that the adaptation of an instrument has a cultural fit, which means that it is prepared for use in different cultural contexts (Beaton et al., 2000; Hambleton, 2004; Sireci et al., 2006).

To be able to use all three English-language questionnaires (PEMS, PE-ARCS, and the GSHS-PA) with Costa Rican students, the PEMS and PE-ARCS questionnaires and items 4, 5, and 15 of the GSHS-PA required a translation and cross-cultural adaptation to Costa Rican Spanish. Spanish language evolution can be attributed to a variety of factors, including natural language drift, the influence of mass communication media, internal population migrations, urbanization, contact with other languages, educational systems, missionary language propagation, community literacy, and official language policies (Lipski, 2012). It is not surprising that, while the Spanish language retains a fundamental cohesiveness around the world, there is significant social and geographical variation (Lipski, 2012).

Table 3 shows the four-stage process that was undertaken drawing on Beaton et al.'s (2007) process for cross-cultural adaptation of outcome measures. An expert committee was formed consisting of four native Spanish speakers who were also fluent in Costa Rican Spanish and in English as a second language. Among them, one member had expertise in the content area, another was a professional in English language instruction, and the remaining two supported the translation process. All four committee members performed the forward and backward translations of the PEMS and PE-ARCS as detailed in Table 3.

Table 3

The Steps used for the English to Spanish Translation and Cross-Cultural Adaptation of the PEMS and PE-ARCS

Stage	Actions
1. Forward translation	PEMS and PE-ARCS were translated from English to Spanish independently by two bilingual (Costa Rican Spanish and English) translators (translators A and B).
2. Synthesis	Spanish versions from Stage 1 were consolidated into one document by translators A and B and consensus achieved on any discrepancies.
3. Back translation	The Spanish version from Stage 2 was translated back into English independently by two additional bilingual translators (translators C and D). Subsequently, these two English language versions were unified by consensus.
4. Expert review	Translators A and D compared the original English language version of PEMS and PE-ARCS with the back translation English language versions from Stage 3. Consolidated versions of each questionnaire were discussed until consensus was achieved regarding the Spanish language versions to be used with Grade 9 students in Costa Rica.

3.5.1 Adaptation of The Pre-Existing Spanish Language Version of the GSHS – Physical Activity Module (GSHS-PA)

For this study and to aid in the translation process, I first compiled all of the core and core-expanded questions of the GSHS-PA that were already available in Spanish (WHO, 2013a, 2013b) which were only adapted to the Costa Rican context. As a result, only items 4, 5, and 15 from the GSHS-PA 2021 English version were translated and adapted to Spanish (WHO, 2021a, 2021b).

The same expert committee that performed the translations of the PEMS and PE-ARCS and who were native Spanish speakers fluent in Costa Rican Spanish and in English as a second language performed the forward and backward translations for items 4, 5 and 15 of the GSHS-PA 2021 English version. Once I had all core and core- expanded questions (WHO, 2013a, 2013b, 2021a, 2021b) in Spanish, adaptations to the Costa Rican context were made as needed (see Appendix J). Maximizing semantic, idiomatic, experiential, and conceptual equivalency between the source and target questionnaires is the goal of the adaptation process (Beaton et al., 2000).

As the lead investigator in this study, I reviewed all items in the original and translated versions of the questionnaires and resolved discrepancies to obtain the final adapted Spanish version of the questionnaires. As stated by Borsa et al. (2012), in order to create a single version of an instrument, the researcher must compare the various translations and evaluate their semantic, idiomatic, conceptual, linguistic, and contextual differences.

Items 3 and 7 were assessed for semantic equivalence were words may have several meanings or grammatical changes are occasionally necessary when constructing sentences (Beaton et al., 2007). For example, in item 1 the word ‘school’ was referred to ‘colegio’ (high school) rather than ‘escuela’ (elementary school), and grammatical adjustments were required in

item 7: During the past 7 days, on how many days did you do stretching exercises, such as toe touching, knee bending, or leg stretching? To further explain what 'knee bending' and 'leg stretching' was, more information was added, and the sentence structure changed, therefore asking: During the past 7 days, on how many days did you do stretching exercises, such as 'knee bending taking heels to the glutes and extended legs, trying to touch the toes'? (see Appendix J).

Conceptual equivalence indicates whether the concept being studied and the experiences of individuals in the target culture are valid; items may have semantically similar meanings but differ conceptually (Guillemin et al., 1993). Items 1, 2, 5, 6, and 12-15 were checked for conceptual equivalence. For example, item 2: During the past 7 days, on how many days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weightlifting? The word 'lagartijas'(lizard), is a common word used among youths to refer to 'push ups' which was used instead of 'flexiones de brazos' (bending of the arms) (see Appendix J).

Items, 8 – 11 did not require any changes, and items 6, and 12 – 14 were checked for conceptual equivalence and discrepancies were solved. At the beginning of each item, 'school year' was replaced by 'curso lectivo' as this commonly refers to the school year whereas 'curso académico', tends to refer to a particular subject or course within the academic school offer.

No modifications were made in terms of experiential and conceptual equivalency for any of the items in the GSHS-PA questionnaire. Idiomatic equivalence is necessary when idioms and colloquialisms are rarely translatable and it is usually necessary to find equivalent expressions or substitute items (Beaton et al., 2007), and experiential equivalency refers to recognizing whether a particular item is appropriate in the new culture and, if not, replacing it with an equivalent item.

Items 1, 3, 6, and, 10 from the GSHS-PA 2013 core questionnaire (WHO, 2013a) and items 2, 7, 8, 9, 11, 12, 13, and 14 from the core-expanded questions (WHO, 2021b), were

grammatically changed and written using the second person singular referring to ‘you’ as ‘usted’ instead of ‘vos’ or ‘tú’. Culturally, the pronoun ‘usted’ is mostly used in the general Costa Rican population. Solano Rojas (2012) stated that (a) even when interacting with one another, elementary students in grades one to six use ‘usted’ to a great extent (> 90%); (b) even in situations of greater camaraderie among friends and classmates, the use of ‘usted’ reaches (88.8%); (c) the majority of the time, adults use ‘usted’, but usage occasionally changes depending on factors including age or perceived authority; and (d) in Costa Rica’s school environment and within the community, the child generally receives the treatment of ‘usted’.

3.6 Procedures

In Costa Rica, high school physical education classes consist of two 40-minute periods (MEP, 2016), giving students a weekly total of 80 minutes of physical education. School principals from all five participating schools directed that I speak with the physical education teachers regarding the best way for students to complete the surveys. Consented students completed the PEMS, PE-ARCS, and GSHS-PA in person during the first 20 minutes of each grade 9 physical education lesson after which they continued with the remainder of their regular physical education time, and data was collected at once. All physical education teachers preferred this method of administering all three surveys in only one physical education class.

In total, the recruitment and data collection took four weeks to complete (see Table 4). The table summarizes the process of recruitment and data collection where the majority of data were collected in week 2 for public schools and week 3 for private schools.

Table 4

Process of Recruitment and Data Collection

Week	Recruitment	Data collection	Follow up	FitBit Prize draw
1	3 public schools			
2		3 public schools		
3	2 private schools	2 private schools	Continued to	
4		From the public	collect surveys	All 5 schools
		and private	from absentees	
		schools	and late 'joiners'	

Following recruitment, I collected data from the three public schools. I had originally planned to recruit only students from three public schools, but after realizing in week three that I was struggling to recruit from these public schools, I decided to recruit students from two additional private schools. As a result, in week three, I recruited and collected data in the two private schools while also continuing to collect surveys from absentees and late 'joiners'.

At the end of week four, all eligible consented students were entered into a prize draw for a Fitbit Inspire 3 smartwatch which took place either in the schools' administrative office or physical education departments. This prize draw was intended as a token of appreciation for students who took the time to participate in the study and complete the questionnaires.

3.7 Data Treatment and Analyses

3.7.1 Data Treatment

Raw scores from the PEMS, PE-ARCS and GSHS-PA were entered into Excel, along with qualitative responses provided from the checklist included in the PE-ARCS. Excel was used to compute descriptive statistics and to graph results. IBM SPSS Statistics Version 29.0 was used to check the data for normality, multicollinearity, to compute the multivariate analyses of variance (MANOVA), and to perform the linear regression analyses.

Subscale scores for the PEMs motivation levels (intrinsic, extrinsic and amotivation) and PE-ARCS basic psychological needs (autonomy, competence and relatedness) were computed. For the PEMS, I summed items 1, 4, and 7 for intrinsic motivation, items 2, 5, and 8 for extrinsic motivation, and items 3, 6, 9 for amotivation. The range of possible scores for each subscale was 3 – 21. For the PE-ARCS, I summed items 3, 6, 9, and 12, for the autonomy subscale, items 2, 5, 8, and 11 for the competence subscale, and items 1, 4, 7, 10 for relatedness subscale. The range of possible scores for each PE-ARCS subscale was 4 – 28.

Descriptive statistics for GSHS-PA variables were computed based on different types of data in the questionnaire. Items 4, 5, 11, 12, 13, 14, and 15 were treated as categorical data, items 8, 9, and 10 as ordinal data, and items 1, 2, 3, and 7 as ratio data. An additional analysis was performed in items 1, 2, 9, and 10 as these questions were focused specifically on measuring physical activity as per 24-hour movement guidelines in terms of MVPA, strength, sleep, and sedentary time. Youths ages five to seventeen should engage in at least an average of 60 minutes of daily MVPA and in strength activities three times per week (WHO, 2020). In addition, they should obtain eight to ten hours per night of uninterrupted sleep (CSEP, 2021), and limit sedentary time to $\leq$ 2 hours per day (WHO, 2021a).

Items 1, 2, 9 and 10 were converted to dichotomous scores, with 0 = not meeting the guideline, and 1 = meeting the guideline. The cut-off for each behaviour was (a) engaging in at least 60 minutes of MVPA 7 days per week, (b) doing muscle and bone strengthening activities at least three days per week (WHO, 2020), (c) getting ≥ 8 hours of sleep every night (CSEP, 2021), and (d) limiting sedentary time to ≤ 2 hours per day (WHO, 2021a). The purpose of this extra analysis was to compare Costa Rican students' levels of MVPA and strength to the WWHO's Physical Activity Guidelines (WHO, 2020), sleep behaviour to Canada's 24-Hour Movement Guidelines for the children and youth (5-17 years) (2021) and sedentary time to question 5 from the Global School-based Health Survey Core Questionnaire Physical Activity Module (WHO, 2021a) , and see whether students were meeting the aforementioned guidelines.

3.7.2 Data Analyses

For the PEMS and PE-ARCS, mean and standard deviation were computed on all three subscales for each tool for all students and by gender. A MANOVA with gender as a factor was used to address whether students' motivation levels (intrinsic, extrinsic, and amotivation) differed between males and females (Question 1). Similarly, a MANOVA was used to determine whether students' levels of basic psychological needs of autonomy, relatedness, and competence for physical education differed by gender (Question 2). To examine Question 3, multiple regression using forced entry (Field, 2018) was used to assess whether basic psychological needs predicted intrinsic motivation toward physical education.

Data from the GSHS-PA were used to address Question 4 'What is the amount of daily physical activity patterns of grade nine Costa Rican students?'. Frequency counts were computed for all students and by gender on items 4, 5, and 8 – 15 and means and standard deviation were computed for all students and by gender for items 1, 2, 3, and 7 to inquire about the proportion of

students meeting the guidelines (see Table 7). Multiple regression using forced entry was used to examine whether intrinsic and extrinsic motivation and the three measures of basic psychological needs predicted the number of days per week that students met the national physical activity guideline of 60 minutes of MVPA (Question 5).

To explore which activities students would like to include to make physical education more appealing, responses from the PE-ARCS' checklist (see Appendix H) were analyzed. Frequency counts were computed for all students' responses. Chi-squared tests of independence were used to examine whether there was a gender-based difference on students' selection of specific activity categories from the checklist.

3.8 Qualitative Data Treatment and Analysis for Question Six

For the purpose of this study, I used part of Sallis et al.'s (2006) ecological model, which outlines the four domains of active living, each influenced by various levels unique to its domain. With the assistance of another investigator, we first agreed consensus on the five levels of Sallis et al.'s (2006) ecological model that best suited and defined the terms for this project (e.g., intrapersonal, perceived environment, etc.) (see Table 1).

During the qualitative data analysis process, researchers must classify information using inductive reasoning (Pitney et al., 2020). For this process, I used Pitney et al.'s (2020) eight step approach which follows the acronym CREATIVE: (1) Consider the research questions and purpose statement, (2) Read through the transcripts, (3) Examine the data for important information, (4) Assign levels, (5) Thematize the data, (6) Interpret the themes, (7) Verify the findings, and (8) Engage in the writing process.

In the first step, I went over my research questions to make sure I understood the purpose of the questions to remind myself of the type of relevant information I was looking for during the

process of the analysis. For the second step, students' responses to the PEMS' open-ended question (see Appendix G) were first translated from Spanish to English and transcribed into a Word document. I then read through the data several times to ensure that I understood the information. This step requires becoming fully immersed in the data (Burnard, 1991; Polit & Beck, 2004). Immersion, which can be defined as reading interview transcripts several times over, can help provide context and clarity to the data's key findings (Pitney et al., 2020). After reading and re-reading the students' responses to immerse myself in the data; responses were tagged in relation to the template of codes that I created based on Sallis et al.'s (2006) domains of active living (see Table 1) to get an overview of how the students' responses related to the ecological model.

In the third step, after getting a better sense of the data, I highlighted single words, short sentences or paragraphs and any other specific information that stood out and was related to my research questions. For each piece of highlighted information I had, I then assigned codes to create labels that helped capture the meanings in step four. Codes are defined as illustrative labels that can reflect the meaning of a text and are seen as the foundation of the analysis process (Pitney et al., 2020). During this step, a second investigator and I independently applied open coding to the transcripts, adding several codes to the text. Afterward, we returned to discuss any differences in our coding and interpretations until we reached a consensus. Open coding allows identify unique concepts and themes for categorization (Williams & Moser, 2019), providing a multi-dimensional preliminary framework for further study (Khandkar, 2009).

In the fifth step, I thematized the data by grouping similar codes to create different themes. To aid in the process of coding, I used Taguette software (Rampin & Rampin, 2021), a free software program designed for analyzing qualitative data such as interview transcripts,

survey responses, and open-ended survey questions. This program also allows users to encode different sections of text data creating different ‘tags’, making it easier to identify patterns or themes.

In step six, I analyzed the primary findings of the data and after interpreting the meanings I created themes that captured the meaning of what was being investigated. In this step, I created subthemes that would be combined to make two main themes. The theme’s title should be relevant to the objective of the study and to the readers (Pitney et al., 2020). Furthermore, I stopped collecting data when a theme was constantly identified among most of the participants, there was redundancy in the findings or new information was no longer found which is also known as saturation of data (Pitney et al., 2020).

In step seven, I verified the findings with the help of the second investigator. We double-checked the findings to ensure the data was accurately represented and that themes truly reflected what was in the data. Finally, in step eight I shared the findings which represented the culmination of the analysis process. Here, I explained how the data was coded and shared the major themes that emerged. Moreover, as another important way of guaranteeing rigour in qualitative research, I shared some quotes of the students’ exact words as examples of the data that supported these themes. By sharing the findings from the qualitative analysis of the data, it helps others understand the meaning behind my project and how it was done.

After coding and extracting key themes with Taguette (Rampin & Rampin, 2021), I exported the entire data of students’ responses on the two-part open-ended question and generated a word cloud using Wordclouds (https://www.wordclouds.com). The word cloud highlights the words students most frequently used to describe the physical education setting and their perceptions of the class environment. To create a visual representation, I used the silhouette

of a person and a ball (see Figure 7). Word clouds provide a meaningful analysis of qualitative data (DePaolo & Wilkinson, 2014).

Chapter 4: Results

The primary aim of this study was to examine grade 9 Costa Rican students' motivation toward physical education using the PEMS, and how their feelings of competence, autonomy, and relatedness (using PE-ARCS) influenced students' intrinsic motivation toward physical education (one subscale of the PEMS). The secondary aim was to gain an understanding of students' physical activity behaviours using the GSHS-PA, and to explore students' personal experiences in physical education. Finally, I examined whether motivation and students' basic psychological needs predicted participation in physical activity outside of school.

Examination of the PEMS and PE-ARCS subscales as well as the GSHS-PA item for physical activity for skewness and kurtosis revealed that their distributions can be considered normal. Skewness statistics ranged from -.134 to .840 and kurtosis statistics ranged from -.145 to -.930. Multicollinearity was calculated for the regression models as more than one predictor variable was entered. Multicollinearity was not a cause for concern as none of the six predictor variables correlated very highly with each other, the variance inflation factors were 2.0 or less, and tolerance statistics were .497 or higher (Field, 2018).

4.1 Motivation Levels

My first research question focused on describing students' motivation levels for physical education (intrinsic, extrinsic, and amotivation) and whether motivation differed by gender. Table 5 shows the means and standard deviations of the motivation subscales for the overall sample and by gender. Intrinsic and extrinsic levels of motivation were relatively strong, and levels of amotivation were low. A MANOVA showed a significant overall effect for gender (Wilks' lambda = .831 with F (3, 114) = 7.74, $p < 0.001$, partial eta squared (η_p^2) = .169). The univariate F tests revealed that boys were significantly more intrinsically and less extrinsically motivated

than girls, and the effect size was large for both variables (see Table 5). There was no gender-based difference in amotivation.

Table 5

Descriptive Statistics and MANOVA Results for Intrinsic, Extrinsic, and Amotivation Scores on the PEMS by Gender

Subscale and (range)	All (n = 118)		Boys (n = 51)		Girls (n = 67)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*p*	η^2_ρ
Intrinsic Motivation (3 – 21)	15.94	4.51	17.02	3.84	15.12	4.82	.023	0.44
Extrinsic Motivation (3 – 21)	16.01	3.76	15.02	4.03	16.76	3.38	.012	0.53
Amotivation[a] (3 – 21)	6.54	3.83	6.57	4.14	6.52	3.61	.949	<0.01

Note. Multivariate partial eta squared (η^2_ρ) interpreted as small = .01, medium = .06, and large .14 (MRC Cognition and Brain Sciences Unit, 2009). [a]Lower amotivation scores represent a more positive state.

4.2 Basic Psychological Needs

My second research question focused on describing students' levels of autonomy, relatedness, and competence in physical education, and whether these needs differed by gender. Table 6 shows the descriptive statistics for the basic psychological needs subscales for the overall sample and by gender. The results of the MANOVA shown in Table 6 revealed there was no overall gender-based difference (Wilks' lambda = .968 with F (3, 114) = 1.25, p = .294, η^2_ρ = .032), none of the univariate F tests were significant and the effect sizes were small.

Table 6

Descriptive Statistics and MANOVA Results for Autonomy, Relatedness and Competence Need Satisfaction by Gender

Subscale and (range)	All (n = 118)		Boys (n = 51)		Girls (n = 67)			
	M	*SD*	*M*	*SD*	*M*	*SD*	*p*	η_p^2
Autonomy (4 – 28)	17.86	5.90	17.73	5.95	17.96	5.89	.835	<0.01
Competence (4 – 28)	21.26	5.31	22.16	5.74	20.58	4.88	.111	0.02
Relatedness (4 – 28)	19.95	4.92	20.41	5.19	19.60	4.71	.375	0.01

Note. Multivariate partial eta squared (η_p^2) interpreted as small = .01, medium = .06, and large .14 (MRC Cognition and Brain Sciences Unit, 2009).

4.3 Predicting Intrinsic Motivation Toward Physical Education

Multiple linear regression was used to test whether basic psychological needs predicted intrinsic motivation toward physical education (Question 3). Despite the differences in intrinsic motivation between the boys and girls, this analysis was conducted for all students due to the sample size. The overall regression was statistically significant (R^2 = .35, F(3, 114) = 20.55, p < .001). Only students' perceptions of their competence in physical education predicted intrinsic motivation toward physical education (β = .476, p < .001); levels of autonomy and relatedness were not significant predictors (β = .102, p = .240 and β = .099, p = .284, respectively).

4.4 Physical Activity Behaviours

My fourth research question focused on describing the physical activity patterns of Grade 9 Costa Rican students. The average number of days of at least 60 minutes of physical activity for all students was M = 3.28 (SD = 2.13). For boys M = 3.94 (SD = 2.20) and for girls M = 2.77

(*SD* = 1.94). Table 7 shows the proportion of students meeting the minimum requirements for MVPA, strength, sleep, and sedentary time. The total number of students in Table 7 add up to more than 118 as students can meet more than one guideline. Only 13 students met the requirement of engaging in at least 60 minutes of daily MVPA. A larger number of students engaged in the recommended muscle-strengthening activities per week, met with the advised 8-10 hours of sleep each night, and met the sedentary time guidelines. Chi-squared analyses of the proportion of boys and girls meeting each health guideline revealed no gender-based differences: MVPA, $\chi 2 = 2.00$, $df = 1$, $p = .158$; Strength, $\chi 2 = 2.59$, $df = 1$, $p = .108$; Sedentary behaviour, $\chi 2 = 0.39$, $df = 1$, $p = .531$; and Sleep, $\chi 2 = 1.96$, $df = 1$, $p = .162$.

Table 7

The Proportion of Students Meeting Individual Guideline Behaviours

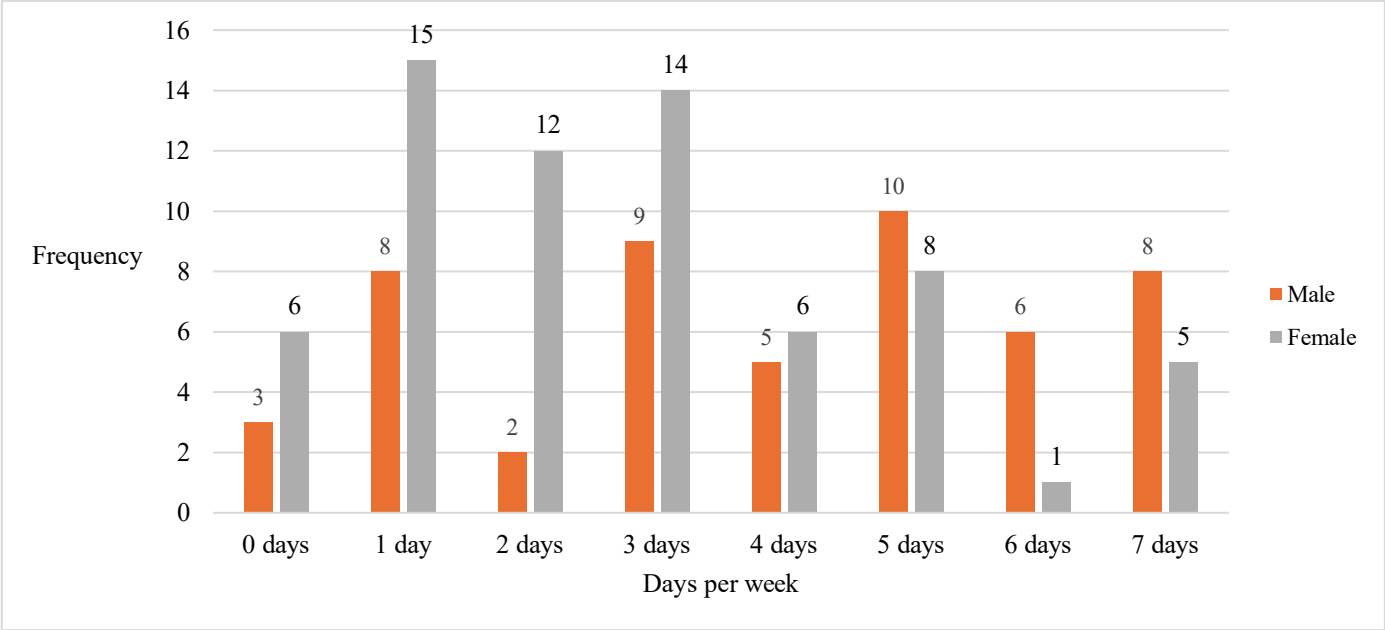
Behaviour	All students	Boys (*n* = 51)	Girls (*n* = 67)
MVPA [a]	11.0% (n = 13)	15.6%	7.4%
Strength [a]	40.7% (n = 48)	49.0%	34.3%
Sleep [b]	39.8% (n = 47)	47.1%	34.3%
Sedentary time [c]	32.2% (n = 38)	35.3%	29.8%

Note. [a]Reflects students' behaviours that were met in comparison to the WHO's (2020) guidelines (60 minutes of daily MVPA, seven days per week; engaging in strength activities three times per week). [b]Reflects students' behaviours that were met in comparison to Canada's 24-Hour Movement Guidelines for the children and youth (5-17 years) (2021) (getting ≥ 8 hours of sleep every night). [c]Reflects students' levels of sedentary time that were met compared to question 5 from the Global School-based Health Survey Core Questionnaire Physical Activity Module (WHO, 2021a) (≤ 2 hours per day).

Figure 4 shows how often per week students met the guideline of 60 minutes of daily MVPA. Thirty percent (20/67) of girls and 57% of boys (29/51) met the MVPA guideline on four or more days per week. This was used as a cut-off to draw attention to the decline in the number of days students met the MVPA guidelines across all seven days of the week.

Figure 4

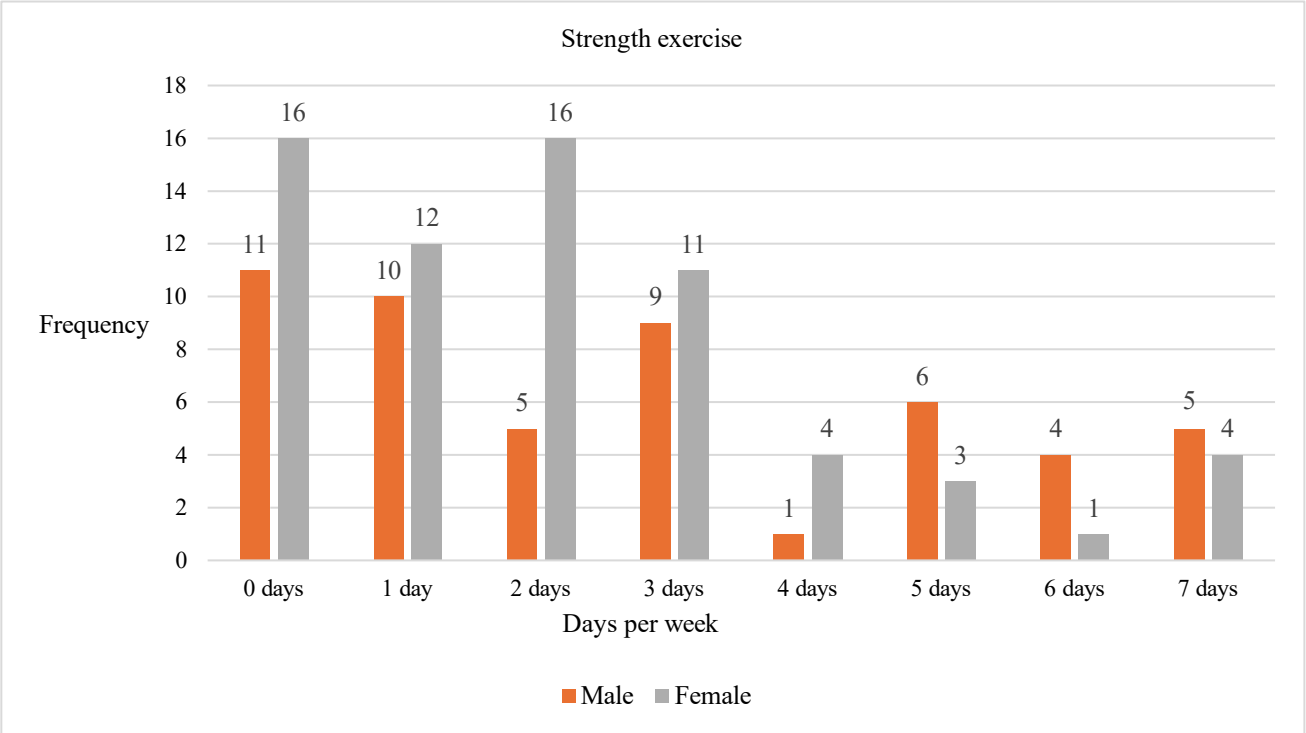
The Number of Days per Week Students Met the WHO's (2020) Physical Activity Guideline



The strength exercise guideline was met by 48 students, or 40.7% of the sample. Figure 5 shows the frequency of strength activities per week for all students and by gender as well as the number of days the guidelines were met. The findings on participation in schools' sports teams and sedentary time in terms of screen time for all students and by gender are in Appendix K.

Figure 5

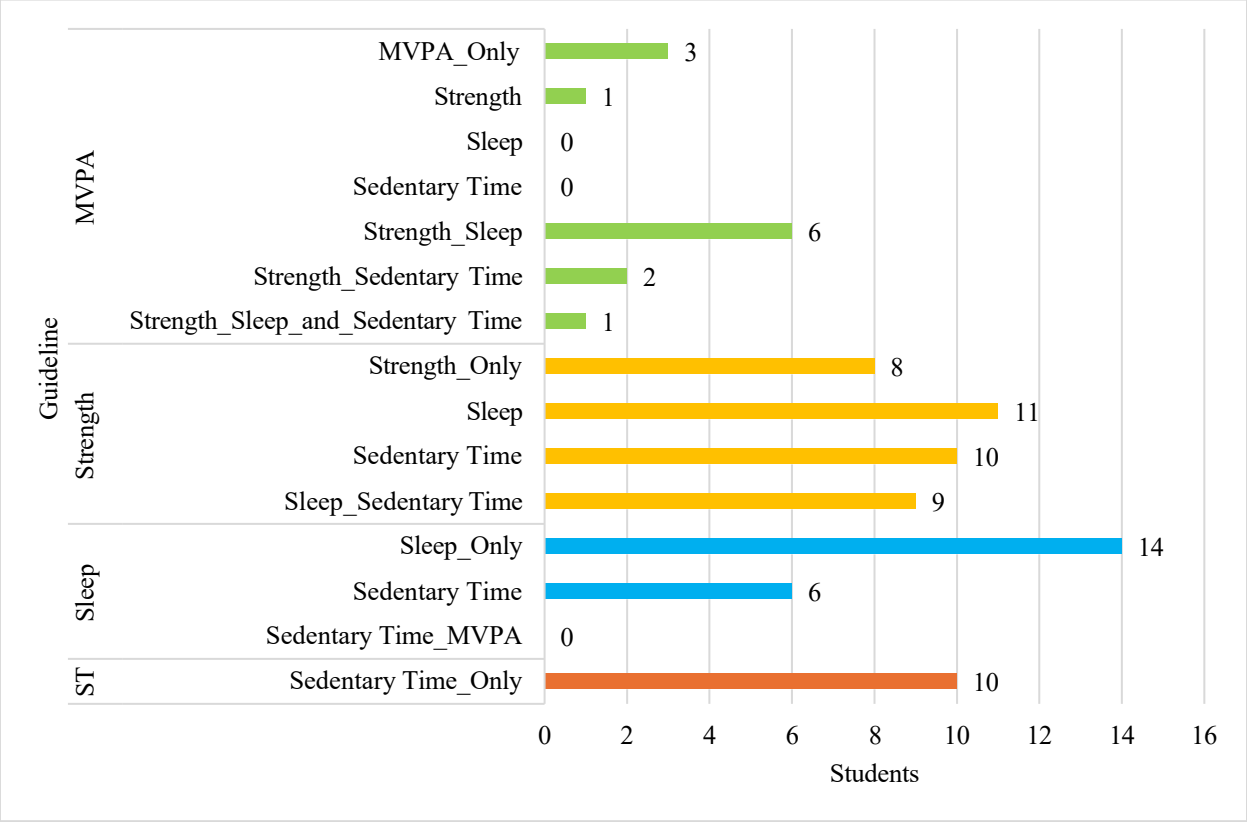
The Number of Days per Week Students (n = 118) Met the WHO's (2020) Strength Guideline



Overall, 35 students met one guideline, 28 students met two guidelines, 17 students met three guidelines, 1 student met all four guidelines, and 37 students did not meet the minimum requirements for any of the WHO's (2020) guidelines on physical activity, strength, sleep, and sedentary time. The specific combinations of guidelines being met by students are displayed in Figure 6. The graph is interpreted as combining the variable on the far left with the variables adjacent. For example, the number of students meeting the guidelines for Sleep, Sedentary Time and MVPA was 0.

Figure 6

Frequency Count of Students (n = 118) Meeting the WHO's (2020) Multiple Guidelines



My fifth research question focused on whether basic psychological needs (i.e., autonomy, relatedness, and competence) and motivation (i.e., intrinsic, extrinsic, and amotivation) predicted how many days students met the physical activity guidelines. Known predictors of physical activity, namely intrinsic motivation and competence were entered into the regression first to see if they predicted the outcome. Extrinsic motivation, amotivation, relatedness, and autonomy were added in the second step. The linear model of predictors is displayed in Table 8. Both models were significant. In model 1, competence was a significant positive predictor of days of MVPA. In model 2 competence was a significant and positive predictor of days of MVPA per week; while extrinsic motivation was a significant and negative predictor.

Table 8

Linear Model of Predictors of Meeting Physical Activity Guidelines, With Confidence Intervals Reported in Parentheses. Confidence Intervals and Standard Errors Based on 1000 Bootstrap Samples

		b	*SE B*	*β*	*p*
Model 1					
	Constant	-.48 (-2.00, 1.19)	.80		.54
	Competence	.11 (.03, .19)	.04	.27	.01
	Intrinsic motivation	.09 (-.04, .21)	.05	.19	.07
Model 2	Constant	-.48 (-1.23, 4.37)	.80		.54
	Competence	.14 (.04, .23)	.05	.34	.01
	Intrinsic motivation	.09 (-.05, .24)	.06	.19	.10
	Extrinsic motivation	-.12 (-.23, -.02E-1)	.06	-.21	.04
	Amotivation	-.08 (-.19, .06)	.06	-.14	.17
	Autonomy	.01E-1 (-.07, .07)	.04	.02E-1	.98
	Relatedness	-.02 (-.13, .07)	.05	-.05	.62

Note. $R^2 = .17$, $p < .001$ for Step 1; $\Delta R^2 = .21$, $p < .001$ for Step 2 (the change from Step 1 to 2 was not significant $p = .20$).

4.5 Qualitative Findings

My sixth research question involved students' qualitative responses to their experiences in physical education, the changes they would make to physical education to make the classes more appealing and how students' responses related to Sallis et al.'s (2006) ecological model within the four domains of active living.

In relation to the template of codes in which five levels were developed within Sallis et al.'s (2006) ecological model: (1) Intrapersonal, (2) Perceived Environment, (3) Behaviour, (4) Behaviour Settings within the school environment, and (5) Policy Environment; students' comments primarily related to Level 4, the characteristics of the activity environment. Predominantly they spoke of the physical education program and the facilities where the classes take place. These comments pertaining to the environment also influenced what they were saying in relation to Level 2, their perceptions of the environment affecting their experiences in physical education. For example, students' comments from Level 2 reflected their feelings regarding the lack of attractiveness of the physical education classes.

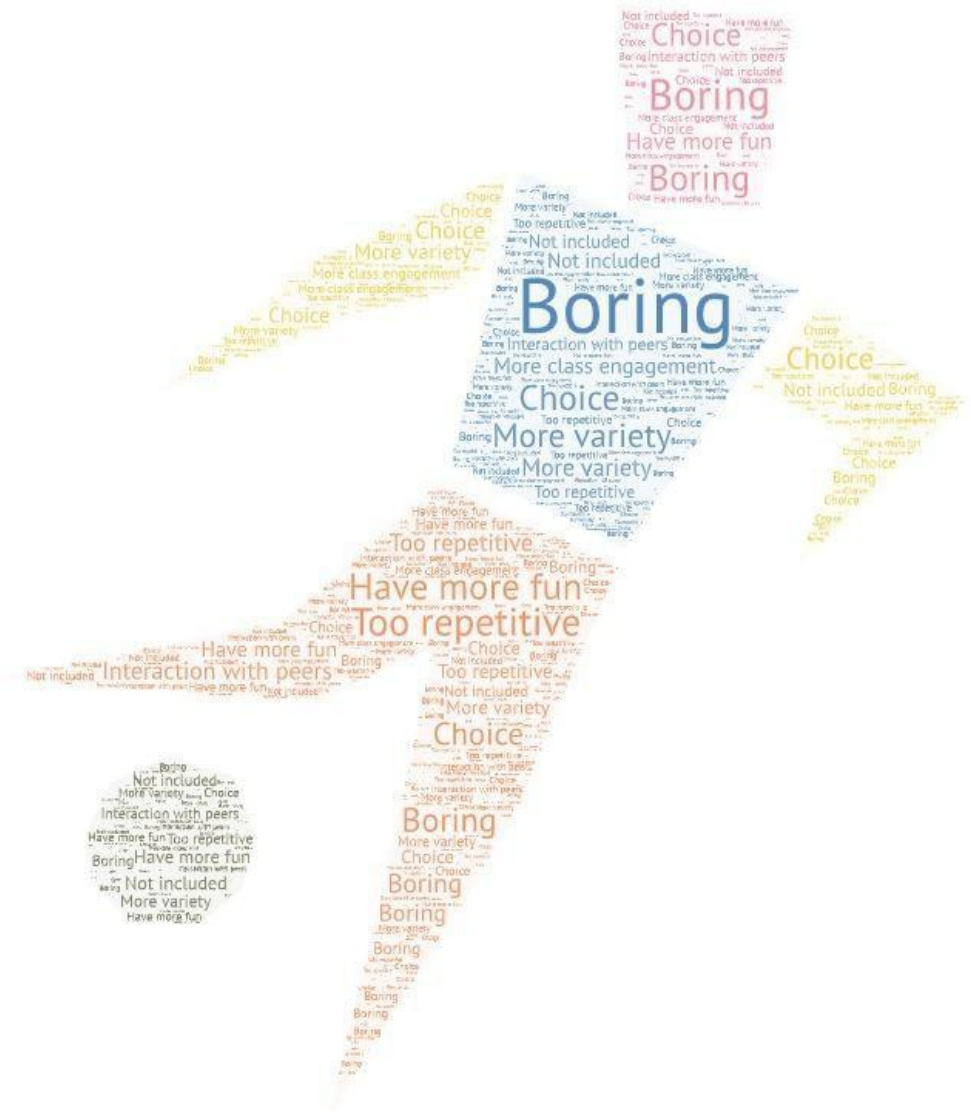
Some of the students' responses related to the policy environment (e.g., Level 5 in the template of codes). Students expressed their feelings regarding the physical education evaluation policies and how these impacted their engagement and motivation to participate in class. For example, although not frequently mentioned, a few students expressed their discontent with certain aspects including losing marks for not wearing their physical education uniform, the timing of physical education classes during the day, and the limited time allotted to the subject each week. While some students were eager to take part, there were recurring concerns about the strict uniform requirements and physical education class timetable.

When coding openly, it was evident that some codes cut across Level 2 (how students perceived the environment) and Level 4 (characteristics of the environment). In particular, the codes of 'not fun', 'boring', 'not enthusiastic', 'have more fun', 'interaction with peers', 'physical education content', 'program variety', and 'student choice and voice'. As can be seen in the word cloud (see Figure 7), students frequently commented on the physical education setting and how they felt about the environment. In general, students heavily commented on their

discontent with the content of the physical education program and the facilities where physical education takes place and how this influenced their personal feelings about the physical education class.

Figure 7

Visual Representation of Students' Comments Pertaining to the Perceived Environment (Level 2) and Behaviour Settings (Level 4) of the Template of Codes



Note. The template of codes was created based on Sallis et al.'s (2006) ecological model.

After analyzing students' responses to the open-ended question in the PEMS (see Appendix G), two major themes emerged. I defined the first theme as Students' Experiences in Physical Education Could Be Better' which included sub-themes like "*This Class is Very Boring!"*, and *'Physical Education for All'*. The second theme was defined as *'The Physical Environment Undermines Experiences in Physical Education'* and included sub-themes like *'Inadequate and Insufficient Facilitie*s' and *'Compromising Physical and Social Well-Being'*.

4.5.1 Students' Experiences in Physical Education Could Be Better

Overall, the majority of the students emphasized the need for activity variety in their physical education classes. In addition, many students indicated a desire to connect more with their peers during physical education. Other students stated the preference to choose the type of activity they participate in, and others considered the option of choosing whether or not they take physical education classes.

4.5.1.1 "This Class is Very Boring!"

Some students indicated that they found physical education "fun" (student 1-9-9-004), other students clearly stated, "I wouldn't make any changes" (students 3-9-2-003 and 1-9-4-003), "I like the activities" (student 3-9-1-009) and "I like it just the way it is" (student 3-9-2-003). However, a very strong sense amongst the majority of the students was that the current content of physical education was "boring" (students 1-9-3-001, 1-9-3-002, 1-9-3-003, 1-9-3-004, 1-9-4-007, 1-9-5-004, 1-9-7-003, 2-9-1-006, 2-9-3-001, 3-9-1-010, 3-9-2-004, 4-9-1-006, and 5-9-1-001), "mediocre" (student 1-9-9-003) and "not fun" (student 1-9-1-003), with some activities and/or exercises being the "same" (students 4-9-1-006, 1-9-5-004, 1-9-7-003, 1-9-8-012, and 1-9-8-016) making the class too monotonous and therefore unappealing. Many of the students sought "more fun" (students 1-9-4-001, 1-9-4-009, 1-9-6-006, 1-9-8-008, 1-9-8-018, 1-9-9-002,

2-9-1-006, 2-9-3-001, 2-9-4-001, 3-9-1-008, 3-9-2-001, 3-9-5-001, 4-9-1-002, and 5-9-1-004), as the lack of activity variety during the class led to disinterest and reduced motivation to participate. Another strong feeling amongst many students was the need for fostering meaningful connections among classmates through greater class participation from their classmates. For example, student 1-9-7-003 expressed “Sometimes the class is very boring and almost no one wants to participate because we always do the same thing”. Lastly, some students indicated that they would like to engage in activities of their preference as being forced into certain types of activities or exercises reduced their interest and that having more control over the type of activities they participate in could make physical education more appealing. Student 2-9-2-001 indicated “I wish we can choose what to do, to make class more entertaining”. In terms of interacting with their peers, student 5-9-1-005 expressed “I would like to have more teambuilding activities to spend more time with my classmates”. Similarly, student 5-9-2-007 said that “Both sections should receive physical education together, because I think it is good that peers from both sections interact with each other”. According to the students, incorporating variety, choice and having more peer interactions can help enhance participation and enjoyment during physical education.

4.5.1.2 Physical Education for All

A few girls showed concerns about sharing the same space with boys during physical education and how this affected their experience. For instance, student 5-9-1-001 indicated “The boys always want to play soccer and for example, if I am playing on the field and they tell me to leave and I refuse, they hit me with a ball”. This situation highlights a broader issue of power dynamics and exclusion in co-ed physical education classes, where girls feel marginalized and uncomfortable. Another girl openly suggested having separate classes for boys and girls to

address discomfort during physical education, as student 1-9-6-005 expressed “I would like that girls receive a different class from boys, so that in questionable moments we do not find it hard to do the exercises”, reflecting a desire for more personalized and comfortable learning environment where girls may feel less self-conscious or pressured while being around others.

A few students felt excluded during the classes as they found some of the exercises to be “difficult” (student 5-9-1-004) due to certain physical limitations or because “not everyone is in good physical condition” (student 1-9-8-017). Students suggested that their abilities should be considered when performing certain types of exercises or activities in class. For example, student 1-9-8-0113 indicated “I would like to do easier exercises because due to medical reasons I cannot do heavy exercises”. Student 1-9-8-016 felt that “Teachers should make exercises more accessible to everyone because not everyone has the same physical condition to do them” and that they should “Support students that cannot do physical activity and not force them to” (student 1-9-6-001). These comments reflect students’ necessity of adapting exercises to accommodate different physical abilities, ensuring that all students can fully participate in class activities.

Another concern mentioned by a student was how teachers’ commitments to the school’s sports teams affected the availability and consistency of physical education classes. Student 2-9-1-006 mentioned ‘I wish teachers would not neglect us so much for going out with the school’s sport teams to play outside”. Although this was only explicitly mentioned by one student, this was evident during the recruitment stage as I had difficulties scheduling school visits. Physical education teachers were not available due to their commitments with extramural sports, which directly affected students’ physical education time.

4.5.2 The Physical Environment Undermines Experiences in Physical Education

The second major theme, 'The Physical Environment Undermines Experiences in Physical Education,' was comprised of two interrelated sub-themes (1) 'Inadequate and Insufficient Facilities' and (2) Compromising Physical and Social Well-Being'. Students' responses focused on their disregard of engaging in physical activities during physical education due to feeling too hot and sweaty and having to share space with other students other than their peers.

4.5.2.1 Inadequate and Insufficient Facilities

The district of Guápiles has a very wet tropical rainforest climate (Kottek et al., 2006), with temperatures typically ranging from 22°C to 31°C, rarely dropping below 20°C or rising over 33°C with the wettest period of the year lasting nine months (from late March to late December). During this time, many people find the heat and humidity uncomfortable, even oppressive or unbearable (Weather Spark, n.d.). The high temperatures and intense rains suggest that weather conditions may not always be optimal for students to engage in outdoor physical activity, and with most schools comprising of only one gymnasium, students are often required to share facilities with other students other than their classmates which can influence students' participation in class. Many students mentioned the desire to have physical education "only with my section" (students 1-9-4-007, 1-9-6-003, 1-9-6-007, 1-9-10-003, 1-9-10-004). Student 1-9-6-007 explained "I would like that only my section would be in the gym for physical education as I would feel more comfortable engaging in physical activity only with my classmates" and student 2-9-6-004 suggested that they "have a larger and more pleasant space for all students so that all students can run comfortably". Student 1-9-1-003 added "I'd like to have more space and work in separate groups because students from different levels are mixed up and it's not fun".

Moreover, student 1-9-8-008 pointed out that “Physical education would be more fun if we had locker rooms, cold water dispensers and air conditioning to make it more interactive and comfortable”.

4.5.2.2 Compromising Physical and Social Well-Being

This sub-theme reflected students’ concerns about their physical discomfort during physical education, highlighting how the multipurpose use of facilities, the inadequate ventilation and changing rooms to support physical activity and hygiene contributed to their negative experiences.

One common feeling amongst the students was their preference for physical education at the end of the day. Student 1-9-4-006 stated, “I would like to change the schedules and leave physical education for the last period because I sweat a lot, and I don’t want to be sticky all day”. Most of the students’ comments highlighted they felt physically uncomfortable during physical education and sometimes preferred not to engage in physical activity. For example, student 1-9-1-001 stated, “I would prefer not doing so many activities because we sweat a lot”. Students 1-9-4-002 and 1-9-8-003 said “It’s too hot” and therefore “most of the students don’t want to do anything” (student 1-9-8-003). In addition, student 1-9-8-015 commented, “I’d like the door to the changing room to be fixed so we can change into our uniform and have more privacy”. Overall, these comments reveal students’ disengagement in physical education due to feelings of physical discomfort and lack of privacy.

4.5.3 Linking Qualitative Findings to Sallis et al.’s (2006) Ecological Model of Active Living

As depicted in Figure 8, the sub-themes were compared to students’ comments associated with levels of Sallis et al.’s (2006) ecological model of active living. As noted by Sallis and colleagues, the phenomenon of factors cutting across and interacting with several levels of their

model were evident in these data. Most of the students' responses related to both Level 4: the setting itself, as well as Level 2: students' perceptions of the environment.

Figure 8

Matrix of Linkages between Levels of the Ecological Model and Themes Developed through Inductive Analysis

		Levels of the coding template		
Theme	**Subtheme**	**2. Perceived Environment**	**4. Setting**	**5. Policy**
Students' experiences in physical education could be better	This class is very boring!	Students lacked enthusiasm for physical education, said the content was monotonous and unappealing; and they wanted to have more fun.	Curriculum perceived as limited in scope, repetitive, and not affording choice.	Physical education should be optional.
	Physical education for all	Girls felt self-conscious or pressured in classes with boys. Students with physical limitations felt excluded.	Students' current capabilities were not taken into consideration by teachers.	Classes are co-educational.
The physical environment undermines experiences in physical education	Inadequate and insufficient facilities	Students expressed that the hot and crowded conditions were unpleasant and contributed to "most of the students don't want to do anything" (Student 4-002).	Gymnasiums were often hot, with no air conditioning, poor ventilation, and no water dispensers. Indoor space was very crowded, especially when it rained, as several classes were forced to share the space.	Students wanted more equipment and better infrastructure such e.g., more indoor spaces and improved ventilation.

The physical environment undermines experiences in physical education (cont.)	Compromising physical and social well-being	Feeling physically uncomfortable after physical education e.g., "I don't want to be sticky all day, [so] I would leave physical education for last period" (Student 4-006); this was exacerbated by inadequate changing rooms with little privately. Students also felt socially vulnerable when multiple classes were in the same space. As student 10-004 said, "Let there just be one section at a time in the gym [so we] have more space to work comfortably".	Students would prefer having physical education at the end of the day. For state of changing facilities compromised privacy.

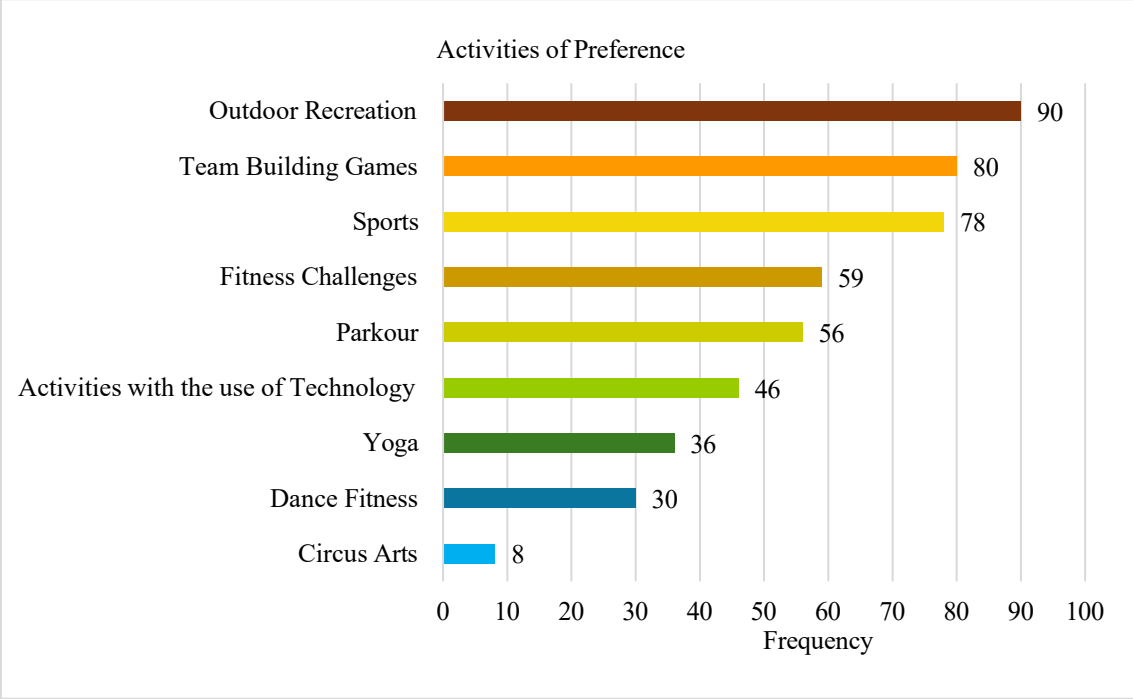
Note. Levels 1 (Personal attributes) and 3 (Behaviour) were not included in the table as they were rarely commented on by students.

4.5.4 Suggested Changes to Improve Physical Education Classes

Figure 9 shows a ranked list of activities students would like to include in their physical education classes ranked from the most to the least frequent activity. When students were asked to include which activities of their choice would make physical education more appealing, 90 students expressed their interest in including activities related to outdoor recreation, 80 preferred including cooperative games that foster teamwork, communication, and problem-solving skills (team building games), and 78 students reported interest in sports. Of these 78 students, a few of them highlighted sports that appear to be underrepresented in the Grade 9 curriculum (see Appendix B), such as swimming, volleyball, track and field, basketball and martial arts.

Figure 9

Frequency Count of Students' (n = 118) Activities of Preference to Include in Physical Education



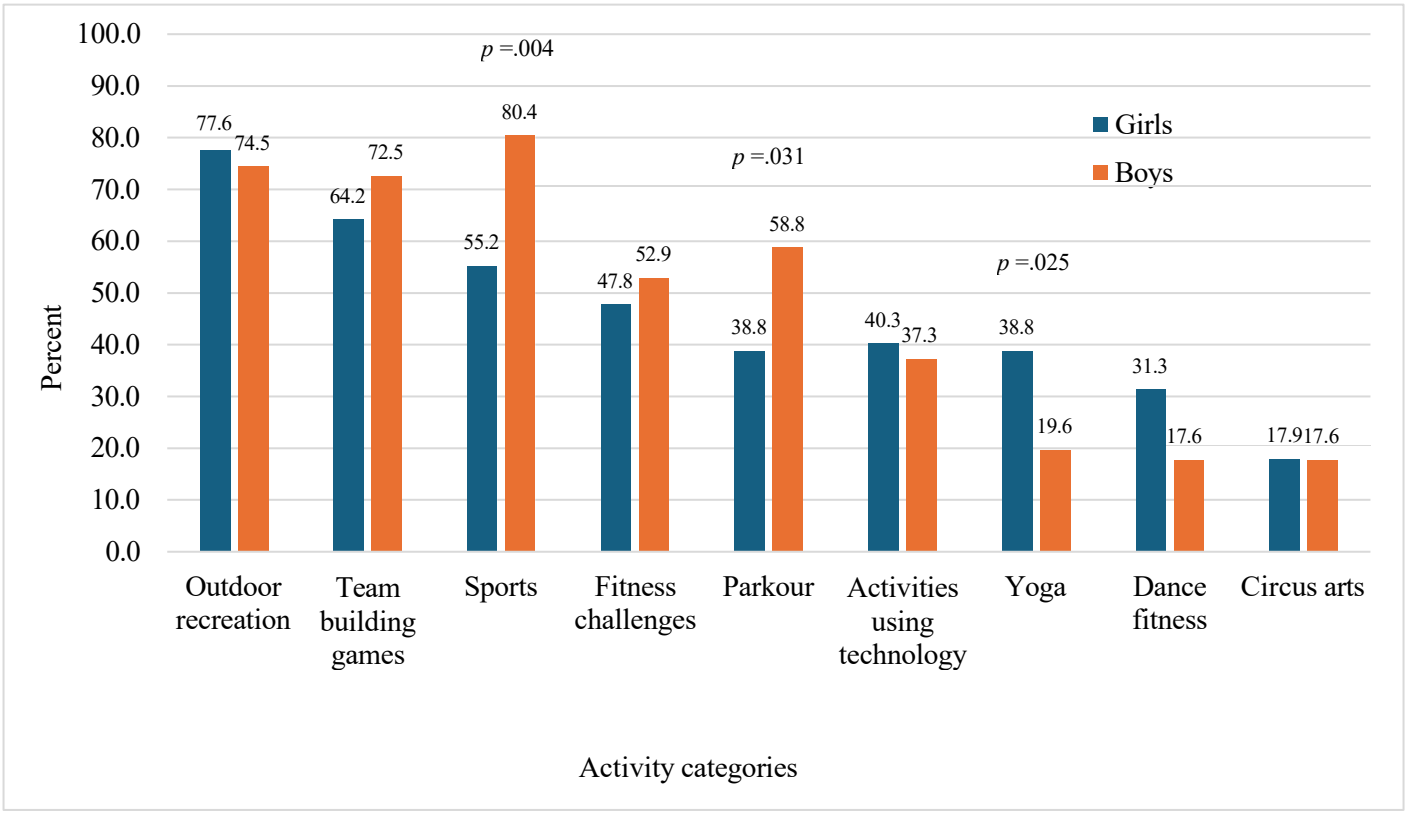
Note. Students were able to check all the boxes that applied to their preference (see Appendix H).

4.5.5 Gender-Based Suggested Preferred Activities in Physical Education

In addition to the qualitative analysis, this was done to ask about students' preferences in a quantitative way. Students' preference for including particular types of activities in the Grade 9 physical education curriculum are shown in Figure 10. Three quarters of students wanted to add outdoor recreation activities to the curriculum. The figure also shows there were three gender-based differences. Chi-squared analyses revealed that boys selected Sports and Parkour at significantly higher rates than girls, whereas girls were significantly more interested than boys in adding yoga to the curriculum. Overall, the finding suggests that girls tend to favor non-competitive, exploratory and fitness-enhancing activities, while boys lean toward more competitive and physically intensive activities.

Figure 10

The Proportion of Girls (n = 67) and Boys (n = 51) and Gender-based Chi-squared Results for Choosing Specific Activity Categories from the Checklist



Note. Students were able to check all the boxes that applied to their preference (see Appendix H).

Chapter 5: Discussion

The aim of this study was to examine Costa Rican students' levels of motivation toward physical education and explore how their feelings of autonomy, competence, and relatedness influenced their intrinsic motivation toward physical education. Additionally, I assessed students' 24-hour movement behaviours, explored their personal experiences in physical education, and examined whether motivation and basic psychological needs predicted participation in physical activity outside of school. Overall results from this study provide insights into Costa Rican students' motivation toward physical education and how their basic psychological needs play a key role in fostering intrinsic motivation.

5.1 How Students Feel About Physical Education

5.1.1 Students' Motivation and Basic Psychological Needs in Physical Education

Students' levels of intrinsic and extrinsic motivation were relatively positive, suggesting overall positive feelings toward physical education. These positive feelings reflected inherent enjoyment or external motivating factors like obtaining a good grade or recognition from the teacher. The findings are consistent with research conducted by Stormoen et al. (2016). They found that the majority of high school students showed strong levels of intrinsic motivation in physical education, indicating that they were eager to participate and put effort in class because they found physical education enjoyable and were motivated by a desire to learn and improve their skills.

Levels of amotivation were relatively low for both boys and girls with no gender-based difference. This result contrasts to those of Shen (2015) and Kurniawan et al. (2022) who indicated that girls showed higher levels of amotivation compared to boys. The finding from this study is positive, particularly given prior research has shown that amotivation is negatively

correlated with the satisfaction of basic psychological needs (Vasconcellos et al., 2020). In other words, when students feel less autonomous, less connected to others, and less competent in physical education, their levels of amotivation tend to increase.

In this study, overall students' levels of basic psychological needs were noticeably positive. Students indicated they felt quite confident in their ability to learn and perceived themselves as skilled during physical education classes. They also expressed having a positive connection with their peers, indicating they felt socially accepted by their peers. To understand students' sense of autonomy in physical education, they were asked about the degree in which they had the opportunity to choose what activities they performed in their classes. Although on average, students' responses were more positive than negative, they did not strongly agree that they had opportunities to choose their activities in physical education. This thought was further supported by the qualitative findings. The absence of gender differences in the three basic needs found in this study suggest that both boys and girls were provided with equal opportunities to feel capable despite their skill level, make important connections with their peers and be given options to choose from while in physical education. Similar results were reported by Navarro-Patón et al. (2018) who found no significant gender differences among secondary school students' needs of competence, autonomy and relatedness.

5.1.2 Students' Basic Psychological Needs as Predictors of Intrinsic Motivation in Physical Education

An analysis of students' basic psychological needs as predictors of intrinsic motivation in physical education was conducted. This analysis was not divided by gender, as the sample size was smaller than intended. The students' perceptions of competence significantly predicted intrinsic motivation, indicating that the more competent they felt, the more intrinsically

motivated they were to participate in physical education. Neither students' sense of autonomy nor feelings of relatedness emerged as significant predictors. These findings are consistent with previous studies (Ferrer-Caja & Weiss, 2002; Ntoumanis, 2001; Standage et al., 2012). For example, Ferrer-Caja and Weiss found that perceived competence was a strong predictor of intrinsic motivation among high school students aged 14 to 19 enrolled in elective physical education classes in the United States. Similarly, both Standage et al. and Ntoumanis found that perceived competence predicted intrinsic motivation toward physical education among British adolescents. This is encouraging since building actual competence and a sense of competence are goals of physical education curriculums (Davis et al., 2023; National Association for Sport and Physical Education, 2004; Ontario Ministry of Education, 2015) and something that can be achieved in physical education.

Effective strategies to achieve a sense of competence include helping students develop their actual skills, building self-efficacy, and/or encouraging them to positively interpret their skill levels. De Meester and colleagues (2016) demonstrated that among adolescents, actual motor competence and perceived motor competence are significantly and moderately associated. Further, these authors' cluster analysis demonstrated that adolescents in the cluster with the highest levels of both actual and perceived competence had the strongest autonomous motivation for physical education and the highest levels of physical activity. De Meester et al. also demonstrated that adolescents who overestimate their motor abilities are significantly more autonomously motivated toward physical education than peers with more accurate perceptions. These authors concluded that "overestimation positively relates to motivation for PE and engagement in PA and sports, especially among adolescents with low actual MC" (p. 2035) and suggested that physical educators should foster environments that support all levels of motor

competence and pay particular attention to students with low perceived competence. This study's findings are encouraging as they not only align with previous research but also confirm the key role of competence in motivating students in physical education. Therefore, fostering a competence supportive environment in physical education for Costa Rican students is necessary to enhance students' perceived competence and thus, their intrinsic motivation. As Liu et al. (2025) noted, teachers that provide students with reasonable challenges and positive feedback can improve students' perceptions of their skills.

Self-efficacy is a concept associated with both perceptions of competence and mastery. It can be thought of as the confidence a person has in their ability to engage in a behaviour (Bandura, 1977) and is foundational to developing competence and perceptions of competence (Fox & Wilson, 2008; Sonstroem & Morgan, 1989). Past performance has been regarded as the most influential factor in building self-efficacy (e.g., a person's belief that they can perform a behaviour) (Pekmezi et al., 2009). Individuals with strong self-efficacy are more likely to engage in a task willingly, put more effort, persist through challenges, and perform at a higher level compared to those who doubt their abilities (Bandura, 1977a). In turn, these behaviours lead to enhanced skills, which in turn bring about more positive self-perceptions. Sonstroem and Morgan (1989) also demonstrated that improvements in self-efficacy and perceived competence, when supported by a positive sense of physical acceptance (e.g., an individual's contentment with their physical appearance or body image), can collectively elevate an individual's self-esteem.

To foster an environment that supports students' self-efficacy in physical activity, Murfay et al. (2024) concluded that teachers should create opportunities for students to experience early successes in physical activity, encourage students to redefine success in physical activity

contexts (e.g., normalizing failure and including participation as success) by setting realistic and achievable goals. Additionally, raising awareness of the benefits of physical activity and tracking their participation can help students recognize their progress and motivate them to stay active.

5.1.3 Exploring Students' Desire for Change in Physical Education

To gain a deeper understanding of students' feelings towards physical education, they were asked to reflect on their past experiences, suggest changes to make the subject more appealing, and explain the reason behind these suggestions. Although data from the quantitative survey showed that students felt quite positive towards physical education, when asked about what changes they would make to the class, students offered numerous suggestions for improvements that also included criticisms. Many of them expressed dissatisfaction with the repetitive nature of activities, often describing them as boring. This finding is consistent with prior research highlighting that students often describe the repetitive nature of physical education activities as boring and unenjoyable (Banville et al., 2021). Conversely, this finding contrasts with previous research conducted by Portillo-Torres et al., (2016), which used focus group interviews with high school students in Costa Rica. In their study, Portillo-Torres et al. found that students were satisfied with the range of activities that were introduced in the national curriculum (MEP, 2009) which included more sports like volleyball, racquetball, handball, and other activities like music-based activities and acrosport (free-hand exercises that integrate rhythmic and acrobatics with activities that require strength and teamwork to maintain balance in figures like human pyramids) (MEP, 2009). While these findings differ from mine, the absence of age-related data limits direct comparisons with the students from my study. Furthermore, although Portillo et al.'s question (i.e., *What do you like and dislike about physical education?*) used in the students' focus group interview was similar to the one I used, it focused only on

students' current experiences and immediate preferences in physical education classes. In contrast, my question (*What would you change to make physical education more appealing to you and why would you make these changes?),* requires a higher level of analytical thinking as students had to justify their responses generating potential recommendations for future curriculum design.

When asked which activities would make physical education more appealing, many students in this study indicated a preference for outdoor recreation (e.g., hiking, nature walks, or orienteering activities), there was also interest in team building activities designed to foster teamwork, communication and problem-solving skills. These preferences align closely with the core elements of adventure education which is a physical education model designed to engage students in collaborative challenges and introduce them to a variety of physical activities that are uncommon in traditional physical education (Lund & Tannehill, 2015). This type of content is available in Costa Rica, but only from Grade 10. The current curriculum guidelines of the Ministerio de Educación Pública (MEP, 2009) introduces outdoor education at Grade 10 and includes adventure sports and activities in Grade 11. Whereas the content of physical education at Grade 9 mainly focuses on physical fitness, team sports, and dance (see Appendix B). Prior research has indicated potential psychosocial benefits of incorporating elements of adventure education in students' physical education experiences. For example, Lee and Zhang (2019) reported that students who engaged in physical education settings and adventured-based programs, showed higher self-esteem (Baena-Extremera et al., 2012), self-perception (Garst et al., 2001; Gibbons et al., 2018) and self-concept (Larson, 2007). As such, incorporating activities aligned with adventure-based learning earlier in the students' educational career is likely to be beneficial.

5.2. Gender-Based Similarities and Differences

Although boys and girls shared similarities in their overall motivational profiles and amotivation toward physical education, notable gender-based differences emerged for intrinsic and extrinsic motivation. However, there was no overall gender-based difference in students' basic psychological needs. Furthermore, the qualitative findings highlighted significant gender differences between boys' and girls' activity preferences in physical education.

5.2.1 Motivation and Basic Psychological Needs

The findings of this study reveal a significant gender difference in both intrinsic and extrinsic motivation. Boys were more intrinsically and less extrinsically motivated than girls, suggesting that they engage in physical education for its inherent satisfaction. This pattern aligns with prior research showing that boys score higher on intrinsic motivation (Hosseini et al., 2020; Kurniawan et al., 2022; Navarro-Patón et al., 2020), report greater enjoyment (Miller et al., 2022), and show more positive attitudes towards physical education (Arslan Kabasakal & Geri, 2024) in comparison to girls. Conversely, Arsani et al. (2020) found no significant differences on intrinsic motivation between boys and girls. In this regard, Arsani et al. claimed that the lack of motivational differences between boys and girls could not be explained by behavioural and gender differences alone. Drawing on Deci's (1971) view that intrinsic motivation is shaped by both task and ego orientations, and Boyd et al.'s (2002) finding that ego involvement reduces interest in sports, Arsani et al. assumed that boys and girls shared similar task and ego orientations, though these were not directly measured. Moreover, other aspects that may indicate why these results differ from my study can be attributed to the cultural context; Arsani et al.'s study was conducted with students from Indonesia, where gender norms, physical education framework, and teaching practices may be different from those in Costa Rica. In addition, the

results may have been influenced by sample characteristics in terms of age group (the age of the participants who were in their "Junior school year" is unknown), or measurement tools used. For example, Arsani et al. assessed students' levels of intrinsic and extrinsic motivation using an adapted version of Deci's (1971) motivation questionnaire. According to the authors this questionnaire included five items on intrinsic motivation and five items on extrinsic motivation presented in a random order. However, the specific questions for each type or motivation were not provided. In contrast, I used Sulz et al.'s (2016) Physical Education Motivation Scale, a more recent tool specifically designed to assess high school students' levels intrinsic motivation, extrinsic motivation and amotivation in physical education in which items from the three different subscales are interspersed throughout the questionnaire. Given these differences, it is not surprising the results are different.

That boys scored lower than girls on extrinsic motivation is consistent with Navarro-Patón et al. (2024) who reported a similar disparity among secondary students from several provinces in Galicia, Spain. On the other hand, girls in this study were significantly more extrinsically motivated and the effect size was large. These findings indicate that their participation in physical education may be more influenced by the desire to achieve good grades and receive positive recognition from the teacher. This is consistent with Biddle and Armstrong's (1992) findings related to gender-based motivational orientations toward physical activity, where girls were primarily extrinsically motivated compared to boys. Biddle and Armstrong found that middle school girls in England, tend to be more extrinsically motivated in physical education. The authors found that girls relied on their teacher's opinion or judgement about what to do and how well they performed in physical education and sports, and preferred to engage in easy tasks

while boys were attracted to challenges for pure enjoyment, and were less interested in obtaining good grades and praise from their teacher.

Perceived competence was assessed with items asking how skilled and capable students felt during physical education, relatedness was measured through items asking the extent to which they felt accepted by their classmates, and autonomy was assessed using items that examined the extent to which students felt free to make choices, have a say in making decisions and participate in activities that reflected their preference. The evidence in this study showed no significant difference in perceived competence, autonomy, and relatedness between the boys and girls. These results differ to some degree from previous research. For example, Mouratidis et al. (2015) found that among Greek middle school girls, they experienced lower levels of competence and autonomy compared to boys. However, they found no significant differences in relatedness among boys and girls. The authors explained that physical education in Greece offered boys and girls equal opportunities to socialize, regardless of their skill level. Furthermore, Mouratidis et al. stated that even students who felt less competent could enjoy physical education for its social aspects such as teamwork and making friends which satisfied both boys' and girls' need for relatedness. As a result, boys and girls experienced similar feelings of acceptance, connection and support from their peers and teachers in physical education.

5.2.2 Gender-Based Preferences in Physical Education Activities

Regarding the preferred type of physical activity in physical education, girls seemed to be more inclined toward activities that emphasize exploration and physical condition rather than competitive elements. Girls demonstrated a strong interest in yoga, fitness challenges, technology-driven activities, and dance fitness. This is consistent with previous evidence considering gender differences in physical education. For instance, Gibbons and Humbert (2008)

highlighted that girls in middle school preferred that their physical education programs offer a greater range of activities, including lifetime activities like dancing, swimming, and walking as they did not like the predominance of team sports claiming those type of activities were not relevant to their present or future lifestyle. Moreover, Peral-Suárez et al. (2020) concluded that girls tended to choose individual sports that emphasized artistic expression such as dance, rhythmic gymnastics, skating, and aquatic sports. These preferences should be considered when shaping future physical education programs in Costa Rica, as the current Grade 9 curriculum (MEP, 2009) remains largely focused on fitness training and teams sports with dance being the only notable exception (see Appendix B). Given the differences in activity preferences and varying levels of comfort with physical contact between genders, teaching strategies may need to be adjusted to better accommodate these distinctions. For instance, the Ministry of Education encourages separating genders during physical education when teaching sports that involve higher risk of accidental physical contact such as football, basketball or handball; to align with standard sports settings where female and male divisions are typically maintained (MEP, 2009). However, as a former teacher in School Circuit 01 and having colleagues that I have interacted with, this does not happen in practice.

On the other hand, boys expressed higher interest in conventional sports (i.e. basketball, soccer, badminton) and parkour (e.g., movements to enhance agility, balance, and coordination), preferring activities that are more competitive and physically demanding. In line with these results, Peral-Suárez et al. (2020) found that boys preferred to engage in team-based and contact sports like football, wrestling, handball, and racket sports. Considering boys' interest toward more sports-based and high-intensity activities, expanding the curriculum to include options that reflect these preferences could be advantageous. For example, incorporating a dynamic, skill-

oriented activity like parkour may serve as a valuable addition to the current physical education curriculum, especially given that gymnastics, a similar discipline focused on coordination and balance, is already introduced in Grade 8. Fernández-Ríos and Suarez (2016) concluded that incorporating parkour in physical education settings led to several positive outcomes for boys and girls, regardless of skill level which included enhanced problem-solving and social skills, increased enjoyment, greater inclusion and the ability to overcome fear. Additionally, Fernández et al., (2022) reported that parkour-based activities in physical education showed notable improvements in boys' agility.

5.3 Physical Education Policies

In addition to reflecting on the content of physical education, some students provided opinions on how physical education policies influenced their motivation and willingness to participate in class. While many students were enthusiastic about participating in class, concerns about rigid uniform policies was a recurring theme that appeared to hinder their full engagement. When having to change and wear the proper uniform, Miller et al. (2022) found that girls were less encouraged than boys to participate in physical education. However, Porter et al. (2025) indicated that creating physical education regulations that allow adolescent girls to wear extra layers, select their own bottoms and wear uniform throughout the day may increase their comfort and inclusivity and promote more participation in physical education.

Another important aspect that contributed to students' disinterest in participating in class was the combination of having to share space with students other than their classmates and feeling too hot and sweaty. The latter was particularly pronounced among girls. This finding is consistent with those of Phillips et al. (2021). Phillips et al. reported that girls appeared to be more affected than boys, by the effect of sweating in class and unfavorable scheduling time for

physical education as this caused them to remain sweaty for the rest of the day. In addition, the rainy, hot and humid climate in Guápiles presents challenges for outdoor physical activity. The situation is further compounded by infrastructural limitations, as the majority of the schools have only one gymnasium which is often shared among multiple sections. In such cases, it is essential to consider both physical and environmental factors, as the settings in which students engage in physical activity are influenced by distinct environmental conditions (Sallis et al., 2006) and therefore, can affect their participation and overall experience.

Given that high school students in Costa Rica receive only 80 minutes of physical education per week, any disruption can significantly impact their participation. A common issue arises when physical education teachers are required to travel with schools' sports teams such as soccer, basketball or volleyball often for multiple days per week. As a result, many grade nine sections are left without physical education during those periods, and in some cases, students may go without two or more consecutive weeks without a single class. Although only a few students raised concerns about the effective time spent in physical education, their comments align with findings from Portillo-Torres et al. (2016), who reported similar concerns but through the perspectives of teachers. One of the main challenges teachers identified was the limited instructional time available, with some reporting that they may see certain classes only once or twice during an entire academic term. This reduced time is often due to scheduling conflicts with other school activities such as exam week, civic holidays, regional sports events, and staff or parent-teacher meetings. Additionally, when schools have a gymnasium, it is frequently repurposed for meetings and school events, further disrupting scheduled physical education classes and affecting students' opportunities for participation.

5.4 Grade 9 Costa Rican Students and 24-Hour Movement Behaviours

In this study, I compared Costa Rican Grade 9 students' levels of engaging in at least 60 minutes of daily MVPA on seven days per week, and doing strength training activities at least three times per week against the WHO's (2020) guidelines. Additionally, I used the Canadian Society for Exercise Physiology's 24-hour movement guidelines for the children and youth (5-17 years) (2021) to compare students who met the recommendation of getting 8-10 hours of sleep each night and their sedentary time patterns of engaging in sedentary activities ≤ 2 hours per day were compared to question 5 from the Global School-based Health Survey Core Questionnaire Physical Activity Module (WHO, 2021a).

Meeting individual and multiple 24-hour movement behaviour guidelines is beneficial for young people's health. The intensified interest is an outgrowth of research showing that meeting a guideline is independently associated with positive physical, psychosocial, and mental health outcomes (Bang et al., 2020; Chaput et al., 2020; Faulkner et al., 2020; Janssen et al., 2017) and compromising any of the movement behaviors has negative health consequences (Wilhite et al., 2023). However, findings from this study demonstrated that many Grade 9 students in the Guápiles' Regional Education Directorate of Costa Rica were not meeting guidelines for individual 24-hour movement behaviours, especially for MVPA or combinations of those behaviours. Consistent with up to date research findings (Hossian et al., 2025), the results in this study are of concern, as nearly one third of students in the present study (31.4% of the sample) did not meet any of the guidelines. Chi-squared analysis revealed no gender-based differences in the proportion of boys and girls meeting each health guideline. The median scores for all four 24-hour behavioural guidelines examined in this study were below the recommended levels and the proportion of students meeting each guideline was low, especially for MVPA. The results

showed that only 11.0% of students (15.7% of boys and 7.5% of girls) accrued ≥ 60 minutes of MVPA 7 days per week per day. This proportion is lower than Aguilar-Farias et al.'s (2018) findings from Costa Rica, where 18.5% of students (24.7% of boys and 12.1% of girls) met the same criteria using the same GSHS MVPA question. Additionally, the low levels of MVPA from the students in this study align with Meneses Montero and Ruiz Juan's (2017) longitudinal study which included Costa Rican participants aged 11 to 20 years. Meneses Montero and Ruiz Juan found students' levels of physical activity and sports participation were insufficient to produce health benefits and that this pattern has remained consistent over time. In terms of sedentary behaviour, more than two-thirds of students in this study did not meet the guideline compared to 41% of boys and 46% of girls in Costa Rica in 2009 (Da Silva et al., 2024). In contrast, a larger percentage of students engaged in the recommended muscle-strengthening activities per week (40.7%). Although this number appears substantial, the question as it stands does not provide an indication of the volume and intensity of the activities performed. Therefore, it is unclear whether students are or are not meeting the physiological requirements necessary to effectively improve muscular strength.

Consistent with the widespread pattern of insufficient sleep among adolescents worldwide (Gariepy et al., 2020), 60% of students in the current study did not meet the sleep duration guideline. As insufficient sleep in adolescence is associated with negative physical and mental health outcomes (Owens et al., 2014), poorer academic performance (Bao et al., 2024), and an increased risk of motor vehicle accidents (Owens et al., 2014), this finding is of concern.

5.4.1 Health Benefits of Meeting Multiple Guidelines

Research evidence suggests that meeting more 24-hour movement guidelines is associated with better academic performance (Bao et al., 2024), higher levels of wellbeing,

mental and psychosocial health (Brown et al., 2021; Owens et al., 2014), and better physical health and health-related quality of life (Rollo et al., 2020) among adolescents. However, only one student in this study met all four individual guidelines, while 17 students met three guidelines, and 28 students met two guidelines. These results underscore the importance of promoting adherence to multiple 24-hour movement behaviour guidelines among Costa Rican adolescents to support their overall physical, health and well-being.

5.4.2 Gender-Based Patterns of Engagement

There were no significant gender-based differences in the proportion of students meeting the 24-hour movement behaviour guidelines. Both the boys and girls scored below the recommended levels for optimal health for youth for MVPA, strength exercises, sleep, and sedentary time. My results add to an unclear pattern of findings in Latin America. Alvarez and colleagues reported that a greater proportion of boys in Panama and El Salvador were insufficiently active (45% and 47.6%, respectively) compared to girls (35.3% and 40.4%, respectively). Whereas, and perhaps more typically (Bernabe-Ortiz & Carrillo-Larco, 2022; Marques et al., 2020), Alvarez et al. reported that a greater proportion of Guatemalan and Costa Rican girls had low physical activity levels (38% and 34.6%, respectively) compared to boys (28.3% and 24.8%, respectively). These finding of lower, higher, and in my study no difference, in physical activity levels, show that gender-based patterns of physical activity among Latin American youth are currently not fully examined or understood.

5.5 Gaps in Recent Evidence on Costa Rican Adolescents' Physical Activity

Another area of concern is that the most recent evidence on young Costa Ricans' physical activity levels continue to cite old data from 2009 (Bernabe-Ortiz & Carrillo-Larco, 2022; Brazo-Sayavera et al., 2021; Guthold et al., 2020). Although more contemporary studies examined

children's (9 – 13 years) physical activity levels from Central America (Evert Iraheta & Álvarez Bogantes, 2020; Ortiz et al., 2019), including children from Costa Rica (Álvarez et al., 2020) and South American adolescents (Galindo-Perdomo et al., 2022), a notable gap in the literature is the limited data on adolescents' physical activity patterns in Latin America (Aubert et al., 2021), specifically in Costa Rica. There is a need for updated research to better understand current trends in adolescent 24-hour movement behaviours in Costa Rica.

5.6 Predicting Physical Activity Outside of School

To explore whether students' motivation and their basic psychological needs predicted the number of days they met the physical activity guidelines, two linear regression models were computed. Perceived competence and intrinsic motivation were entered into the linear regression model in the first step and extrinsic motivation, amotivation, relatedness and autonomy were added in the second step. Both models were significant, revealing that only students' perceptions of their competence were positively associated with higher levels of physical activity outside of school. However, the second model, which included additional variables, showed that extrinsic motivation toward physical education was a significant negative predictor of physical activity outside of school. This indicates that when students place greater importance on their grades and on being liked by their teacher (reflecting extrinsic motivation), they tend to engage in lower levels of MVPA outside of school. Although perceptions of competence was the only variable to account for a significant and positive proportion of students' physical activity behaviours, it is important to acknowledge that factors more distal to the individual, like financial resources, access to physical activity opportunities, and family support, also affect students' engagement in physical activity beyond the physical education setting (Sallis et al., 2006).

Previous research has shown the importance of competence and intrinsic motivation in physical education as predictors of intention to be physically active after school and in the years to come (Hein et al., 2004; Taylor et al., 2010). For instance, Fernández-Espínola et al. (2020) found competence as a strong predictor of both intrinsic motivation and the intention to be physically active with an explained variance of 33%. In this study, intrinsic motivation and perceived competence were significant predictors, while autonomy, relatedness, and extrinsic motivation were not. This was found to be in line with results from Fernández-Espínola et al. (2020) where extrinsic motivation was not statistically significantly associated with the intention to engage in physical activity outside of the educational context. This underscores the critical role of competence in fostering students' intrinsic motivation and participation in physical education. If a physical education teacher aims to encourage lifelong participation in physical activity beyond the school setting, it is crucial that students leave each lesson having experienced success and found the activities personally rewarding (Capel et al., 2021).

5.7 Limitations

5.7.1 Low Recruitment Rate

Despite my ability to fluently communicate with others in Spanish, my previous teaching experience in schools within Guápiles' School Circuit 01, advertising the study on social media one week prior to data collection; presenting the study, recruiting and collecting data in person; and offering a prize draw to consented students; recruitment was still challenging. Recruitment rates were 17% in the public and 30% in the private schools. This was undoubtedly one of the most important limitations of this study as I was able to recruit approximately half of the sample that was intended. Similarly, Márquez-Barquero et al. (2019) reported difficulties engaging students from public schools in grades 4 to 6 in the Province of Heredia in Costa Rica. Although

the authors attributed the challenges primarily to inconsistencies in the school calendar and the numerous extracurricular activities that hindered the educational process, they did not provide specific recruitment rates.

Recruiting participants for this study proved to be challenging despite multiple efforts even after personally revisiting classrooms within 24 hours of distributing consent forms to remind students and collect signed documents; many students still disregarded returning the signed parental consent forms which significantly limited participation. Obtaining parental consent in addition to adolescent's assent is a major obstacle when recruiting young people (Fletcher & Hunter, 2003; Kealey et al., 2007). This suggests that factors such as students' forgetfulness, lack of parental engagement or low motivation to participate may have contributed to the low recruitment rate.

In retrospect, the recruitment strategies were targeted at students and their school environment, with parents and guardians only involved through the informed consent process. Prior to recruiting students at school, greater success may have been achieved by raising awareness in the community, e.g., through local businesses and community organizations (Owens et al., 2017).

5.7.2 Subjective Measure of Physical Activity

Data for measurements of physical activity in this study were obtained from participants' responses to self-report questionnaires. Self-report (subjective) measurements of physical activity are frequently used to collect data at a population level through surveys, interviews, diaries/logs, and questionnaires (Prince et al., 2008). Self-report measures are frequently used due to their applicability, low participant burden, and widespread acceptance (Dishman et al., 2001) and because they are cost-effective and convenient (Helmerhorst et al., 2012). However,

when compared to objective measures, self-report measures frequently display higher values (Cerin et al., 2016) including in young populations aged 8 to 17 years (Lockwood et al., 2017). Self-report methods have a number of reliability and validity limitations (Shephard, 2003). For example, self-report questionnaires are less reliable when measuring light or moderate physical activity (Jacobs et al., 1993), they can overestimate or underestimate the actual physical activity energy expenditure and rates of inactivity and lack the ability to measure the precise amount of physical activity (Prince et al., 2008). The primary drawbacks of self-report questionnaires include issues with recalling physical activity specifics and some respondents' incapacity to average frequency and durations over the previous week or month (Durante & Ainsworth, 1996).

Objective or direct measures of physical activity are frequently used to improve accuracy and precision as well as validate self-report measures (e.g., heart rate monitors, pedometers, accelerometers), however, the use of these devices is often expensive and time-consuming (Prince et al., 2008). Additionally, certain types of accelerometers will give an integrated picture of MVPA, sedentary behaviour, and sleep (Rodrigues et al., 2025). Given the practical challenges of data collection, the decision to incorporate only subjective measures in this study was influenced not only by a specific request from Costa Rica's National Physical Education Advisor but also by time and financial constraints. In keeping with regional educational guidelines and priorities, this approach has made the assessment more practical and culturally relevant.

5.8 Recommendations for Costa Rica's Ministry of Health, Ministry of Public Education, and Physical Education Teachers

Drawing on the results from this study, a series of recommendations that may help strengthen physical education delivery in Costa Rican high schools and help address concerns regarding the low physical activity levels among adolescents are presented. These

recommendations are directed toward three main audiences. First, recommendations to the Ministry of Health highlight the need of updating Costa Rican health guidelines and including 24-hour movement guidelines, which provide a comprehensive framework for fostering balanced daily routines of physical activity, strength, sedentary time, and sleep during a 24-hour period among children and adolescents aged 5 – 17 years. Second, long-term considerations intended for the Ministry of Public Education, more specifically to the Directorate of Curriculum Development in the Physical Education Department of the Third Cycle and Diversified Education to help guide future curricular improvements over time. Third, immediate, practical strategies that high school physical education teachers can adopt within their current practice are provided. Each recommendation is grounded in this study's findings and aligned with evidence-based approaches to promote student motivation in physical education.

5.8.1 Ministry of Health

5.8.1.1 Adopting and Implementing 24-Hour Movement Guidelines

The findings of this study, which highlight alarmingly low levels of physical activity and insufficient sleep duration among students are of concern. Notably, Costa Rica's Plan Nacional of Health and Physical Activity (Ministerio de Salud & Ministerio de Deporte y Recreación, 2011), which references the outdated WHO's (2010) guidelines warrants urgent revision. For example, the Ministerio de Salud's (2022) current national food guidelines based on food systems for the adolescent and adult population (12 – 65 years) recommends only 30 minutes of physical activity, five days per week for adolescents which is inconsistent with the WHO's (2020) guidelines. Given the emerging emphasis on considering all four movement behaviours in children and adolescents, concerning global trends on adolescents' physical activity levels (Guthold et al., 2020), and the specific results of this study, it is strongly recommended that

Costa Rica's Ministerio de Salud, formally adopt comprehensive 24-hour Movement Guidelines such as those implemented in Australia and Canada (Australian Government Department of Health and Aged Care, 2019; CSEP, 2021). These guidelines offer evidence-based recommendations for maintaining a healthy 24-hour day providing a combination of physical activity, sleep, strength and sedentary time (Tremblay, Carson, et al., 2016), all of which are critical to adolescents' overall health and well-being.

5.8.2 Costa Rica's Public Ministry of Education

5.8.2.1 Inclusion of 24-hour Movement Behaviours in School Curricula

The MEP's physical education curriculum includes the concept of health within its transversal axis for Grade 9 (see Appendix B). Its main objective is to reach every student in each class by fostering the practice and promotion of healthy lifestyles through the meaningful use of free time (MEP, 2009). Although this reflects the intention of aligning education with health promotion, the framework remains limited. In this context, it is recommended that future curriculum revisions extend beyond an exclusive focus on physical activity, the promotion of active lifestyles; and instilling the values, attitudes and behaviours of 'personal care' addressing only aspects such as the responsibility to maintain healthy lifestyles, and the identification of and modification of habits that are detrimental to health (MEP, 2009). It is insufficient to only offer students physical activity opportunities and health and safety information to have a lasting impact on their behaviour (B.C. Curriculum, n.d.). Based on emerging interest in this area and growing scientific evidence supporting the benefits of adopting 24-hour movement guidelines for children and adolescents (Bao et al., 2024; Brown et al., 2021; Owens et al., 2014; Rollo et al., 2020), it is strongly suggested that these elements be integrated into Costa Rica's national education curriculum. They could either be embedded within the physical education program or

alternatively, introduced as a cross-curricular component with the health education area of the Science curriculum (MEP, 2017) for the third cycle of basic general education (Grades 7 to 9).

5.8.2.2 Consider Innovative Approaches, and Students' Input in Developing Future Physical Education Curriculums

Many students mentioned they were bored with the activities offered in physical education. They said there was considerable repetition and a lack of variety in physical education activities. Therefore, I recommend innovation, greater variety of activities, and giving students a voice in the development of future physical education curricula. Hinojo Lucena et al. (2020) argued the need to continue introducing innovative teaching and learning strategies in various disciplines of the official educational curriculum, including physical education, given the particular characteristics of the society in which students are growing up today. For future research in the field of physical education, it is important to examine innovative strategies implemented around the world that have been shown to enhance students' experiences in physical education.

Based on the finding of this study, which highlights students' preferences for outdoor recreation, it is recommended that future research explore the integration of adventure education (Lund & Tannehill, 2015), and Dyson and Sutherland's (2014) adventure-based learning which is described as organized experiential challenges and physical activities aimed at developing and improving intrapersonal and interpersonal relationship skills. Moreover, careful consideration should be given to revising physical education schedules to allocate time for outdoor activities throughout the academic year. For example, introducing one or two outdoor sessions per semester could increase students' exposure to natural environments while maintaining alignment with curriculum goals. In the specific context of Guápiles', it is also important to take local

weather patterns into account to ensure seasonal planning that can allow teachers to deliver outdoor physical education lessons under favorable weather conditions.

More contemporary research findings have shown the effectiveness of implementing successful teaching strategies and technological devices in physical education. For example, Hinojo Lucena et al. (2020) demonstrated that Bergmann and Sams' (2012) flipped learning strategy in physical education which consisted of students being able to access class content through online audiovisual resources and personalize their study at their own pace, significantly enhanced students' interactions with teachers and peers in both elementary and secondary education and showed a notable increase in autonomy among high school students. Additionally, Quintas-Hijós et al. (2020) examined the results of implementing an approach that incorporated digital motor games known as gaming (exergames) (e.g., Just Dance Now) designed to improve players' motor skills as an instructional tool and the use of game-based components to encourage behaviour outside of games (gamification) (i.e. the Mechanics-Dynamics-Aesthetics) as a teaching strategy. The results showed that students felt more motivated and showed increased overall positive feelings through the gamification model, and the exergame was shown to produce more fun and enhanced motor learning among students. Similarly, Quintero González et al. (2018) found that gamification promoted greater motivation and teamwork among students, encouraging greater participation and increased effort in class.

Evidence suggests that students' attitudes decrease when the physical education curriculum was focused on competition, included boring and repetitive activities, and involved fitness testing activities (Phillips et al., 2021). These findings underscore the importance of re-evaluating traditional methods in curriculum development and promoting practices that better reflect students' voices and needs. Walseth et al. (2018) reported that involving students in the

curriculum-making process is crucial to their perceptions of the purpose of physical education. Their results indicated that listening to students and broadening their understanding of what physical education can be, can empower students and add to meaningful physical education experiences. Allowing students in the decision-making process fosters a sense or autonomy, which is a key component of the three basic psychological needs within Deci and Ryan's (1985) SDT.

Moreover, high-quality instructional strategies play a vital role in creating meaningful and impactful learning experiences in physical education. Whitehead (2021) proposed that in physical education, learning is more likely to occur if students engage in well-organized environments with adequate time, space and equipment to complete assigned tasks; observation is used to deliver individualized feedback that reinforces effort, provides guidance, and supports students' improvements; and the learning environment is physically, socially, and emotionally safe, where students feel confident that their efforts will be recognized and even small accomplishments are appreciated. These key propositions highlight the importance of a well-organized, encouraging, and learner-focused instructional framework.

5.8.3 High School Physical Education Teachers

Although systematic changes through the Ministry of Public Education may take several years to implement in teaching physical education, there are actionable strategies that physical education teachers can begin applying immediately within their current practice.

5.8.3.1 Enhance Students' Perceived Competence in Physical Education

The findings in this study indicate that perceptions of competence was the only predictor of their levels of intrinsic motivation toward physical education. Additionally, perceptions of competence predicted physical activity levels outside of school. Given the importance of

physical activity for adolescent health (Janssen & LeBlanc, 2010; Tambalis, 2022), physical education has the potential to increase perceptions of competence and thereby physical activity levels. Previous research has revealed successful strategies that can be used to satisfy students' need for competence in physical education. For example, planning and organizing in-class activities according to students' skill levels (e.g., providing options in which students can feel successful regardless of their skill levels) as well as praising and encouraging individual effort and progress (Tessier et al., 2010). In addition, Brankovic and Hadzikadunic (2017) found that including a short feedback session before class where teachers asked the students about activities they had earlier, and encouraging students to actively engage in a conversation with the teacher and their peers regarding the achievements and challenges they had during the lesson after stretching and breathing at the end of class significantly increased students perceived competence in physical education. Further, Dyson and Strachan (2000) demonstrated that students who were organized into small, heterogenous groups in physical education and that worked together to grasp concepts initially taught by the teacher (co-operative learning) improved students' development of motor and social skills as well as their attitude toward physical education. When it comes to creating meaningful experiences for students in physical education, motor competence, social interactions, fun, challenge, and personally relevant learning are among the most important factors (Beni et al., 2017).

5.8.3.2 Foster an Autonomy-Supportive Environment

The qualitative findings of this study revealed deeper insights into students' experiences and their suggestions for improving the opportunities they had to make choices within physical education. Evidence suggests that students who receive autonomy support from their physical education teachers report higher levels of satisfaction of basic psychological needs, particularly

in perceived autonomy, as well as intrinsic motivation, positive self-perceptions and emotions; and intentions to engage in physical activity during their free time (Pérez-González et al., 2019). An autonomy-supportive environment include teachers who use non-controlling, flexible and informal language, is flexible in modifying needs and changing uninteresting activities to more exciting and relevant while considering students' preferences and interests, provides students with options and allows them to work independently, giving students time to work on their own and in their own way allowing them to take the initiative in learning activities (Moreno-Murcia & Sánchez-Latorre, 2016).

5.8.3.3 Integrating Grade 9 Physical Education Contents with Health Education: A Cross-Curricular Approach

By incorporating health education into physical education, teachers can help students go beyond skill development and promote their awareness on how everyday activities affect overall health and well-being. For example, teachers can discuss the physiological benefits of fitness circuits such as cardiovascular health, muscle growth, bone and joint health, and the importance of conducting a proper warm-up to prevent injuries while students are participating in fitness circuits (e.g., aerobic training, strength, flexibility). In addition, they can include personal reflection activities where students can engage themselves in reflection exercises by monitoring their heart rates, or rating their levels of perceived exertion using the OMNI-Child Perceived Exertion Scales (Lagally, 2013). Then, ask students to relate these findings to health outcomes (e.g., higher aerobic fitness levels = lower risk of noncommunicable diseases).

When teaching sports, (baseball, softball, handball, and sports with rackets), teachers can emphasize qualities like discipline, assertive communication and teamwork in addition to helping students develop sport specific skills. Following a sports unit, they can engage students in a brief

discussion on topics such as the importance of balanced and healthy performance nutrition, hydration, adequate sleep and recovery.

Moreover, teachers can create a cultural connection with dance activities by including Latin and traditional Costa Rican dances in their activities with music. Further discuss how dance benefits mental health, enhances balance, and coordination, and can serve as a stress-relieving and sociable activity. Teacher can provide students with the opportunity of choosing which type of dance or musical activities they would like to practice in class based on their personal preferences and skill levels (e.g., traditional Costa Rican dances, cardio dance, Zumba, tae-bo, etc.).

To begin integrating the concept of 24-hour movement behaviours, teachers can first highlight the specific benefits of each behaviour individually. For example, they can mention the benefits of getting the recommended 8 to 9 hours of sleep every night or demonstrate how replacing sedentary time with light physical activity can result in positive health outcomes. Following this, teachers can then encourage students to reflect on how the combination of active transportation, dancing, physical training and sports, and active participation in physical education can collectively help them reach the recommended physical activity levels.

As for assigning projects in physical education, teachers can ask students to design a ‘healthy 24-hour’ and then ‘healthy 2-3 days’ and up to a ‘healthy week’ schedule by combining the recommended levels of physical activity, sleep, muscle strengthening activities and sedentary time at the beginning and end of the academic year. Then, have students compare their results and reflect on the findings. Furthermore, interdisciplinary projects can also be considered. For instance, to promote a cross-curricular approach in collaboration with science teachers, students can create presentations on different topics including how physical activity can help prevent

noncommunicable diseases, and how the practice of sports and/or physical activity align with human biology. For example, these elements of physical education can be linked to the evaluation criteria of understanding the interrelationship between anatomical and physiological aspects of the human body systems, as part of personal health (MEP, 2017) in Grade 9 science. Moreover, integrating the concept of 24-hour movement behaviours in physical education can be linked to the evaluation criteria of valuing actions that promote healthy lifestyles, which favor the functioning of the different systems of the human body (MEP, 2017).

5.8.5 Other Recommendations

5.8.5.1 Improve Participant Enrollment in Youth Studies

Future studies may benefit from alternative recruiting strategies such as in-person and telephone interviews (May et al., 2007), holding in-person information sessions at schools (Villarruel et al., 2006), providing clear messages regarding the study (Schoeppe et al., 2014) and having support from key stakeholders (Schoeppe et al., 2014). In addition, Kennedy et al. (2008) found that word-of-mouth, identified flyers and live radio were effective methods for recruiting adolescent girls. Moreover, Parrish et al. (2017) claim that, in order to successfully recruit adolescents for a one-session study, innovative and diverse recruitment methods and tools such as electronic communication and social media, respondent-driven sampling with an incentive for referral, communication methods (phone, text messaging, e-mail), and incentives can be used. However, in a time when technology is developing quickly and accessibility has increased, different media strategies should be taken into account while recruiting adolescents (Parrish et al., 2017). But, even though social media recruitment is inexpensive, it is still a useful tool that should be utilized in conjunction with other strategies and partnerships in the community (Naqvi et al., 2024).

5.8.5.2 Use of Qualitative Assessments in Research Focusing on Adolescents

In this study, the quantitative data showed relatively high levels of autonomy, yet many students' comments suggested a need for greater decision-making opportunities and more variety in class activities. To better understand this disparity, future research should incorporate focus group interviews and/or one-on-one interviews with students. These interviews can provide deeper insights into why students feel the need for more choices and how their current experiences in physical education might be improved. Additionally, it is recommended that these interviews be conducted at different points in time to capture a more comprehensive view of students' perspectives and ensure consistency in their responses.

5.9 Conclusion

In summary, this study provides insights into the motivational constructs that influence Costa Rican students' participation in physical education, specifically regarding their need satisfaction and intrinsic motivation. Overall, whether motivated internally or by external incentives, students felt quite positive toward physical education and reported low levels of amotivation. In addition, boys and girls felt quite similar in terms of basic psychological need satisfaction.

There were gender-based differences. Boys reported higher levels of intrinsic motivation whereas girls indicated somewhat higher levels of extrinsic motivation. Fostering intrinsic motivation in physical education can lead to more active and healthier lifestyles for students, contributing to their overall health. Interestingly, feelings of competence emerged as the only significant predictor of intrinsic motivation in physical education. Perceived competence was the only significant predictor of MVPA outside of school hours. These findings suggest the importance of fostering a sense of competence by building students' self-efficacy and mastery

experiences through tailored activities and positive reinforcement to enhance intrinsic motivation.

In addition to the importance of intrinsic motivation toward physical education, results from this study also revealed alarming patterns regarding the amount of physical activity that students engage outside of school. The suggested amount of physical activity for youths was not met by most of the students. Furthermore, it is concerning that only one student in this sample met the minimum requirements for all four 24-hour movement behaviours while nearly one-third of students (31,4 %) did not meet any of the recommended behaviours. These results are consistent with worldwide trends showing a decline in physical activity among adolescents. The findings suggest the need for more research on adolescent physical activity in Latin America, particularly in Costa Rica, where contemporary data on physical activity trends is scarce.

Furthermore, qualitative findings denoted preferences for incorporating novelty and variety in physical education classes. While some students expressed positive attitudes toward physical education, their qualitative feedback revealed a desire for more diverse and engaging activities. By incorporating a wider range of activities that appeal to students' interests, educators can increase engagement and motivation in physical education. Additionally, future research should explore innovative teaching strategies such as gamification and the use of digital tools (e.g., iPads, Tablets, smartphones, video feedback, applications) to further enhance student motivation and participation in physical education.

Chapter 6: Brief Report on 24-Hour Movement Guidelines

Preamble

This brief report, entitled "24-hour movement behaviours of Grade 9 Costa Rican students: A pilot study" is the first study arising from my thesis. A second manuscript focusing on students' motivation, basic psychological needs, and the qualitative findings will be written for the Journal of Teaching in Physical Education.

This manuscript presents the results reported in Chapter 4 regarding the extent to which grade 9 Costa Rican students in the Guápiles region met the 24-hour movement behaviours for MVPA, strength, sleep, and sedentary time. The aim of this brief report as a pilot study was to assess the viability of the study and offer initial evidence of Costa Rica's grade 9 students' 24-hour movement behaviours based on the physical activity sub-section of the Global School – Based Student Health Survey.

I contributed to this study by collecting and analyzing data and writing and editing the manuscript. I gratefully acknowledge the contributions and support of Dr. Viviene Temple, who served as the co-author of this manuscript. Dr. Temple analyzed quantitative data, wrote and edited the manuscript.

This manuscript was recently published. Sosa Nicora, E. B. & Temple, V. A. (2025). 24-hour movement behaviours of Grade 9 Costa Rican students: A pilot study. *Advances in Physical Education, 15*(3), 341-351, https://doi.org/10.4236/ape.2025.153023

Title of the work: 24-Hour Movement Behaviors of Grade 9 Costa Rican Students: A Pilot Study

Type of article: research article

Authorship: Elisa Sosa Nicora, School of Exercise Science, Physical and Health Education, University of Victoria, British Columbia, Canada. Email elisasosanicora@uvic.ca ORCID number: https://orcid.org/0009-0008-7339-8650

Viviene A. Temple, School of Exercise Science, Physical and Health Education, University of Victoria, British Columbia, Canada. Email vtemple@uvic.ca ORCID number: https://orcid.org/0000-0003-2213-1629

24-hour Movement Behaviors of Grade 9 Costa Rican Students: A Pilot Study

Abstract

Meeting individual 24-hour movement behavior guidelines of physical activity, sedentary behavior, and sleep is independently and collectively associated with positive physical, psychosocial, and mental health outcomes. The aim of this pilot study was to examine the feasibility of the study and to provide preliminary evidence of the 24-hour movement behaviors of Grade 9 Costa Rican students. Cross-sectional data were collected using the physical activity sub-section of the Global School-Based Student Health Survey with n = 118 students (male = 51) in the Guápiles region of Costa Rica. The proportion of students meeting individual guidelines was: MVPA = 11.0%, strength exercises = 40.7%, sedentary time = 32.2%, and sleep = 39.8%. There were no gender-based differences based on chi-squared analyses of the proportion of males and females meeting each health guideline. One student met all four guidelines examined, and 37 students (31.4% of the sample) did not meet any of the guidelines. Our findings demonstrated that many Grade 9 students in the Guápiles region were not meeting individual 24-hour movement behaviors or combinations of those movement guidelines. These findings demonstrate a need to concurrently examine the 24-hour movement behaviors of Costa Rican youth. Additionally, assessing health and academic outcomes associated with meeting individual and integrated 24-hour movement behavior guidelines is needed.

Key words

Latin America; Physical Activity; Adolescence; Sleep; Sedentary Behaviour

Introduction

Interest and research on a combination of physical activity, sedentary behavior, and sleep behavior guidelines has swelled over the past decade (de Lannoy et al., 2023; Wilhite et al., 2023). These combined guidelines have been termed the "24-hour movement guidelines" (Tremblay et al., 2016) or "movement guidelines" (Wilhite et al., 2023) and were initially published for children and youth in 2016 (Tremblay et al., 2016). The intensified interest is an outgrowth of research showing that meeting a guideline is independently associated with positive physical, psychosocial, and mental health outcomes (Bang et al., 2020; Chaput et al., 2020; Faulkner et al., 2020; Janssen et al., 2017) and compromising any of the movement behaviors has negative health consequences (Wilhite et al., 2023). Further, interest has grown because meeting combinations of guideline recommendations is associated with better outcomes among children and youth (Bang et al., 2020; Bao et al., 2024; de Lannoy et al., 2023; Rollo et al., 2020; Sampasa-Kanyinga et al., 2017; Wilhite et al., 2023). However, Sampasa-Kanyinga and colleagues (2017) found that different countries had significantly different associations between health-related quality of life and whether children met the 24-hour movement guidelines. Children from higher-income countries had a more positive health-related quality of life when they met all the guidelines, whereas children from lower-income countries did not. This finding highlights the importance of considering each country as social and cultural contexts differ.

Latin America has historically been under-represented in physical activity surveillance data, especially for youth (Aguilar-Farias et al., 2018). Although there is some interest in examining the 24-hour movement behaviors in this world region (Ferrari et al., 2022), these behaviors have not been concurrently examined in Costa Rican youth. In terms of the individual

movement behaviors, Guthold and colleagues' synthesis of cross-sectional survey data involving 1.6 million adolescents between the ages of 11 and 17 years from 146 countries and jurisdictions revealed that 82.0% of students in Costa Rica were insufficiently active (defined at <60 minutes of MVPA/day or being active < 60 minutes on 5 days/week) (Guthold et al., 2020).
Further, Aguilar-Farias et al. (2018) found that the median number of active days, defined as ≥60 minutes of MVPA per day among 2601 Costa Rican youth (mean age 14.3 years), was 2. These authors also found that, on average, 18.5% of students (24.7% of males and 12.1% of females) were physically active on 7 days per week. Additionally, Costa Rica had the 2nd highest relative gender-based difference of the 26 Latin American countries included in Aguilar-Farias et al.'s study (Aguilar-Farias et al., 2018).

Sedentary behavior levels of Costa Rican youth were recently reported by da Silva and colleagues (2024). These authors presented a national surveillance data set that used the Global School-Based Student Health Survey (GSHS) in 2009. The criteria for sedentary behavior were the same as in the present study, that is, ≥3 hours per day (when not in school or doing homework) spent sitting and watching television, playing computer games, talking with friends, using their mobile phone, or doing other sitting activities. Overall, the prevalence of sedentary behavior was 43.6% and females were significantly more sedentary than males (46.3% and 40.9%, respectively).

Data on sleep and muscular strength exercise participation of Costa Rican youth are limited. However, in national surveys, engaging in regular strength activities among those aged 15 - 35 years (no further stratification provided) was 4.5% in 2013 (Ministerio de Cultura Y Juventud, 2013) and 6.6% in 2018 (Ministerio de Cultura Y Juventud, 2018). Further, Costa Rica's Ministry of Health (Ministerio de Salud & Caravaca Rodríguez, 2019) reported that the

proportion of students in grades 8 - 10 getting 8 or more hours of sleep on week and weekend nights was 20.9% and 55.9%, respectively.

The reasons to conduct a pilot study include assessing the likely success of proposed recruitment approaches, identifying potential logistical problems, further developing a research question and plan, and convincing funding bodies and other stakeholders that the research study is worth supporting (van Teijlingen & Hundley, 2002). Collecting preliminary data can also help to establish whether a subsequent intervention might bring about benefits to participants. Consistent with the reasons why pilot studies are conducted, we examined feasibility, our ability to recruit participants, and collected data to provide preliminary evidence of the 24-hour movement behaviors of Grade 9 Costa Rican students. The following research questions were asked: 1) How many days per week did students accrue 60 minutes or more of MVPA and undertake muscle strengthening exercises? 2) How many hours per day did students spend in sedentary activities? 3) How many hours of sleep did students get per night? 4) What proportion of students met the guidelines related to MVPA, strength, sedentary, and sleep behaviors? 5) Did the proportion of students meeting guidelines differ by gender?

2. Method

2.1 Design and Ethics Approval

This descriptive cross-sectional pilot study was approved by the University of Victoria Human Research Ethics Board (Protocol Number 24-0078), the Vice Minister of Costa Rica's Ministry of Public Education Academic Office, the Guápiles' Education Directorate and Regional Physical Education Advisor, each school director, and physical education teachers of participating classes. Students' parents or guardians provided informed consent for the student to participate, and students provided written assent.

2.2 Sampling Frame and Participants

This study took place in School Circuit 01 of the Guápiles' Regional Education Directorate, Pococí, Limón, Costa Rica in 2024. Three public and two private high schools in a medium-sized urban area were invited to participate. Those five schools were clustered geographically and served more than half of the high school student population in Guápiles. Of the 646 eligible Grade 9 students, the final sample was N = 118. The recruitment rates were 17% in the public and 30% in the private schools. Students' average age was 14.7 years (SD = 0.6), and 43% were male. Table 1 displays school-level gender, age, and type of school descriptive statistics.

Table 1

Student Age, Gender, and School Type for Each Participating School

	School 1	**School 2**	**School 3**	**School 4**	**School 5**
Number of students	59	19	22	6	12
Male	18	11	12	3	7
Female	41	8	10	3	5
Type of school	Public	Public	Public	Private	Private
Mean age in years (SD)	14.7 (0.7)	14.5 (0.5)	14.6 (0.5)	15.3 (1.0)	14.5 (0.5)

2.3 Material and Instrument

The Global School-Based Student Health Survey (GSHS), also known as the Encuesta Mundial de Salud Escolar in Spanish, is a self-administered survey assessing behavioral risk factors of youth 13 - 17 years of age in 10 health behavior domains. In this study, the physical activity sub-section of the GSHS core questionnaire (World Health Organization, 2021) was

used. The GSHS has been used globally since 2003 for cross-national comparisons or to assess the prevalence of adolescent health needs and behaviors in a population, including Latin America (Aguilar-Farias et al., 2018). The test-retest reliability (Kendall's tau_b) of the core questions in the physical activity sub-section ranges from 0.73 to 0.81, and the content validity index on the core physical activity sub-section of the Persian version of the GSHS was 1 (indicating the items were highly relevant) (Ziaei et al., 2014).

For this study, 4 of the 6 core questions were used. Specifically, students were asked to report 1) the sum time they were "physically active for a total of at least 60 minutes per day" and respond on an ordinal scale of 0 - 7 days per week. Physical activity was defined as activity that increases their heart rate and makes them breathe hard. 2) The number of days they did "exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weightlifting" on an ordinal scale of 0 - 7 days per week. 3) How many hours per day (when not in school or doing homework) they spent sitting and watching television, playing computer games, talking with friends, using their mobile phone, or doing other sitting activities on an ordinal scale of <1, 1 - 2, 3 - 4, 5 - 6, 7 - 8, >8 hours per day. 4) The number of hours of sleep they got per night on an ordinal scale (4 or less, 5, 6, 7, 8, 9, 10 or more hours per night). Two questions (on active transportation and physical education) were not used as they did not directly relate to the aim of this pilot study.

All of the GSHS physical activity core questions were available in Spanish. However, the Spanish language version of the questions was checked for semantic and conceptual equivalence to the Costa Rican context. For example, the Costa Rican word for high school 'colegio' replaced 'escuela' (elementary school) in question 1 and the word for push-ups (question 2) was changed from "flexiones de brazos" (bending of the arms) to "lagartijas" (lizard), a common word used

among Costa Rican youths to refer to push-ups. Where “you” as “vos” or “tú” in Spanish was used, the third person singular “usted” was used instead. Culturally, the pronoun “usted” is generally used by Costa Ricans. These revisions were checked by two bilingual translators and the first author, who is also bilingual.

2.4 Procedure

One week prior to recruitment, an infographic describing the study was posted on the official social media site of each school and in Grade 9 group chats (e.g., WhatsApp). Students were subsequently recruited by the first author. A brief presentation was made to each class, and consent and assent forms were collected during the week following the presentation. In the second week, students completed the questionnaire during a physical education class. Data from absentees and students who chose to join the study later were collected in weeks 3 and 4. A prize draw for participating students for a Fitbit Inspire 3 Smartwatch occurred at each school at the end of week 4.

2.5 Data Analysis

Descriptive statistics were computed on each variable. Four GSHS core questions were converted into dichotomous scores (with 0 = not meeting the guideline, and 1 = meeting the guideline) so that these data could be compared with existing guidelines. The World Health Organization’s [WHO] (World Health Organization, 2020) MVPA and strength exercise guidelines for children and adolescents (aged 5 - 17 years) were used for comparison because Costa Rica’s current guidelines (Ministerio de Salud & Ministerio de Deporte y Recreación, 2011) were not developed specifically for Costa Rica but were based on WHO guidelines that are consistent with the current 2020 recommendations. Additionally, the Canadian 24-Hour Movement Guidelines for Children and Youth (5 - 17 years) (Tremblay et al., 2016) were used as

Costa Rica does not have guidelines for adolescent sedentary behavior and sleep. The cut-offs for meeting the behavioral guidelines were: 1) Physical activity, ≥60 minutes of MVPA per day, 2) Strength, ≥3 days per week, 3) Sedentary, ≥3 hours per day as previously used with the GSHS (Guthold et al., 2010), and Sleep, 8 - 10 hours per night. A chi-squared test of independence was used to examine whether there was a gender-based difference in meeting each guideline. IBM SPSS Statistics Version 29.0 was used for all analyses.

3. Results

The proportion of students meeting individual guidelines was: MVPA = 11.0%, strength exercises = 40.7%, sedentary time = 32.2%, and sleep = 39.8% (Figure 1). The median number of days students engaged in the four movement behaviors is displayed in Table 2. The median scores for both males and females were below the levels recommended for optimal health for youth for MVPA, strength exercises, sleep, and sedentary time. Chi-squared analyses of the proportion of males and females meeting each health guideline revealed no gender-based differences: MVPA, $\chi^2 = 2.00$, $df = 1$, $p = 0.158$; Strength, $\chi^2 = 2.59$, $df = 1$, $p = 0.108$; Sedentary behavior, $\chi^2 = 0.39$, $df = 1$, $p = 0.531$; and sleep, $\chi^2 = 1.96$, $df = 1$, $p = 0.162$. The proportion of students (all students and by gender) engaging in ≥60 minutes of MVPA and strength exercises per number of days per week is shown in Table 3. The proportion of students meeting all guidelines, individual guidelines, combinations of guidelines, or no guidelines is depicted in Figure 1. Notably, nearly one-third of students did not meet any health behavior guidelines, and 1 student met all 4 guidelines.

Table 2

Median and Interquartile Range (IQR, percentile 25 - percentile 75) of 24-Hour Movement Behaviors

Variables	Students					
	All (n = 118)		Male (n = 51)		Female (n = 67)	
	Median	IQR[a]	Median	IQR	Median	IQR
MVPA (days/week)	3	1 - 5	4	2 - 6	3	1 - 4
Strength (days/week)	2	1 - 3	2	1 - 5	2	1 - 3
Sedentary (hours/day)	3	2 - 4	3	2 - 4	3	2 - 4
Sleep (hours/night)	7	6 - 8	7	6 - 8	7	6 - 8

a: IQR = Interquartile Range.

Figure 1

The Proportion of Students Meeting Individual and Combinations of 24-Hour Movement Behavior Guidelines

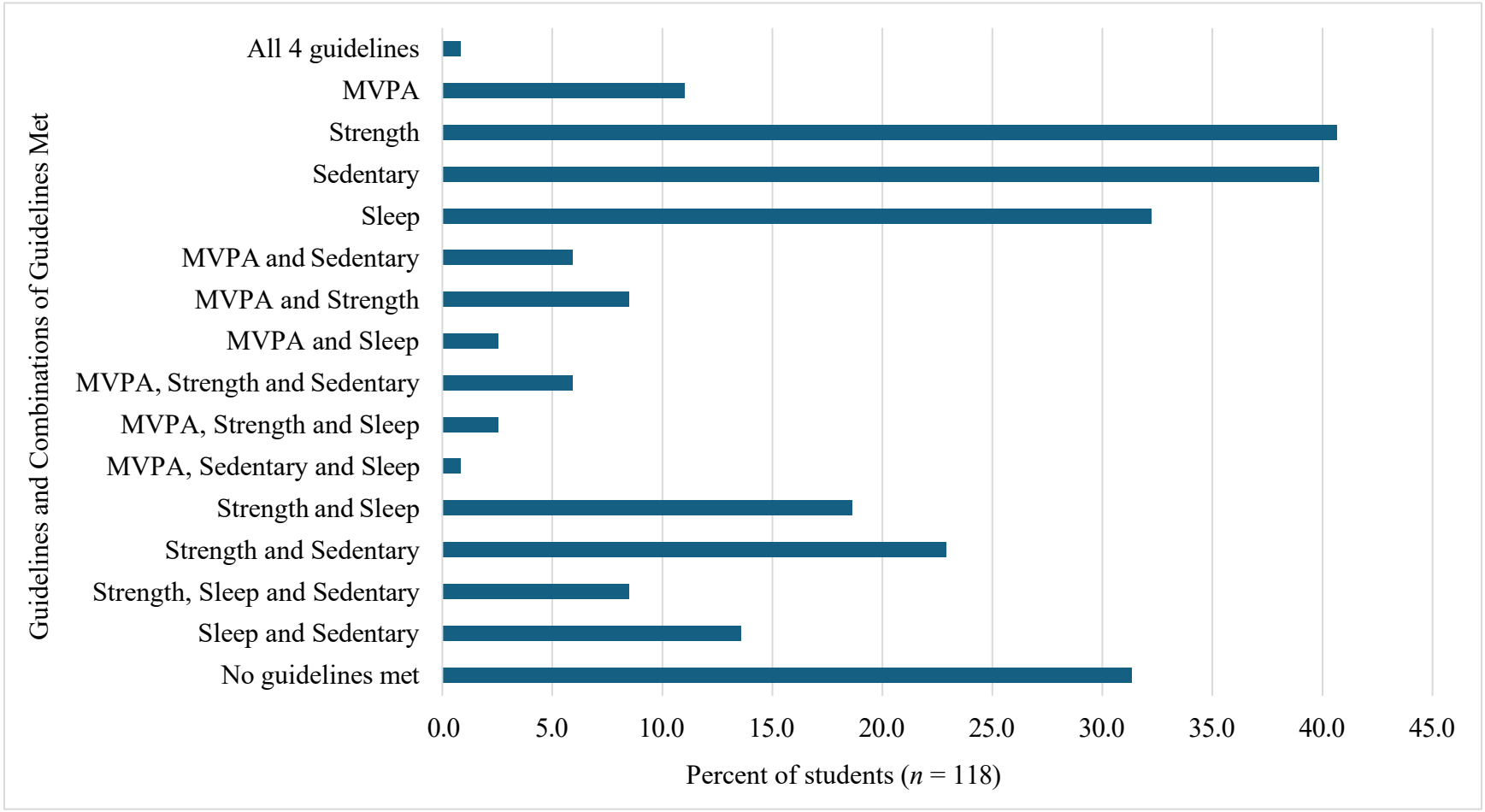


Table 3

The Proportion of Students (N = 118) Engaging in ≥ 60 Minutes of MPVA and Strength Exercises per Number of Days per Week

Behaviour	Days per Week						
Proportion (%) of students engaging in	**1**	**2**	**3**	**4**	**5**	**6**	**7**
≥60 min MVPA (all students)	7.6	19.5	11.9	19.5	9.3	15.3	5.9
Males	5.9	15.7	3.9	17.6	9.8	19.6	11.8
Females	9.0	22.4	17.9	20.9	9.0	11.9	1.5
Strength exercises (all students)	22.9	18.6	17.8	16.9	4.2	7.6	4.2
Males	21.6	19.6	9.8	17.6	2.0	11.8	7.8
Females	23.9	17.9	23.9	16.4	6.0	4.5	1.5

4. Discussion

Meeting individual and multiple 24-hour movement behavior guidelines is beneficial for young people's health. The median scores for all four 24-hour behavioral guidelines examined in this study were below the recommended levels, and the proportion of students meeting each guideline was low, especially for MVPA. In comparison to previous physical activity/inactivity levels of Costa Rican youth (Aguilar-Farias et al., 2018; Guthold et al., 2020), adolescents in this study were more inactive. For example, we found that 11.0% of students (15.7% of males and 7.5% of females) accrued ≥60 minutes of MVPA 7 days per week per day compared to Aguilar-Farias et al.'s findings, where 18.5% of students (24.7% of males and 12.1% of females) met the same criteria using the same GSHS MVPA question. Additionally, more than two-thirds of

students in our study did not meet the sedentary behavior guideline, compared with 41% of males and 46% of females in Costa Rica in 2009 (da Silva et al., 2024).

Consistent with the widespread pattern of insufficient sleep among adolescents worldwide (Gariepy et al., 2020), 60% of students in the current study did not meet the sleep duration guideline. As insufficient sleep in adolescence is associated with negative physical and mental health outcomes (Owens et al., 2014), poorer academic performance (Bao et al., 2024), and an increased risk of motor vehicle accidents (Owens et al., 2014), this finding is of concern. Also of concern are the findings that only one student met all the guidelines, and nearly one-third of students in the present study did not meet any of the guidelines. Meeting more of the 24-hour movement guidelines is associated with better academic performance (Bao et al., 2024), higher levels of wellbeing, mental and psychosocial health (Brown et al., 2021; Owens et al., 2014), and better physical health and health-related quality of life (Rollo et al., 2020) among adolescents.

Limitations

An important reason we conducted this pilot study was to examine the feasibility of recruiting participants. Despite the fact that the first author spoke Spanish, had taught in this school district, had advertised via social media, was onsite to personally give a presentation, recruit, and collect data, and offered a prize draw to consenting students, recruitment was challenging. We acknowledge that the 18% response rate (17% public, 30% private) may bias results and limit generalizability to all Costa Rican Grade 9 students. In retrospect, these strategies were directed toward the students and their immediate environment, whereas parents and guardians were only asked to provide informed consent. Strategies to raise awareness in the community, e.g., via local stores and community organizations (Owens et al., 2017) prior to recruiting students at school may have been more successful. Physical activity was measured

using one self-report GSHS core question (World Health Organization, 2021), which asked students how many days/week they accrued ≥60 minutes of MVPA. However, the 2020 WHO guidelines for MVPA are an average of 60 minutes/day across the week (Chaput et al., 2020) rather than every day. Therefore, our findings in relation to meeting the MVPA guideline are likely conservative. It should also be noted that because the GSHS core question regarding sedentary behavior does not only focus on recreational screen time, the cut-off of ≥3 hours per day, as previously used with the GSHS (Guthold et al., 2010), was used. Additionally, using accelerometry is desirable for measuring physical activity, sedentary behavior, and sleep in an integrated way (Rodrigues et al., 2025). We do, however, recommend supplementing accelerometry with other measures to capture all aspects of the 24-hour movement behaviors, such as strength exercises.

Conclusion

An aim of this pilot study was to provide preliminary evidence of the 24-hour movement behaviors of Grade 9 Costa Rican students. Our findings demonstrate that many Grade 9 students in the Guápiles' Regional Education Directorate of Costa Rica were not meeting guidelines for individual 24-hour movement behaviors or combinations of those behaviors. Contemporary "physical activity" research has moved to surveillance of integrated 24-hour movement behaviors as these behaviors are both interrelated and have a collective influence on young people's health. These pilot study findings demonstrate a need to concurrently examine the 24-hour movement behaviors of Costa Rican youth. Additionally, assessing health and academic outcomes associated with meeting individual and integrated 24-hour movement behavior guidelines is needed.

Acknowledgements

The authors wish to thank Marianne Chacón Mora and Marlin Barrif, who served as bilingual translators for this study.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

Aguilar-Farias, N., Martino-Fuentealba, P., Carcamo-Oyarzun, J., Cortinez-O'Ryan, A., Cristi-Montero, C., Von Oetinger, A., & Sadarangani, K. P. (2018). A regional vision of physical activity, sedentary behaviour and physical education in adolescents from Latin America and the Caribbean: Results from 26 countries. *International Journal of Epidemiology*, *47*(3), 976–986. https://doi.org/10.1093/ije/dyy033

Bang, F., Roberts, K. C., Chaput, J.-P., Goldfield, G. S., & Prince, S. A. (2020). *Physical activity, screen time and sleep duration: Combined associations with psychosocial health among Canadian children and youth*. Government of Canada. https://doi.org/10.25318/82-003-X202000500002-ENG

Bao, R., Qin, H., Memon, A. R., Chen, S., López-Gil, J. F., Liu, S., Zou, L., & Cai, Y. (2024). Is adherence to the 24-h movement guidelines associated with greater academic-related outcomes in children and adolescents? A systematic review and meta-analysis. *European Journal of Pediatrics*, *183*(5), 2003–2014. https://doi.org/10.1007/s00431-024-05461-2

Brown, D. M. Y., Kwan, M. Y., Arbour-Nicitopoulos, K. P., & Cairney, J. (2021). Identifying patterns of movement behaviours in relation to depressive symptoms during adolescence: A latent profile analysis approach. *Preventive Medicine*, *143*, 106352. https://doi.org/10.1016/j.ypmed.2020.106352

Chaput, J.-P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., Jago, R., Ortega, F. B., & Katzmarzyk, P. T. (2020). 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–17 years: Summary of the evidence. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 141. https://doi.org/10.1186/s12966-020-01037-z

da Silva, J. I., de Souza Andrade, A. C., & Muraro, A. P. (2024). Global physical activity, active commuting to school, and sedentary behavior among Latin American adolescents: Global School-Based Student Health Survey and the National School Health Survey. *Journal of Physical Activity and Health*, *21*(9), 879–889. https://doi.org/10.1123/jpah.2022-0645

de Lannoy, L., Barbeau, K., Vanderloo, L. M., Goldfield, G., Lang, J. J., MacLeod, O., & Tremblay, M. S. (2023). Evidence supporting a combined movement behavior approach for children and youth's mental health – A scoping review and environmental scan. *Mental Health and Physical Activity*, *24*, 100511. https://doi.org/10.1016/j.mhpa.2023.100511

Faulkner, G., Weatherson, K., Patte, K., Qian, W., & Leatherdale, S. T. (2020). Are one-year changes in adherence to the 24-hour movement guidelines associated with flourishing among Canadian youth? *Preventive Medicine*, *139*, 106179. https://doi.org/10.1016/j.ypmed.2020.106179

Ferrari, G., Alberico, C., Drenowatz, C., Kovalskys, I., Gómez, G., Rigotti, A., Cortés, L. Y., García, M. Y., Liria-Domínguez, M. R., Herrera-Cuenca, M., Peralta, M., Marques, A., Marconcin, P., Cristi-Montero, C., Leme, A. C. B., Zimberg, I. Z., Farías-Valenzuela, C., Fisberg, M., & Rollo, S. (2022). Prevalence and sociodemographic correlates of meeting the Canadian 24-hour movement guidelines among Latin American adults: A multi-national cross-sectional study. *BMC Public Health*, *22*(1), 217. https://doi.org/10.1186/s12889-022-12613-2

Gariepy, G., Danna, S., Gobiņa, I., Rasmussen, M., Gaspar De Matos, M., Tynjälä, J., Janssen, I., Kalman, M., Villeruša, A., Husarova, D., Brooks, F., Elgar, F. J., Klavina-Makrecka, S., Šmigelskas, K., Gaspar, T., & Schnohr, C. (2020). How are adolescents sleeping?

Adolescent sleep patterns and sociodemographic differences in 24 European and North American countries. *Journal of Adolescent Health*, *66*(6), S81–S88. https://doi.org/10.1016/j.jadohealth.2020.03.013

Guthold, R., Cowan, M. J., Autenrieth, C. S., Kann, L., & Riley, L. M. (2010). Physical Activity and Sedentary Behavior Among Schoolchildren: A 34-Country Comparison. *The Journal of Pediatrics*, *157*(1), 43-49.e1. https://doi.org/10.1016/j.jpeds.2010.01.019

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1·6 million participants. *The Lancet Child & Adolescent Health*, *4*(1), 23–35. https://doi.org/10.1016/S2352-4642(19)30323-2

Janssen, I., Roberts, K. C., & Thompson, W. (2017). Is adherence to the Canadian 24-Hour Movement Behaviour Guidelines for Children and Youth associated with improved indicators of physical, mental, and social health? *Applied Physiology, Nutrition, and Metabolism*, *42*(7), 725–731. https://doi.org/10.1139/apnm-2016-0681

Ministerio de Cultura, y Juventud (2013). *Segunda encuesta nacional de juventudes: Informe de principales resultados*. https://cpj.go.cr/segunda-encuesta-nacional-de-juventudes-2013/

Ministerio de Cultura, y Juventud (2018). *Tercera encuesta nacional de juventudes: Informe de principales resultados.* https://cpj.go.cr/documento/informe-de-principales-resultados/

Ministerio de Salud y Ministerio de Deporte y Recreación (2011). Plan nacional de actividad física y salud 2011-221. https://repositorio-snp.mideplan.go.cr/handle/123456789/70?locale-attribute=en

Ministerio de Salud & Caravaca, Rodríguez, I. (2019). *Informe ejecutivo encuesta nacional colegial 2018.*

Owens, J., Au, R., Carskadon, M., Millman, R., Wolfson, A., Braverman, P. K., Adelman, W.P., Breuner, C.C., Levine, D.A., Marcell, A.V., Murray, P. J., O'Brien, R. F. (2014). Insufficient sleep in adolescents and young adults: An update on causes and consequences. *Pediatrics, 134,* e921-e932. https://doi.org/10.1542/peds.2014-1696

Owens, O. L., James, C., & Friedman, D. B. (2017). Overcoming the challenges of African-American recruitment in health sciences research: Strategies and recommendations. *Urologic Nursing*, *37*(6), 293. https://doi.org/10.7257/1053-816X.2017.37.6.293

Rodrigues, B., Videira-Silva, A., Lopes, L., Sousa-Sá, E., Vale, S., Cliff, D. P., Mendes, R., & Santos, R. (2025). Methodological choices on 24-h movement behavior assessment by accelerometry: A scoping review. *Sports Medicine - Open*, *11*(1), 25. https://doi.org/10.1186/s40798-025-00820-1

Rollo, S., Antsygina, O., & Tremblay, M. S. (2020). The whole day matters: Understanding 24-hour movement guideline adherence and relationships with health indicators across the lifespan. *Journal of Sport and Health Science*, *9*(6), 493–510. https://doi.org/10.1016/j.jshs.2020.07.004

Sampasa-Kanyinga, H., Standage, M., Tremblay, M. S., Katzmarzyk, P. T., Hu, G., Kuriyan, R., Maher, C., Maia, J., Olds, T., Sarmiento, O. L., Tudor-Locke, C., & Chaput, J.-P. (2017). Associations between meeting combinations of 24-h movement guidelines and health-related quality of life in children from 12 countries. *Public Health*, *153*, 16–24. https://doi.org/10.1016/j.puhe.2017.07.010

Tremblay, M. S., Carson, V., Chaput, J., Connor Gorber, S., Dinh, T., Duggan, M. et al. (2016). Canadian 24-Hour Movement Guidelines for Children and Youth: An Integration of

Physical Activity, Sedentary Behaviour, and Sleep. *Applied Physiology, Nutrition, and Metabolism, 41,* S311-S327. https://doi.org/10.1139/apnm-2016-0151

Van Teijlingen, E., & Hundley, V. (2002). The importance of pilot studies. *Nursing Standard*, *16*(40), 33–36. https://doi.org/10.7748/ns2002.06.16.40.33.c3214

Wilhite, K., Booker, B., Huang, B.-H., Antczak, D., Corbett, L., Parker, P., Noetel, M., Rissel, C., Lonsdale, C., Del Pozo Cruz, B., & Sanders, T. (2023). Combinations of physical activity, sedentary behavior, and sleep duration and their associations with physical, psychological, and educational outcomes in children and adolescents: A systematic review. *American Journal of Epidemiology*, *192*(4), 665–679. https://doi.org/10.1093/aje/kwac212

World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behaviour* (1st ed). World Health Organization.

World Health Organization. (2021). *GSHS core questionnaire modules (2021)*. https://www.who.int/publications/m/item/gshs-core-questionnaire-modules-(2021)

Ziaei, R., Dastgiri, S., Soares, J., Baybordi, E., Zeinalzade, A. H., Rahimi, V. A., & Mohammadi, R. (2014). Reliability and validity of the Persian version of Global School-Based Student Health Survey adapted for Iranian School Students. *Journal of Clinical Research & Governance*, 3, 134-140.

References

Ackah, M., Owiredu, D., Salifu, M. G., & Yeboah, C. O. (2022). Estimated prevalence and gender disparity of physical activity among 64,127 in-school adolescents (aged 12–17 years): A multi-country analysis of Global School-based Health Surveys from 23 African countries. *PLOS Global Public Health*, *2*(10), e0001016. https://doi.org/10.1371/journal.pgph.0001016

Aguilar-Farias, N., Martino-Fuentealba, P., Carcamo-Oyarzun, J., Cortinez-O'Ryan, A., Cristi-Montero, C., Von Oetinger, A., & Sadarangani, K. P. (2018). A regional vision of physical activity, sedentary behaviour and physical education in adolescents from Latin America and the Caribbean: Results from 26 countries. *International Journal of Epidemiology*, *47*(3), 976–986. https://doi.org/10.1093/ije/dyy033

Ahmed, S. P., Bittencourt-Hewitt, A., & Sebastian, C. L. (2015). Neurocognitive bases of emotion regulation development in adolescence. *Developmental Cognitive Neuroscience*, *15*, 11–25. https://doi.org/10.1016/j.dcn.2015.07.006

Al Zaki, M., Umar, U., Yenes, R., Rasyid, W., Ockta, Y., & Budiwanto, A. (2023). The impact of regular physical activity on lipid profile and cardiovaskular health in adolescents: A literature review. *Jurnal Penelitian Pendidikan IPA*, *9*(SpecialIssue), 213–221. https://doi.org/10.29303/jppipa.v9iSpecialIssue.7811

Albert, D., Chein, J., & Steinberg, L. (2013). Peer influences on adolescent decision making. *Current Directions in Psychological Science*, *22*(2), 114–120. https://doi.org/10.1177/0963721412471347

Alkhraiji, M. H., Barker, A. R., & Williams, C. A. (2022). Reliability and validity of using the global school-based student health survey to assess 24 hour movement behaviours in

adolescents from Saudi Arabia. *Journal of Sports Sciences*, *40*(14), 1578–1586. https://doi.org/10.1080/02640414.2022.2092982

Álvarez, C. E., Monge, M. F. H., González, E. H., Víquez, G. V., & Vargas, G. A. (2020). Overweight, obesity, physical activity levels, and self-esteem in Central American children: Comparative analysis between countries. *Retos*, *37*, 238–246. https://doi.org/10.47197/retos.v37i37.71680

Ani, M. F. A., Subhi, L. K. A., & Bose, S. (2016). Consumption of fruits and vegetables among adolescents: A multi-national comparison of eleven countries in the Eastern Mediterranean Region. *British Journal of Nutrition*, *116*(10), 1799–1806. https://doi.org/10.1017/S0007114516003810

APA. (2012). Guidelines for psychological practice with lesbian, gay, and bisexual clients. *American Psychologist*, *67*(1), 10–42. https://doi.org/10.1037/a0024659

APA. (2020). *Publication manual of the American Psychological Association* (7th ed.). American Psychological Association. https://doi.org/10.1037/0000165-000

Araujo, R. H. O., Werneck, A. O., Martins, C. L., Barboza, L. L., Tassitano, R. M., Aguilar-Farias, N., Jesus, G. M., Ramírez-Vélez, R., Tesler, R., Oyeyemi, A. L., Silva, E. C. M., Weaver, R. G., Tremblay, M. S., Brazo-Sayavera, J., Mielke, G. I., & Silva, D. R. P. (2024). Global prevalence and gender inequalities in at least 60 min of self-reported moderate-to-vigorous physical activity 1 or more days per week: An analysis with 707,616 adolescents. *Journal of Sport and Health Science*, *13*(5), 709–716. https://doi.org/10.1016/j.jshs.2023.10.011

Araya, G. (2023). *Efecto de la pandemia por la enfermedad de COVID-19 en los indicadores de actividad física, deporte, recreación y afines en la población residente en Costa Rica.*

Compendio de información del proyecto "Estado del Deporte y la Recreación en Costa Rica: Oportunidades para la práctica de actividad física con fines de recreación, salud o de rendimiento físico en las comunidades". https://hdl.handle.net/10669/89927

Araya, G., & Claramunt, M. (2020). *Actividad física en Costa Rica, antecedentes históricos y revisión de sus evidencias científicas en el país*. https://hdl.handle.net/10669/82866

Araya Umaña. (2003). Caminos recorridos por las políticas educativas de género. *Revista Electrónica Actualidades Investigativas En Educación*, *3*(2), 1–30.

Arnett, J. J. (2007). Emerging adulthood: What is it, and what is it good for? *Child Development Perspectives*, *1*(2), 68–73. https://doi.org/10.1111/j.1750-8606.2007.00016.x

Arsani, Maksum, Ali, Abdul Rahman, SyamTuasikal, & Kusnanik, N. W. (2020). Differences in motivational orientation in physical education in terms of gender differences. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, *3*(3), 1428–1434.

Arslan Kabasakal, S., & Geri, S. (2024). The relationship between physical fitness levels, motivation to participate in physical education and physical activity attitudes of middle school students. *SHS Web of Conferences*, *206*, 01023. https://doi.org/10.1051/shsconf/202420601023

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review*, *64*(6, Pt.1), 359–372. https://doi.org/10.1037/h0043445

Aubert, S., Barnes, J. D., Abdeta, C., Nader, P. A., Adeniyi, A. F., Aguilar-Farias, N., Tenesaca, D. S. A., Bhawra, J., Brazo-Sayavera, J., Cardon, G., Chang, C.-K., Nyström, C. D., Demetriou, Y., Draper, C. E., Edwards, L., Emeljanovas, A., Gába, A., Galaviz, K. I., González, S. A., … Tremblay, M. S. (2018). *Global matrix 3.0 physical activity report*

card grades for children and youth: Results and analysis from 49 countries. https://doi.org/10.1123/jpah.2018-0472

Aubert, S., Barnes, J. D., Demchenko, I., Hawthorne, M., Abdeta, C., Abi Nader, P., Adsuar Sala, J. C., Aguilar-Farias, N., Aznar, S., Bakalár, P., Bhawra, J., Brazo-Sayavera, J., Bringas, M., Cagas, J. Y., Carlin, A., Chang, C.-K., Chen, B., Christiansen, L. B., Christie, C. J.-A., … Tremblay, M. S. (2022). Global matrix 4.0 physical activity report card grades for children and adolescents: Results and analyses from 57 countries. *Journal of Physical Activity and Health*, *19*(11), 700–728. https://doi.org/10.1123/jpah.2022-0456

Aubert, S., Brazo-Sayavera, J., González, S. A., Janssen, I., Manyanga, T., Oyeyemi, A. L., Picard, P., Sherar, L. B., Turner, E., & Tremblay, M. S. (2021). Global prevalence of physical activity for children and adolescents; inconsistencies, research gaps, and recommendations: A narrative review. *International Journal of Behavioral Nutrition and Physical Activity*, *18*(1), 81. https://doi.org/10.1186/s12966-021-01155-2

Australian Government Department of Health and Aged Care. (2019). *Australian 24-hour movement guidelines for children (5 to 12 years) and young people (13 to 17 years): An integration of physical activity, sedentary behaviour, and sleep*. Australian Government Department of Health and Aged Care. https://www.health.gov.au/resources/publications/australian-24-hour-movement-guidelines-for-children-5-to-12-years-and-young-people-13-to-17-years-an-integration-of-physical-activity-sedentary-behaviour-and-sleep?language=en

Azzarito, L., Solmon, M. A., & Harrison Jr., L. (2006). "...If I had a choice, I would...." A feminist poststructuralist perspective on girls in physical education. *Research Quarterly*

for Exercise and Sport, *77*(2), 222–239. https://doi.org/10.1080/02701367.2006.10599356

Badr, H. E., Lakha, S. F., & Pennefather, P. (2017). Differences in physical activity, eating habits and risk of obesity among Kuwaiti adolescent boys and girls: A population-based study. *International Journal of Adolescent Medicine and Health*, *31*(1). https://doi.org/10.1515/ijamh-2016-0138

Baena-Extremera, A., Granero-Gallegos, A., & Del Mar Ortiz-Camacho, M. (2012). Quasi-experimental study of the effect of an adventure education programme on classroom satisfaction, physical self-concept and social goals in physical education. *Psychologica Belgica*, *52*(4), 369–386. https://doi.org/10.5334/pb-52-4-369

Ballestero, C., Chaves, K., Lobo, J., & Román, A. L. (2013). Educación física en América Latina: Costa Rica. *Actividad física y ciencias / physical activity and science*, *5*(1), Article 1. http://historico.upel.edu.ve:81/revistas/index.php/actividadfisicayciencias/article/view/5592

Bandura, A. (1977a). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1977b). *Social learning theory*. Prentice Hall.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Bang, F., Roberts, K. C., Chaput, J.-P., Goldfield, G. S., & Prince, S. A. (2020). *Physical activity, screen time and sleep duration: Combined associations with psychosocial health*

among Canadian children and youth. Government of Canada. https://doi.org/10.25318/82-003-X202000500002-ENG

Banville, D., Risto, M., Hodges Kulinna, P., & Ferry, M. (2021). Curriculum decisions made by secondary physical education teachers and comparison with students' preferences. *Curriculum Studies in Health and Physical Education*, *12*(3), 199–216. https://doi.org/10.1080/25742981.2021.1893124

Bao, R., Qin, H., Memon, A. R., Chen, S., López-Gil, J. F., Liu, S., Zou, L., & Cai, Y. (2024). Is adherence to the 24-h movement guidelines associated with greater academic-related outcomes in children and adolescents? A systematic review and meta-analysis. *European Journal of Pediatrics*, *183*(5), 2003–2014. https://doi.org/10.1007/s00431-024-05461-2

Barkoukis, V., Taylor, I., Chanal, J., & Ntoumanis, N. (2014). The relation between student motivation and student grades in physical education: A 3-year investigation. *Scandinavian Journal of Medicine & Science in Sports*, *24*(5), e406–e414. https://doi.org/10.1111/sms.12174

Bassett, D. R., Fitzhugh, E. C., Heath, G. W., Erwin, P. C., Frederick, G. M., Wolff, D. L., Welch, W. A., & Stout, A. B. (2013). Estimated Energy Expenditures for School-Based Policies and Active Living. *American Journal of Preventive Medicine*, *44*(2), 108–113. https://doi.org/10.1016/j.amepre.2012.10.017

Baumgartner, T., & Hensley, H. (2013). *Conducting & reading research in kinesiology* (5th ed.). McGraw-Hill.

B.C. Curriculum. (n.d.). *Physical health and education—Goals and rationale*. Retrieved August 21, 2025, from https://curriculum.gov.bc.ca/curriculum/physical-health-education/goals-and-rationale

Beaton, D., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186–3191. https://doi.org/10.1097/00007632-200012150-00014

Beaton, D., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2007). *Recommendations for the cross-cultural adaptation of the DASH & QuickDASH outcome measures*. https://www.researchgate.net/publication/265000941_Recommendations_for_the_Cross-Cultural_Adaptation_of_the_DASH_QuickDASH_Outcome_Measures_Contributors_to_this_Document

Beck, N. I., Arif, I., Paumier, M. F., & Jacobsen, K. H. (2016). Adolescent injuries in Argentina, Bolivia, Chile, and Uruguay: Results from the 2012–2013 Global School-based Student Health Survey (GSHS). *Injury*, *47*(12), 2642–2649. https://doi.org/10.1016/j.injury.2016.10.002

Becker, A. E., Roberts, A. L., Perloe, A., Bainivualiku, A., Richards, L. K., Gilman, S. E., & Striegel-Moore, R. H. (2010). Youth health-risk behavior assessment in Fiji: The reliability of Global School-based Student Health Survey content adapted for ethnic Fijian girls. *Ethnicity & Health*, *15*(2), 181–197. https://doi.org/10.1080/13557851003615552

Beltrán-Carrillo, V. J., Devís-Devís, J., Peiró-Velert, C., & Brown, D. H. K. (2012). When physical activity participation promotes inactivity: Negative experiences of Spanish adolescents in physical education and sport. *Youth & Society*, *44*(1), 3–27. https://doi.org/10.1177/0044118X10388262

Beni, S., Fletcher ,Tim, & and Ní Chróinín, D. (2017). Meaningful experiences in physical education and youth sport: A review of the literature. *Quest*, *69*(3), 291–312. https://doi.org/10.1080/00336297.2016.1224192

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day* (1st ed.). International Society for Technology in Education.

Bernabe-Ortiz, A., & Carrillo-Larco, R. M. (2022). Physical activity patterns among adolescents in the Latin American and Caribbean region. *Journal of Physical Activity & Health*, *19*(9), 607–614. https://doi.org/10.1123/jpah.2022-0136

Biadgilign, S., Gebremichael, B., Abera, A., & Moges, T. (2022). Gender difference and correlates of physical activity among urban children and adolescents in Ethiopia: A cross-sectional study. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.731326

Biddle, S., & Armstrong, N. (1992). Children's physical activity: An exploratory study of psychological correlates. *Social Science & Medicine*, *34*(3), 325–331. https://doi.org/10.1016/0277-9536(92)90274-T

Bischops, A. C., Radev, S. T., Köthe, U., Chen, S., Geldsetzer, P., Sarker, M., Su, T. T., Mohamed, F. A., Darwish, N., Ahmad, N. A., Ould Baba, S. A., Bärnighausen, T., & Barteit, S. (2023). Data Resource Profile: The Global School-based Student Health Survey—behavioural risk and protective factors among adolescents. *International Journal of Epidemiology*, *52*(2), e102–e109. https://doi.org/10.1093/ije/dyac208

Blakemore, S.-J. (2018). *Inventing ourselves: The secret life of the teenage brain* (1st ed.). Public Affairs.

Borsa, J. C., Damásio, B. F., & Bandeira, D. R. (2012). Cross-cultural adaptation and validation of psychological instruments: Some considerations. *Paidéia (Ribeirão Preto)*, *22*, 423–432. https://doi.org/10.1590/S0103-863X2012000300014

Bouchard, C., Blair, S. N., & Haskell, W. L. (2012). *Physical Activity and Health*. Human Kinetics.

Boyd, M., Weinmann, C., & Yin, Z. (2002). The relationship of physical self-perceptions and goal orientations to intrinsic motivation for exercise. *Journal of Sport Behavior*, *25*(1).

Brankovic, E., & Hadzikadunic, M. (2017). Physical Education Experimental Program to Test the Effect on Perceived Competence. *Sport Mont*, *15*(2), 25–30.

Brazo-Sayavera, J., Aubert, S., Barnes, J. D., González, S. A., & Tremblay, M. S. (2021). Gender differences in physical activity and sedentary behavior: Results from over 200,000 Latin-American children and adolescents. *PLOS ONE*, *16*(8), e0255353. https://doi.org/10.1371/journal.pone.0255353

Brinkman, J. E., Reddy, V., & Sharma, S. (2025). Physiology of sleep. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK482512/

Brown, D. M. Y., Kwan, M. Y., Arbour-Nicitopoulos, K. P., & Cairney, J. (2021). Identifying patterns of movement behaviours in relation to depressive symptoms during adolescence: A latent profile analysis approach. *Preventive Medicine*, *143*, 106352. https://doi.org/10.1016/j.ypmed.2020.106352

Budzynski-Seymour, E., Milton, K., Mills, H., Wade, M., Foster, C., Vishnubala, D., Baxter, B., Williamson, C., & Steele, J. (2021). A rapid review of communication strategies for physical activity guidelines and physical activity promotion: A review of worldwide

strategies. *Journal of Physical Activity and Health*, *18*(8), 1014–1027. https://doi.org/10.1123/jpah.2020-0832

Buehler, C., & Welsh, D. P. (2009). A process model of adolescents' triangulation into parents' marital conflict: The role of emotional reactivity. *Journal of Family Psychology*, *23*(2), 167–180. https://doi.org/10.1037/a0014976

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., Carty, C., Chaput, J.-P., Chastin, S., Chou, R., Dempsey, P. C., DiPietro, L., Ekelund, U., Firth, J., Friedenreich, C. M., Garcia, L., Gichu, M., Jago, R., Katzmarzyk, P. T., … Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, *54*(24), 1451–1462. https://doi.org/10.1136/bjsports-2020-102955

Burnard, P. (1991). A method of analysing interview transcripts in qualitative research. *Nurse Education Today*, *11*(6), 461–466. https://doi.org/10.1016/0260-6917(91)90009-Y

Burnett, S., Jih, Y.-R., Block, P., Hiu, C.-F., Holmes, E., & Lau, J. (2015). Relationship reciprocation modulates resource allocation in adolescent social networks: Developmental effects. *Child Development*, *86*(5). https://doi.org/10.1111/cdev.12396

Burton, A. M., Cowburn, I., Thompson, F., Eisenmann, J. C., Nicholson, B., & Till, K. (2023). Associations between motor competence and physical activity, physical fitness and psychosocial characteristics in adolescents: A systematic review and meta-analysis. *Sports Medicine*, *53*(11), 2191–2256. https://doi.org/10.1007/s40279-023-01886-1

Camacho-Miñano, M. J., LaVoi, N. M., & Barr-Anderson, D. J. (2011). Interventions to promote physical activity among young and adolescent girls: A systematic review. *Health Education Research*, *26*(6), 1025–1049. https://doi.org/10.1093/her/cyr040

Capel, S., Cliffe, J., & Lawrence, J. (Eds.). (2021). *Learning to teach physical education in the secondary school: A companion to school experience* (5th ed.). Routledge, Taylor & Francis Group.

Carson, V., Hunter, S., Kuzik, N., Gray, C. E., Poitras, V. J., Chaput, J.-P., Saunders, T. J., Katzmarzyk, P. T., Okely, A. D., Connor Gorber, S., Kho, M. E., Sampson, M., Lee, H., & Tremblay, M. S. (2016). Systematic review of sedentary behaviour and health indicators in school-aged children and youth: An update. *Applied Physiology, Nutrition, and Metabolism*, *41*(6 Suppl 3), S240-265. https://doi.org/10.1139/apnm-2015-0630

Caspersen, C. J., Pereira, M. A., & Curran, K. M. (2000). Changes in physical activity patterns in the United States, by sex and cross-sectional age. *Medicine & Science in Sports & Exercise*, *32*(9), 1601.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, *100*(2), 126–131.

CDC. (2013). *Comprehensive school physical activity programs: A guide for schools*. U.S. Department of Health and Human Services.

CDC. (2022, July 26). *Physical education, physical activity, healthy schools*. https://www.cdc.gov/physical-activity-education/data-policy/?CDC_AAref_Val=https://www.cdc.gov/healthyschools/physicalactivity/physical-education.htm

Cerin, E., Cain, K. L., Oyeyemi, A. L., Owen, N., Conway, T. L., Cochrane, T., Van Dyck, D., Schipperijn, J., Mitáš, J., Toftager, M., Aguinaga-Ontoso, I., & Sallis, J. F. (2016). Correlates of agreement between accelerometry and self-reported physical activity.

Medicine & Science in Sports & Exercise, *48*(6), 1075. https://doi.org/10.1249/MSS.0000000000000870

Chagas, D. V., & Batista, L. A. (2017). Comparison of health outcomes among children with different levels of motor competence. *Human Movement*, *18*(2), 56–61. https://doi.org/10.1515/humo-2017-0018

Chalkley, A., & Milton, K. (2021). A critical review of national physical activity policies relating to children and young people in England. *Journal of Sport and Health Science*, *10*(3), 255–262. https://doi.org/10.1016/j.jshs.2020.09.010

Chaput, J.-P., Gray, C. E., Poitras, V. J., Carson, V., Gruber, R., Olds, T., Weiss, S. K., Connor Gorber, S., Kho, M. E., Sampson, M., Belanger, K., Eryuzlu, S., Callender, L., & Tremblay, M. S. (2016). Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Applied Physiology, Nutrition, and Metabolism*, *41*(6 (Suppl. 3)), S266–S282. https://doi.org/10.1139/apnm-2015-0627

Chaput, J.-P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., Jago, R., Ortega, F. B., & Katzmarzyk, P. T. (2020). 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–17 years: Summary of the evidence. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 141. https://doi.org/10.1186/s12966-020-01037-z

Chen, H., Liu, J., & Bai, Y. (2023). Global accelerometer-derived physical activity levels from preschoolers to adolescents: A multilevel meta-analysis and meta-regression. *Annals of Behavioral Medicine*, *57*(7), 511–529. https://doi.org/10.1093/abm/kaac030

Cheon, S. H., Reeve, J., & Moon, I. S. (2012). Experimentally based, longitudinally designed, teacher-focused intervention to help physical education teachers be more autonomy

supportive toward their students. *Journal of Sport & Exercise Psychology*, *34*, 365–396. https://doi.org/10.1123/jsep.34.3.365

Choudhury, S., Charman, T., & Blakemore, S.-J. (2008). Development of the teenage brain. *Mind, Brain, and Education*, *2*(3), 142–147. https://doi.org/10.1111/j.1751-228X.2008.00045.x

Clark, J. E., & Metcalfe, J. S. (2002). The mountain of motor development: A metaphor. *In J.E. Clark & J. Humphrey (Eds.), Motor Development: Research and Reviews*, *2*, 163–190.

Cocca, A., Veulliet, N., Niedermeier, M., Drenowatz, C., Cocca, M., Greier, K., & Ruedl, G. (2022). Psychometric parameters of the intrinsic motivation inventory adapted to physical education in a sample of active adults from Austria. *Sustainability*, *14*(20), Article 20. https://doi.org/10.3390/su142013681

Cockburn, C., & Clarke, G. (2002). "Everybody's looking at you!": Girls negotiating the "femininity deficit" they incur in physical education. *Women's Studies International Forum*, *25*(6), 651–665. https://doi.org/10.1016/S0277-5395(02)00351-5

Conger, S. A., Toth, L. P., Cretsinger, C., Raustorp, A., Mitáš, J., Inoue, S., & Bassett, D. R. (2022). Time trends in physical activity using wearable devices: A systematic review and meta-analysis of studies from 1995 to 2017. *Medicine & Science in Sports & Exercise*, *54*(2), 288–298. https://doi.org/10.1249/MSS.0000000000002794

Corbin, C., Pangrazi, R., & Franks, B. (2000). Definitions: Health, Fitness, and Physical Activity. *President's Council on Physical Fitness and Sports Research Digest*, *3*.

Cox, A. E., Smith, A. L., & Williams, L. (2008). Change in physical education motivation and physical activity behavior during middle school. *Journal of Adolescent Health*, *43*(5), 506–513. https://doi.org/10.1016/j.jadohealth.2008.04.020

CPJ. (2013). *Segunda encuesta nacional de juventudes: Informe de principales resultados* (World). CPJ. https://cpj.go.cr/documento/2da-encuesta-nacional-de-juventudes-costa-rica-2013/

CPJ. (2018). *Tercera encuesta nacional de juventudes: Informe de principales resultados. Primera edición* (p. 350). https://cpj.go.cr/documento/informe-de-principales-resultados/

Creación del Instituto Costarricense del Deporte y la Recreación y del régimen jurídico de la educación física, el deporte y la recreación, 7800 Civil Code (Costa Rica) (1998). https://pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param2=NRTC&nValor1=1&nValor2=26290&strTipM=TC

CSEP. (2021). *24-hour movement guidelines for children & youth 5-17 years*. https://csepguidelines.ca/guidelines/children-youth/

CSEP. (2025). *Glossary – 24-hour movement guidelines*. https://csepguidelines.ca/resources/glossary/

Da Silva, J. I., De Souza Andrade, A. C., & Muraro, A. P. (2024). Global physical activity, active commuting to school, and sedentary behavior among Latin American adolescents: Global School-Based Student Health Survey and the National School Health Survey. *Journal of Physical Activity and Health*, *21*(9), 879–889. https://doi.org/10.1123/jpah.2022-0645

D'Agostino, E. M., & Neshteruk, C. D. (2023). Physical activity intensity measurement and association With Adolescent health: Chartering new frontiers. *Journal of Adolescent Health*, *73*(1), 6–7. https://doi.org/10.1016/j.jadohealth.2023.03.009

Davis, M., Gleddie, D. L., Nylen, J., Leidl, R., Toulouse, P., Baker, K., & Gillies, L. (2023). *Canadian physical and health education competencies*. Physical and Health Education Canada.

De Meester, A., Maes, J., Stodden, D., Cardon, G., Goodway, J., Lenoir, M., & Haerens, L. (2016). Identifying profiles of actual and perceived motor competence among adolescents: Associations with motivation, physical activity, and sports participation. *Journal of Sports Sciences*, *34*(21), 2027–2037. https://doi.org/10.1080/02640414.2016.1149608

De Moraes Ferrari, G. L., Kovalskys, I., Fisberg, M., Gómez, G., Rigotti, A., Sanabria, L. Y. C., García, M. C. Y., Torres, R. G. P., Herrera-Cuenca, M., Zimberg, I. Z., Guajardo, V., Pratt, M., King, A. C., Solé, D., Fisberg, M., Kovalskys, I., Gómez, G., Rigotti, A., Sanabria, L. Y. C., … on behalf of the ELANS Study Group. (2019). Original research socio-demographic patterning of self-reported physical activity and sitting time in Latin American countries: Findings from ELANS. *BMC Public Health*, *19*(1), 1723. https://doi.org/10.1186/s12889-019-8048-7

Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, *18*(1), 105–115.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer US. https://doi.org/10.1007/978-1-4899-2271-7

Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2008a). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology*, *49*(1), 14–23. https://doi.org/10.1037/0708-5591.49.1.14

Deci, E. L., & Ryan, R. M. (2008b). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, *49*(3), 182–185. https://doi.org/10.1037/a0012801

DePaolo, C. A., & Wilkinson, K. (2014). Get your head into the clouds: Using word clouds for analyzing qualitative assessment data. *TechTrends*, *58*(3), 38–44. https://doi.org/10.1007/s11528-014-0750-9

DeVellis, R. F. (2012). *Scale development: Theory and applications*. SAGE Publications.

Dirección Regional de Educación Guápiles. (n.d.). *Supervisiones y circuitos escolares. Cantones de Pococí y Guácimo*. Retrieved July 23, 2025, from https://direccionregionaldeguapiles.com/supervisiones-dreg

Dishman, R. K., Washburn, R. A., & Schoeller, D. A. (2001). Measurement of physical activity. *Quest*, *53*(3), 295–309. https://doi.org/10.1080/00336297.2001.10491746

Durante, R., & Ainsworth, B. E. (1996). The recall of physical activity: Using a cognitive model of the question-answering process. *Medicine & Science in Sports & Exercise*, *28*(10), 1282.

Dyson, B., & Strachan, K. (2000). Co-operative learning in a high school physical education programm. *Waikato Journal of Education*, *6*. https://doi.org/10.15663/wje.v6i1.453

Dyson, B., & Sutherland, S. (2014). Adventure education in your physical education program. In *Standards-Based Physical Education Curriculum Development* (5th ed., pp. 229–254). Jones & Bartlett Learning.

Eccles, J. S., & Harold, R. D. (1991). Gender differences in sport involvement: Applying the eccles' expectancy-value model. *Journal of Applied Sport Psychology*, *3*(1), 7–35. https://doi.org/10.1080/10413209108406432

Eizagirre-Sagastibeltza, O., Fernandez-Lasa, U., & Usabiaga, O. (2024). 'You're not good': Inequalities experienced by women in physical education during their childhood and adolescence. *Physical Education and Sport Pedagogy*, 1–10. https://doi.org/10.1080/17408989.2024.2374265

Evert Iraheta, B., & Álvarez Bogantes, C. (2020). Análisis del sobrepeso y obesidad, niveles de actividad física y autoestima de la niñez salvadoreña. *MHSalud: Revista en Ciencias del Movimiento Humano y Salud*, *17*(1), Article 1. https://doi.org/10.15359/mhs.17-1.1

Fairclough, S., & Stratton, G. (2005). Physical activity levels in middle and high school physical education: A review. *Pediatric Exercise Science*, *17*, 217–236. https://doi.org/10.1123/pes.17.3.217

Faulkner, G., Weatherson, K., Patte, K., Qian, W., & Leatherdale, S. T. (2020). Are one-year changes in adherence to the 24-hour movement guidelines associated with flourishing among Canadian youth? *Preventive Medicine*, *139*, 106179. https://doi.org/10.1016/j.ypmed.2020.106179

Fernández, J. D., García Martínez, S., Sotos-Martínez, V. J., & Ferriz Valero, A. (2022). *Application of parkour in physical education: Agility learning and improvement*. https://doi.org/10.7752/jpes.2022.03089

Fernández-Espínola, C., Almagro, B. J., Tamayo-Fajardo, J. A., & Sáenz-López, P. (2020). Complementing the self-determination theory with the need for novelty: Motivation and

intention to be physically active in physical education students. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.01535

Fernández-Río, J., & and Suarez, C. (2016). Feasibility and students' preliminary views on parkour in a group of primary school children. *Physical Education and Sport Pedagogy*, *21*(3), 281–294. https://doi.org/10.1080/17408989.2014.946008

Ferrer-Caja, E., & Weiss, M. R. (2002). Cross-validation of a model of intrinsic motivation with students enrolled in high school elective courses. *The Journal of Experimental Education*, *71*(1), 41–65. https://doi.org/10.1080/00220970209602056

Field, A. P. (2018). *Discovering statistics using IBM SPSS statistics* (5th edition, North American edition). Sage Publications Inc.

Fielding, J., Fielding, N., & Hughes, G. (2012). *Opening up open-ended survey data using qualitative software.* https://link.springer.com/article/10.1007/s11135-012-9716-1

Findlay, L., & Coplan, R. (2008). Come out and play: Shyness in childhood and the benefits of organized sports participation. *Canadian Journal of Behavioural Science*, *40*(3), 153–161. https://doi.org/10.1037/0008-400X.40.3.153

Fitzgerald, A., Fitzgerald, N., & Aherne, C. (2012). Do peers matter? A review of peer and/or friends' influence on physical activity among American adolescents. *Journal of Adolescence*, *35*(4), 941–958. https://doi.org/10.1016/j.adolescence.2012.01.002

Fletcher, A. C., & Hunter, A. G. (2003). Strategies for obtaining parental consent to participate in research. *Family Relations*, *52*(3), 216–221. https://doi-org.ezproxy.library.uvic.ca/10.1111/j.1741-3729.2003.00216.x

Flintoff, A., & Scraton, S. (2001). Stepping into active leisure? Young women's perceptions of active lifestyles and their experiences of school physical education. *Sport, Education and Society*, *6*(1), 5–21. https://doi.org/10.1080/713696043

Foulkes, L., Leung, J. T., Fuhrmann, D., Knoll, L. J., & Blakemore, S. (2018). Age differences in the prosocial influence effect. *Developmental Science*, *21*(6), e12666. https://doi.org/10.1111/desc.12666

Fox, K. R., & Wilson, P. (2008). Self-perceptual systems and physical activity. In *T.S Horn (Ed). Advances in Sport Psychology* (3rd ed., pp. 49–64). Human Kinetics.

Frikha, M., Mezghanni, N., Chaâri, N., Said, N. B., Alibrahim, M. S., Alhumaid, M. M., Hassan, M. M., Alharbi, R. S., Amira, M. S., & Abouzeid, N. (2024). Towards improving online learning in physical education: Gender differences and determinants of motivation, psychological needs satisfaction, and academic achievement in Saudi students. *PLOS ONE*, *19*(2), e0297822. https://doi.org/10.1371/journal.pone.0297822

Gabbard, C. (2021). *Lifelong motor development*. Lippincott Williams & Wilkins.

Galindo-Perdomo, F., Valencia-Peris, A., & Devís-Devís, J. (2022). What are the levels of physical activity of Colombian adolescents?: Gender and age as key factors. *RICYDE. Revista Internacional de Ciencias Del Deporte*, *18*(68), 99–112. https://doi.org/10.5232/ricyde2022.06803

Gariepy, G., Danna, S., Gobiņa, I., Rasmussen, M., Gaspar De Matos, M., Tynjälä, J., Janssen, I., Kalman, M., Villeruša, A., Husarova, D., Brooks, F., Elgar, F. J., Klavina-Makrecka, S., Šmigelskas, K., Gaspar, T., & Schnohr, C. (2020). How are adolescents sleeping? Adolescent sleep patterns and sociodemographic differences in 24 European and North

American countries. *Journal of Adolescent Health*, *66*(6), S81–S88. https://doi.org/10.1016/j.jadohealth.2020.03.013

Garst, B., Scheider, I., & Baker, D. (2001). Outdoor adventure program participation impacts on adolescent self-perception. *Journal of Experiential Education*, *24*(1), 41–49. https://doi.org/10.1177/105382590102400109

Gibbons, S. (2009). Meaningful participation of girls in senior physical education courses. *Canadian Journal of Education*, *32*(2), 222–244.

Gibbons, S. (2014). Relatedness-supportive learning environment for girls in physical education. *LEARNing Landscapes*, *7*(2), Article 2. https://doi.org/10.36510/learnland.v7i2.656

Gibbons, S., Ebbeck, V., Gruno, J., & Battey, G. (2018). Impact of adventure-based approaches on the self-conceptions of middle school physical education students. *Journal of Experiential Education*, *41*(2), 220–232. https://doi.org/10.1177/1053825918761996

Gibbons, S., & Gaul, C. A. (2004). Making physical education meaningful for young women: Case study in educational change. *AVANTE*, *10*(2), 1–16.

Gibbons, S., & Humbert, L. (2008). What are middle-school girls looking for in physical education? *Canadian Journal of Education*, *31*, 167–186.

Gibbons, S., Humbert, L., & Temple, V. (2010). Making physical education meaningful for girls: Translating theory to practice. *PHEnex Journal = Revue PhénEPS*, *2*(1), 1–20.

Glanz, K., Rimer, B. K., & Viswanath, K. (2015). *Health behavior: Theory, research, and practice*. John Wiley & Sons.

Gómez, G., Hidalgo, E. S., Oreamuno, A. S., & Morais, G. F. de. (2023). Actividad física en la población urbana costarricense y su relación con patrones sociodemográficos y

antropométricos. *Pensar en Movimiento: Revista de Ciencias del Ejercicio y la Salud*, *21*(1), Article 1. https://doi.org/10.15517/pensarmov.v21i1.51602

Goodway, J. D., & Branta, C. F. (2003). Influence of a motor skill intervention on fundamental motor skill development of disadvantaged preschool children. *Research Quarterly for Exercise and Sport*, *74*(1), 36–46. https://doi.org/10.1080/02701367.2003.10609062

Goudas, M., Biddle, S., & Fox, K. (1994). Perceived locus of causality, goal orientations, and perceived competence in school physical education classes. *British Journal of Educational Psychology*, *64*(3), 453–463. https://doi.org/10.1111/j.2044-8279.1994.tb01116.x

Government of Canada, C. I. of H. R. (2015, November 18). *Guide to knowledge translation planning at CIHR: Integrated and end-of-grant approaches*. https://cihr-irsc.gc.ca/e/45321.html#a7

Green, K. (1998). Philosophies, ideologies and the practice of physical education. *Sport, Education and Society*, *3*(2), 125–143. https://doi.org/10.1080/1357332980030201

Gruno, J., & Gibbons, S. (2016). An exploration of one girl's experiences in elective physical education: Why does she continue? *Alberta Journal of Educational Research*, *62*(2), 150–167. https://doi.org/10.11575/ajer.v62i2.56157

Gruno, J., & Gibbons, S. (2020). A review of adolescent girls' experiences in school-based curricular physical activity through the lens of self-determination theory. *International Journal of Physical Education*, *57*(2), 12–32. https://doi.org/10.5771/2747-6073-2020-2-12

Gruno, J., Gibbons, S. L., Condie, R., & Wilton, D. (2018). Girls in action: Fostering relatedness in and beyond physical and health education. *Strategies*, *31*(4), 19–25. https://doi.org/10.1080/08924562.2018.1465872

Guay, F. (2022). Applying self-determination theory to education: Regulations types, psychological needs, and autonomy supporting behaviors. *Canadian Journal of School Psychology*, *37*(1), 75–92. https://doi.org/10.1177/08295735211055355

Guay, F., Vallerand, R. J., & Blanchard, C. (2000). On the Assessment of Situational Intrinsic and Extrinsic Motivation: The Situational Motivation Scale (SIMS). *Motivation and Emotion*, *24*(3), 175–213. https://doi.org/10.1023/A:1005614228250

Guillemin, F., Bombardier, C., & Beaton, D. (1993). Cross-cultural adaptation of health-related quality of life measures: Literature review and proposed guidelines. *Journal of Clinical Epidemiology*, *46*(12), 1417–1432. https://doi.org/10.1016/0895-4356(93)90142-N

Guthold, R., Stevens, G. A., Riley, L. M., & Bull, F. C. (2020). Global trends in insufficient physical activity among adolescents: A pooled analysis of 298 population-based surveys with 1·6 million participants. *The Lancet Child & Adolescent Health*, *4*(1), 23–35. https://doi.org/10.1016/S2352-4642(19)30323-2

Hagger, M. S., Chatzisarantis, N., Culverhouse, T., & Biddle, S. (2003). The processes by which perceived autonomy support in physical education promotes leisure-time physical activity intentions and behavior: A trans-contextual model. *J. Educ. Psychol.*, *95*. https://doi.org/10.1037/0022-0663.95.4.784

Hagger, M. S., & Chatzisarantis, N. L. D. (2007). *Intrinsic motivation and self-determination in exercise and sport* (pp. xv, 375). Human Kinetics.

Hagger, M. S., & Chatzisarantis, N. L. D. (2012). Transferring motivation from educational to extramural contexts: A review of the trans-contextual model. *European Journal of Psychology of Education*, *27*(2), 195–212. https://doi.org/10.1007/s10212-011-0082-5

Hagger, M. S., & Chatzisarantis, N. L. D. (2016). The trans-contextual model of autonomous motivation in education: Conceptual and empirical issues and meta-analysis. *Review of Educational Research*, *86*(2), 360–407. https://doi.org/10.3102/0034654315585005

Hambleton, R. K. (2004). Issues, designs, and technical guidelines for adapting tests into multiple languages and cultures. In *Adapting educational and psychological tests for cross-cultural assessment* (1st–38th eds., p. 38). Psychology Press.

Hardman, K., & Green, K. (2011). *Contemporary issues in physical education: International perspectives*. Meyer & Meyer Verlag.

Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development*, *21*(1), 34–64.

Haywood, K. M., & Getchell, N. (2024). *Life span motor development* (8th ed.). Human Kinetics.

Health Canada, & Canadian Society for Exercise Physiology. (2002). *Family guide to physical activity for youth 10-14 years of age*. https://childrenshealthclinic.ca/resources-and-handouts/

Heckhausen, J., & Heckhausen, H. (2018). Motivation and action: Introduction and overview. In J. Heckhausen & H. Heckhausen (Eds.), *Motivation and action* (pp. 1–14). Springer International Publishing. https://doi.org/10.1007/978-3-319-65094-4_1

Heider, F. (1958). *The psychology of interpersonal relations*. https://www.taylorfrancis.com/reader/download/05c4cca8-274f-40a0-bb5b-30ae780fee6f/book/pdf?context=ubx

Hein, V., Müür, M., & Koka, A. (2004). Intention to be physically active after school raduation and its relationship to three types of intrinsic motivation. *European Physical Education Review*, *10*(1), 5–19. https://doi.org/10.1177/1356336X04040618

Helmerhorst, H. H. J., Brage, S., Warren, J., Besson, H., & Ekelund, U. (2012). A systematic review of reliability and objective criterion-related validity of physical activity questionnaires. *International Journal of Behavioral Nutrition and Physical Activity*, *9*(1), 103. https://doi.org/10.1186/1479-5868-9-103

Hinojo Lucena, F. J., López Belmonte, J., Fuentes Cabrera, A., Trujillo Torres, J. M., & Pozo Sánchez, S. (2020). Academic effects of the use of flipped learning in physical education. *International Journal of Environmental Research and Public Health*, *17*(1), Article 1. https://doi.org/10.3390/ijerph17010276

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Adams Hillard, P. J., Katz, E. S., Kheirandish-Gozal, L., Neubauer, D. N., O'Donnell, A. E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R. C., Setters, B., Vitiello, M. V., & Ware, J. C. (2015). National Sleep Foundation's updated sleep duration recommendations: Final report. *Sleep Health*, *1*(4), 233–243. https://doi.org/10.1016/j.sleh.2015.10.004

Ho, W., Ahmed, Md. D., D'Amico, R. L. de, Ramos, A., Ferreira, E. L., Ferreira, M. B. R., Amaral, S. C. F., Gurrola, O. C., Diaz, G. B., Ramos, A., Hoyos, L. A., Jasmin, A., Duque, A. R., Niekerk, R. L. V., Huang, F., & Wong, B. (2018). Measuring the

perception of quality physical education in Latin American professionals. *Revista Brasileira de Ciências Do Esporte*, *40*(4), 361–369. https://doi.org/10.1016/j.rbce.2018.05.006

Hortigüela-Alcalá, D., Barba-Martín, R. A., González-Calvo, G., & Hernando-Garijo, A. (2021). 'I Hate Physical Education': An analysis of girls' experiences throughout their school life. *Journal of Gender Studies*, *30*(6), 648–662. https://doi.org/10.1080/09589236.2021.1937077

Hossian, M., Mielke, G. I., Nisar, M., Tremblay, M. S., & Khan, A. (2025). Global research on 24-hour movement behaviours guidelines in children and adolescents: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *22*(1), 108. https://doi.org/10.1186/s12966-025-01809-5

Howie, L. D., Lukacs, S. L., Pastor, P. N., Reuben, C. A., & Mendola, P. (2010). Participation in activities outside of school hours in relation to problem behavior and social skills in middle childhood. *The Journal of School Health*, *80*(3), 119–125. https://doi.org/10.1111/j.1746-1561.2009.00475.x

Hu, D., Zhou, S., Crowley-McHattan, Z. J., & Liu, Z. (2021). Factors that influence participation in physical activity in school-aged children and adolescents: A systematic review from the social ecological model perspective. *International Journal of Environmental Research and Public Health*, *18*(6), 3147. https://doi.org/10.3390/ijerph18063147

Humbert, M. L., Chad, K. E., Spink, K. S., Muhajarine, N., Anderson, K. D., Bruner, M. W., Girolami, T. M., Odnokon, P., & Gryba, C. R. (2006). Factors that influence physical activity participation among high- and low-SES youth. *Qualitative Health Research*, *16*(4), 467–483. https://doi.org/10.1177/1049732305286051

IAFA. (2003). *Consumo de drogas en Cosa Rica: Resultados de la encuesta nacional del 2000-2001*.

IAFA. (2009). *Consumo de drogas en Costa Rica: Resultados de la encuesta nacional 2006*.

IAFA. (2018). *VI Encuesta nacional: Consumo de drogas en Costa Rica 2015*.

Jackson, L. A., Von Eye, A., Fitzgerald, H. E., Witt, E. A., & Zhao, Y. (2011). Internet use, videogame playing and cell phone use as predictors of children's body mass index (BMI), body weight, academic performance, and social and overall self-esteem. *Computers in Human Behavior*, *27*(1), 599–604. https://doi.org/10.1016/j.chb.2010.10.019

Jackson, L. A., Von Eye, A., Fitzgerald, H. E., Zhao, Y., & Witt, E. A. (2010). Self-concept, self-esteem, gender, race and information technology use. *Computers in Human Behavior*, *26*(3), 323–328. https://doi.org/10.1016/j.chb.2009.11.001

Jacobs, D. R., Ainsworth, B. E., Hartman, T. J., & Leon, A. S. (1993). A simultaneous evaluation of 10 commonly used physical activity questionnaires. *Medicine & Science in Sports & Exercise*, *25*(1), 81.

Janssen, I., & LeBlanc, A. G. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*, *7*(1), 1–16. https://doi.org/10.1186/1479-5868-7-40

Janssen, I., Roberts, K. C., & Thompson, W. (2017). Is adherence to the Canadian 24-hour movement behaviour guidelines for children and youth associated with improved indicators of physical, mental, and social health? *Applied Physiology, Nutrition, and Metabolism*, *42*(7), 725–731. https://doi.org/10.1139/apnm-2016-0681

Kealey, K. A., Ludman, E. J., Mann, S. L., Marek, P. M., Phares, M. M., Riggs, K. R., & Peterson, A. V. (2007). Overcoming barriers to recruitment and retention in adolescent smoking cessation. *Nicotine & Tobacco Research*, *9*(2), 257–270. https://doi.org/10.1080/14622200601080315

Kennedy, B. M., Newton, R. L., York-Crowe, E., Walden, H. M., Ryan, D. H., White, M. A., & Williamson, D. A. (2008). Recruiting African American girls and parents for a secondary weight gain prevention study. *Journal of Cultural Diversity*, *15*(4), 181–186.

Khandkar, S. H. (2009). *Open coding*. University of Calgary.

Kirby, J., Levin, K. A., & Inchley, J. (2012). Associations between the school environment and adolescent girls' physical activity. *Health Education Research*, *27*(1), 101–114. https://doi.org/10.1093/her/cyr090

Klepac, B., Ramirez, A., Pratt, M., Milton, K., Bauman, A., Biddle, S., & Pedisic, Z. (2020). National physical activity and sedentary behaviour policies in 76 countries: Availability, comprehensiveness, implementation, and effectiveness. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 116. https://doi.org/10.1186/S12966-020-01022-6

Knoll, L. J., Magis-Weinberg, L., Speekenbrink, M., & Blakemore, S.-J. (2015). Social influence on risk perception during adolescence. *Psychological Science*, *26*(5), 583–592. https://doi.org/10.1177/0956797615569578

Kottek, M., Grieser, J., Beck, C., Rudolf, B., & Rubel, F. (2006). World Map of the Köppen-Geiger climate classification updated. *Meteorologische Zeitschrift*, *15*(3), 259–263. https://doi.org/10.1127/0941-2948/2006/0130

Kretschmer, L., Salali, G. D., Andersen, L. B., Hallal, P. C., Northstone, K., Sardinha, L. B., Dyble, M., Bann, D., Andersen, L. B., Anderssen, S., Cardon, G., Davey, R., Jago, R., Janz, K. F., Kriemler, S., Møller, N., Northstone, K., Pate, R., Puder, J. J., … International Children's Accelerometry Database (ICAD) Collaborators. (2023). Gender differences in the distribution of children's physical activity: Evidence from nine countries. *International Journal of Behavioral Nutrition and Physical Activity*, *20*(1), 103. https://doi.org/10.1186/s12966-023-01496-0

Kurniawan, R., Heynoek, F. P., Bakti, F. R. F. K., & Sigit, C. N. (2022). Motivation in physical education for junior high school students: A gender perspective. *Journal of Physical Education and Sport*, *22*(12), 3072–3079. https://doi.org/10.7752/jpes.2022.12389

Ladwig, M. A., Vazou, S., & Ekkekakis, P. (2018). "My best memory is when I was done with it": PE memories are associated with adult sedentary behavior. *Translational Journal of the American College of Sports Medicine*, *3*(16), 119. https://doi.org/10.1249/TJX.0000000000000067

Lagally, K. M. (2013). Using ratings of perceived exertion in physical education. *Journal of Physical Education, Recreation & Dance*, *84*(5), 35–39. https://doi.org/10.1080/07303084.2013.779533

Lam, C. B., McHale, S. M., & Crouter, A. C. (2014). Time with peers from middle childhood to late adolescence: Developmental course and adjustment correlates. *Child Development*, *85*(4), 1677–1693. https://doi.org/10.1111/cdev.12235

Larson, B. A. (2007). Adventure camp programs, self-concept, and their effects on behavioral problem adolescents. *Journal of Experiential Education*, *29*(3), 313–330. https://doi.org/10.1177/105382590702900304

Lee, J., & Zhang, T. (2019). The impact of adventure education on students' learning outcomes in physical education: A systematic review. *JTRM in Kinesiology*. https://eric.ed.gov/?id=EJ1216911

Li, Z., Li, J., Kong, J., Li, Z., Wang, R., & Jiang, F. (2024). Adolescent mental health interventions: A narrative review of the positive effects of physical activity and implementation strategies. *Frontiers in Psychology*, *15*, 1433698. https://doi.org/10.3389/fpsyg.2024.1433698

Lindahl, J., Stenling, A., Lindwall, M., & Colliander, C. (2015). Trends and knowledge base in sport and exercise psychology research: A bibliometric review study. *International Review of Sport and Exercise Psychology*, *8*(1), 71–94. https://doi.org/10.1080/1750984X.2015.1019540

Lipski, J. M. (2012). Geographical and social varieties of Spanish: An overview. In *The Handbook of Hispanic Linguistics* (José Ignacio Huade, Antxon Olarrea, Erin O'Rourke, pp. 1–26). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118228098.ch1

Lirgg, C. (2013). Social psychology and physical education. In *Handbook of Physical Education* (pp. 141–162). SAGE Publications Ltd. https://doi.org/10.4135/9781848608009

Liu, Y., Yan, J., & Li, J. (2025). The relationship between physical education teachers' competence support and middle school students' participation in sports: A chain mediation model of perceived competence and exercise persistence. *PLOS ONE*, *20*(1), e0314338. https://doi.org/10.1371/journal.pone.0314338

Lochbaum, M., & Jean-Noel, J. (2016). Perceived autonomy-support instruction and student outcomes in physical education and leisure-time: A meta-analytic review of correlates. [Percepción de la formación de apoyo a la autonomía y resultados en estudiantes en

educación física y tiempo libre: Una revisión meta-analítica de correlaciones]. *RICYDE. Revista Internacional de Ciencias Del Deporte*, *12*, 29–47. https://doi.org/10.5232/ricyde2016.04302

Lockwood, J., Jeffery, A., Schwartz, A., Manlhiot, C., Schneiderman, J. E., McCrindle, B. W., & Hamilton, J. (2017). Comparison of a physical activity recall questionnaire with accelerometry in children and adolescents with obesity: A pilot study. *Pediatric Obesity*, *12*(5), e41–e45. https://doi.org/10.1111/ijpo.12172

Logan, S. W., Robinson, L. E., Wilson, A. E., & Lucas, W. A. (2012). Getting the fundamentals of movement: A meta-analysis of the effectiveness of motor skill interventions in children. *Child: Care, Health and Development*, *38*(3), 305–315. https://doi.org/10.1111/j.1365-2214.2011.01307.x

Lonsdale, C. (2024). *Self determination in physical education*. https://selfdeterminationtheory.org/topics/application-physical-education/

Lund, J., & Tannehill, D. (2015). *Standards-based physical education curriculum development* (3rd ed.). Jones & Bartlett Learning. https://books.google.ca/books?id=HYmOAwAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Marques, A., Henriques-Neto, D., Peralta, M., Martins, J., Demetriou, Y., Schönbach, D. M. I., & Matos, M. G. de. (2020). Prevalence of physical activity among adolescents from 105 low, middle, and high-income countries. *International Journal of Environmental Research and Public Health*, *17*(9), 3145. https://doi.org/10.3390/ijerph17093145

Márquez-Barquero, M., Azofeifa-Mora, C., & Rodríguez-Méndez, D. (2019). Factores de motivación de logro: El compromiso y entrega en el aprendizaje, la competencia motriz

percibida, la ansiedad ante el error y situaciones de estrés en estudiantes de cuarto, quinto y sexto nivel escolar durante la clase de educación física. *Revista Educación*, *43*(1), 1–12.

Marshall, W. A., & Tanner, J. M. (1969). Variations in pattern of pubertal changes in girls. *Archives of Disease in Childhood*, *44*(235), 291–303.

Marshall, W. A., & Tanner, J. M. (1970). Variations in the pattern of pubertal changes in boys. *Archives of Disease in Childhood*, *45*(239), 13–23.

Martinez, A., Gietzen, L., & McDaniel, V. (2024). Exploring the role of physical activity influencing emotional regulation and mental health in adolescents. *Pacific Journal of Health*, *7*(1). https://doi.org/10.56031/2576-215X.1046

May, D. E., Hallin, M. J., Kratochvil, C. J., Puumala, S. E., Smith, L. S., Reinecke, M. A., Silva, S. G., Weller, E. B., Vitiello, B., Breland-noble, A., & March, J. S. (2007). Factors associated with recruitment and screening in the treatment for adolescents with depression study (TADS). *Journal of the American Academy of Child & Adolescent Psychiatry*, *46*(7), 801–810. https://doi.org/10.1097/CHI.0b013e3180582019

McAuley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric Properties of the Intrinsic Motivation Inventory in a Competitive Sport Setting: A Confirmatory Factor Analysis. *Research Quarterly for Exercise and Sport*, *60*(1), 48–58. https://doi.org/10.1080/02701367.1989.10607413

McClelland, D. C. (1961). *The achivieving society*. D. Van Nostrand Company, INC.

McGill, H. C., McMahan, C. A., Herderick, E. E., Malcom, G. T., Tracy, R. E., & Strong, J. P. (2000). Origin of atherosclerosis in childhood and adolescence1234. *The American Journal of Clinical Nutrition*, *72*(5), 1307s–1315s. https://doi.org/10.1093/ajcn/72.5.1307s

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). *An ecological perspective on health promotion programs*. https://journals.sagepub.com/doi/abs/10.1177/109019818801500401

Meeus, W., Iedema, J., Maassen, G., & Engels, R. (2005). Separation–individuation revisited: On the interplay of parent–adolescent relations, identity and emotional adjustment in adolescence. *Journal of Adolescence*, *28*(1), 89–106. https://doi.org/10.1016/j.adolescence.2004.07.003

Meneses Montero, M., & Ruiz Juan, F. (2017). Longitudinal study on leisure time behaviors and physical and sports activity level in students from Costa Rica, Mexico and Spain. *Retos*, *31*, 219–226. https://doi.org/10.47197/retos.v0i31.53396

MEP. (1987). *Programa de la educación física en III y VI Ciclos*.

MEP. (1995). *Decreto No. 24017. Reglamento sobre centros educativos privados*.

MEP. (1996). *Programa de estudios de educación física. III Ciclo y educación diversificada*.

MEP. (2005). *Programas de estudios 2005. Educación Física III Ciclo y Educación Diversificada*.

MEP. (2009). *Proyecto de ética, estética y ciudadanía: Programa de estudio de educación física. Tercer ciclo de educación general básica y educación diversificada*.

MEP. (2016). *Lineamientos sobre horarios para los diferentes ciclos, niveles, ofertas y modalidades del sistema educativo costarricense* (pp. 1–88).

MEP. (2017). *Educar para una nueva ciudadanía. Programa de estudio de ciencias. Tercer ciclo de educación general básica*.

MEP (Director). (2020, November 16). *Las DRE y su ubicación geográfica* [Video recording]. https://www.youtube.com/watch?v=dviJA-Z0cIA

MEP, & UCR. (1997). *Informe nacional evaluación de la salud física de estudiantes de educación general básica.* [Mimeo. San José, Costa Rica: Francisco Tovar González (edición)].

Miller, B. C., Edwards, E. S., & Nye, S. (2022). Understanding the factors that influence motivation and experiences in high school physical education. *The Physical Educator*, *79*(6), Article 6. https://doi.org/10.18666/TPE-2022-V79-I6-9810

Ministerio de Salud. (2022). *Guías alimentarias basadas en sistemas alimentarios para la población adolescente y adulta en Costa Rica*. https://www.ministeriodesalud.go.cr/guiasalimentarias/gabsa/

Ministerio de Salud, & MEP. (2020). *Encuesta colegial de vigilancia nutricional y actividad física. Costa rica, 2018*.

Ministerio de Salud, & Ministerio de Deporte y Recreación. (2011). *Plan nacional de actividad física y salud 2011-2021*. *1*, 1–28.

Monge-Rojas, R., Garita-Arce, C., Sánchez-López, M., & Colón-Ramos, U. (2009). Barriers to and suggestions for a healthful, active lifestyle as perceived by rural and urban Costa Rican adolescents. *Journal of Nutrition Education and Behavior*, *41*(3), 152–160. https://doi.org/10.1016/j.jneb.2008.03.002

Moreno-Murcia, J. A., & Sánchez-Latorre, F. (2016). The effects of autonomy support in physical education classes. *RICYDE. Revista Internacional de Ciencias Del Deporte*, *XII*(43), 79–89.

Mouratidis, A., Barkoukis, V., & Tsorbatzoudis, C. (2015). The relation between balanced need satisfaction and adolescents' motivation in physical education. *European Physical Education Review*, *21*(4), 421–431. https://doi.org/10.1177/1356336X15577222

MRC Cognition and Brain Sciences Unit. (2009). *Rules of thumb on magnitudes of effect sizes*. https://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/effectSize

Mullan, E., Markland, D., & Ingledew, D. K. (1997). A graded conceptualisation of self-determination in the regulation of exercise behaviour: Development of a measure using confirmatory factor analytic procedures. *Personality and Individual Differences*, *23*(5), 745–752. https://doi.org/10.1016/S0191-8869(97)00107-4

Murfay, K., Beighle, A., Erwin, H., Aiello, E., & Pyszynski, S. (2024). Supporting students' physical activity self-efficacy within high school physical education. *International Journal of Physical Activity and Health*. https://doi.org/10.18122/ijpah.3.2.8.boisestate

Naqvi, J. B., Olesen, B., Greenstadt, E., Carson, J., Marcus, B., Godino, J., Zive, M., Meyer, D., Higgins, M., Osuna, L., Gomez, R., Dunsiger, S., & Larsen, B. (2024). Randomized controlled trial of a multiple technology-based physical activity intervention for Latina adolescents: Recruitment strategies and baseline data from the *Chicas Fuertes* trial. *Contemporary Clinical Trials*, *147*, 107716. https://doi.org/10.1016/j.cct.2024.107716

National Association for Sport and Physical Education. (2004). National physical education standards: General description of standards. In *Moving into the future: National standards for physical education* (2nd ed.). National Association for Sport and Physical Education.

Navarro-Patón, R., Lago-Ballesteros, J., Basanta-Camiño, S., & Arufe-Giraldez, V. (2018). *Assessment of the basic psychological needs in physical education according to age, gender and educational stage*. https://doi.org/10.14198/jhse.2018.133.20

Navarro-Patón, R., Rodríguez-Negro, J., Muíño-Piñeiro, M., & Mecías-Calvo, M. (2024). Gender and educational stage differences in motivation, basic psychological needs and

enjoyment: Evidence from physical education classes. *Children*, *11*(12), Article 12. https://doi.org/10.3390/children11121503

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, *91*(3), 328–346. https://doi.org/10.1037/0033-295X.91.3.328

Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology*, *71*, 225–242. https://doi.org/10.1348/000709901158497

Ntoumanis, N. (2005). A prospective study of participation in optional school physical education using a self-determination theory framework. *Journal of Educational Psychology*, *97*(3), 444–453. https://doi.org/10.1037/0022-0663.97.3.444

Ontario Ministry of Education. (2015). *The Ontario curriculum: Grades 9 to 12 physical and health education*. https://www.dcp.edu.gov.on.ca/en/curriculum/secondary-hpe/context/21st-century

Ortiz, R. R., Zamora, E. O., Mairena, R. P., Monge, M. F. H., & Bogantes, C. Á. (2019). Análisis del sobrepeso, obesidad, niveles de actividad física y autoestima de la niñez de León, Nicaragua. *MHSalud: Revista en Ciencias del Movimiento Humano y Salud*, *16*(1), Article 1. https://doi.org/10.15359/mhs.16-1.4

Owens, J., Au, R., Carskadon, M., Millman, R., Wolfson, A., Braverman, P. K., Adelman, W. P., Breuner, C. C., Levine, D. A., Marcell, A. V., Murray, P. J., & O'Brien, R. F. (2014). Insufficient sleep in adolescents and young adults: An update on causes and consequences. *Pediatrics*, *134*(3), e921–e932. https://doi.org/10.1542/peds.2014-1696

Owens, James, C., & Friedman, D. B. (2017). Overcoming the challenges of African-American recruitment in health sciences research: Strategies and recommendations. *Urologic Nursing*, *37*(6), 293. https://doi.org/10.7257/1053-816X.2017.37.6.293

Parrish, D. E., Duron, J. F., & Oxhandler, H. K. (2017). Adolescent recruitment strategies: Lessons learned from a university-based study of social anxiety. *Social Work Research*, *41*(4), 213–220.

Pekmezi, D., Jennings, E., & Marcus, B. H. (2009). Evaluating and enhancing self-efficacy for physical activity. *ACSM'S Health & Fitness Journal*, *13*(2), 16–21. https://doi.org/10.1249/FIT.0b013e3181996571

Pelletier, L. G., Tuson, K. M., Fortier, M. S., Vallerand, R. J., Briére, N. M., & Blais, M. R. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The Sport Motivation Scale (SMS). *Journal of Sport and Exercise Psychology*, *17*(1), 35–53. https://doi.org/10.1123/jsep.17.1.35

Peral-Suárez, Á., Cuadrado-Soto, E., Perea, J. M., Navia, B., López-Sobaler, A. M., & Ortega, R. M. (2020). Physical activity practice and sports preferences in a group of Spanish schoolchildren depending on sex and parental care: A gender perspective. *BMC Pediatrics*, *20*(1), 337. https://doi.org/10.1186/s12887-020-02229-z

Pereira Hidalgo, E. (2011). La educación física en las organizaciones educativas, un estudio de caso en centros educativos públicos de secundaria en el circuito 10 en la Dirección Regional de Educación de San José, Costa Rica. *Gestión de La Educación*, *1*(2), 107. https://doi.org/10.15517/rge.v1i2.2145

Pérez-González, A. M., Valero-Valenzuela, A., Moreno-Murcia, J. A., & Sánchez-Alcaraz, B. J. (2019). Revisión sistemática del apoyo a la autonomía en educación física. *Apunts*

Educación Física y Deportes, *138*, 51–61. https://doi.org/10.5672/apunts.2014-0983.es.(2019/4).138.04

PHE Canada. (2024). *Quality physical education*. https://phecanada.ca/professional-learning/qpe

Phillips, S. R., Marttinen, R., Mercier, K., & Gibbone, A. (2021). Middle school students' perceptions of physical education: A qualitative look. *Journal of Teaching in Physical Education*, *40*(1), 30–38. https://doi.org/10.1123/jtpe.2019-0085

Piggin, J. (2019). *The politics of physical activity*. Routledge. https://doi.org/10.4324/9780429290381

Pires, S., Vieira, D., & Branco, M. C. (2021). Children and teens moving towards mental health. *Nascer E Crescer - Birth and Growth Medical Journal*, *30*(3), Article 3. https://doi.org/10.25753/BirthGrowthMJ.v30.i3.20048

Pitney, W., Parker, J., Singe, S. M., & Potteiger, K. (2020). Collecting and analyzing qualitative data. In *Qualitative research in the health professions* (1st ed., pp. 31–48). Routledge. https://doi.org/10.4324/9781003526100-5

Poitras, V. J., Gray, C. E., Borghese, M. M., Carson, V., Chaput, J.-P., Janssen, I., Katzmarzyk, P. T., Pate, R. R., Connor Gorber, S., Kho, M. E., Sampson, M., & Tremblay, M. S. (2016). Systematic review of the relationships between objectively measured physical activity and health indicators in school-aged children and youth. *Applied Physiology, Nutrition, and Metabolism*, *41*(6 (Suppl. 3)), S197–S239. https://doi.org/10.1139/apnm-2015-0663

Polit, D. F., & Beck, C. T. (2004). *Nursing Research: Principles and Methods*. Lippincott Williams & Wilkins.

Porta, M., & Last, J. M. L. M. (2018). Puberty. In J. M. Last (Ed.), *A Dictionary of Public Health*. Oxford University Press. https://www.oxfordreference.com/display/10.1093/acref/9780191844386.001.0001/acref-9780191844386-e-3710

Porter, A., Cawley, E., Chapman, L., Crisp, C., Wadman, R., Barber, S., Penton-Voak, I., Attwood, A., Jago, R., & Bould, H. (2025). *A qualitative study exploring how secondary school PE uniform policies influence body image, and PE engagement among adolescent girls* (p. 2024.12.19.24319312). medRxiv. https://doi.org/10.1101/2024.12.19.24319312

Portillo-Torres, M. C., Hernández-Quesada, Ó., & Quirós-Quirós, H. (2016). Teachers and students' opinions of physical education classes in high school. *Revista Electrónica Educare*, *20*(2), 1. https://doi.org/10.15359/ree.20-2.5

Prince, S. A., Adamo, K. B., Hamel, M. E., Hardt, J., Gorber, S. C., & Tremblay, M. (2008). A comparison of direct versus self-report measures for assessing physical activity in adults: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *5*(1), 56. https://doi.org/10.1186/1479-5868-5-56

Quintas-Hijós, A., Peñarrubia-Lozano, C., & Bustamante, J. C. (2020). Analysis of the applicability and utility of a gamified didactics with exergames at primary schools: Qualitative findings from a natural experiment. *PLOS ONE*, *15*(4), e0231269. https://doi.org/10.1371/journal.pone.0231269

Quintero González, L. E., Jiménez Jiménez, F., & Area Moreira, M. (2018). Más allá del libro de texto. La gamificación mediada con TIC como alternativa de innovación en educación física. *Retos: nuevas tendencias en educación física, deporte y recreación*, *34*, 343–348.

Raitakari, O. T., Juonala, M., Kähönen, M., Taittonen, L., Laitinen, T., Mäki-Torkko, N., Järvisalo, M. J., Uhari, M., Jokinen, E., Rönnemaa, T., Åkerblom, H. K., & Viikari, J. S. A. (2003). Cardiovascular risk factors in childhood and carotid artery intima-media thickness in adulthood: The cardiovascular risk in young Finns study. *JAMA*, *290*(17), 2277–2283. https://doi.org/10.1001/jama.290.17.2277

Rampin, R., & Rampin, V. (2021). Taguette: Open-source qualitative data analysis. *Journal of Open Source Software*, *6*(68), 3522. https://doi.org/10.21105/joss.03522

Reforma del artículo 78 de la Constitución Política para el fortalecimiento del derecho a la educación, 8954 Civil Code (Costa Rica) (2011). https://pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=70834&nValor3=85778&strTipM=TC

Reilly, J. J., Barnes, J., Gonzalez, S., Huang, W. Y., Manyanga, T., Tanaka, C., & Tremblay, M. S. (2022). Recent secular trends in child and adolescent physical activity and sedentary behavior internationally: Analyses of active healthy kids global alliance global matrices 1.0 to 4.0. *Journal of Physical Activity and Health*, *19*(11), 729–736. https://doi.org/10.1123/jpah.2022-0312

Revuelta-Sánchez, I. M., & Araya-Vargas, G. A. (2021). Case study from Central America: Challenges and opportunities for physically active lifestyles in girls and young women in costa rica and countries in central america. In K. Siefken, A. R. Varela, T. Waqanivalu, & N. Schulenkorf, *Physical Activity in Low- and Middle-Income Countries* (1st ed., pp. 202–216). Routledge. https://doi.org/10.4324/9780429344732-12

Ricardo, L. I. C., Wendt, A., Costa, C. dos S., Mielke, G. I., Brazo-Sayavera, J., Khan, A., Kolbe-Alexander, T. L., & Crochemore-Silva, I. (2022). Gender inequalities in physical

activity among adolescents from 64 Global South countries. *Journal of Sport and Health Science*, *11*(4), 509–520. https://doi.org/10.1016/j.jshs.2022.01.007

Robinson, L. E. (2011). Effect of a mastery climate motor program on object control skills and perceived physical competence in preschoolers. *Research Quarterly for Exercise and Sport*, *82*(2), 355–359. https://doi.org/10.1080/02701367.2011.10599764

Robinson, L. E., & Goodway, J. D. (2009). Instructional climates in preschool children who are at-risk. Part I: Object-control skill development. *Research Quarterly for Exercise and Sport*, *80*(3), 533–542. https://doi.org/10.1080/02701367.2009.10599591

Rodrigues, B., Videira-Silva, A., Lopes, L., Sousa-Sá, E., Vale, S., Cliff, D. P., Mendes, R., & Santos, R. (2025). Methodological choices on 24-h movement behavior assessment by accelerometry: A scoping review. *Sports Medicine - Open*, *11*(1), 25. https://doi.org/10.1186/s40798-025-00820-1

Rojas, Y. S. (2012). Las formas pronominales: Vos-tu-usted en Costa Rica: Análisis de una muestra. *Pensamiento Actual*, *1*(1), Article 1. https://revistas.ucr.ac.cr/index.php/pensamiento-actual/article/view/3762

Rollo, S., Antsygina, O., & Tremblay, M. S. (2020). The whole day matters: Understanding 24-hour movement guideline adherence and relationships with health indicators across the lifespan. *Journal of Sport and Health Science*, *9*(6), 493–510. https://doi.org/10.1016/j.jshs.2020.07.004

Rosselli, M., Ermini, E., Tosi, B., Boddi, M., Stefani, L., Toncelli, L., & Modesti, P. A. (2020). Gender differences in barriers to physical activity among adolescents. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(9), 1582–1589. https://doi.org/10.1016/j.numecd.2020.05.005

Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*, 749–761.

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*(1), 54–67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037110003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2002). An overview of self-determination theory: An organismic-dialectical perspective. In *Handbook of self-determination research* (pp. 3–33). University of Rochester Press.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Ryan, R. M., & Deci, E. L. (2022). Self-Determination Theory. In F. Maggino (Ed.), *Encyclopedia of quality of life and well-being research* (pp. 1–7). Springer International Publishing. https://doi.org/10.1007/978-3-319-69909-7_2630-2

Ryan, R. M., Duineveld, J. J., Di Domenico, S. I., Ryan, W. S., Steward, B. A., & Bradshaw, E. L. (2022). We know this much is (meta-analytically) true: A meta-review of meta-

analytic findings evaluating self-determination theory. *Psychological Bulletin*, *148*(11–12), 813–842. https://doi.org/10.1037/bul0000385

Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health*. https://doi.org/10.1146/annurev.publhealth.27.021405.102100

Sallis, J. F., & Owen, N. (2002). Ecological models of health behavior. In *Health behavior and health education: Theory, research, and practice. Ed. K Glanz, BK Rimer, FM Lewis.* (3rd ed., pp. 462–484).

Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports and Exercise*, *32*(5), 963–975. https://doi.org/10.1097/00005768-200005000-00014

Sanchez-Oliva, D., Sanchez-Miguel, P. A., Miguel, F., Kinnafick, F.-E., & Gacrcía-Calvo, T. (2014). Physical education lessons and physical activity intentions within Spanish secondary schools: A self-determination perspective. *Journal of Teaching in Physical Education*, *33*(2), 232–249. http://dx.doi.org/10.1123/jtpe.2013-0043

Saunders, T. J., Gray, C. E., Poitras, V. J., Chaput, J.-P., Janssen, I., Katzmarzyk, P. T., Olds, T., Connor Gorber, S., Kho, M. E., Sampson, M., Tremblay, M. S., & Carson, V. (2016). Combinations of physical activity, sedentary behaviour and sleep: Relationships with health indicators in school-aged children and youth. *Applied Physiology, Nutrition, and Metabolism*, *41*(6 (Suppl. 3)), S283–S293. https://doi.org/10.1139/apnm-2015-0626

Sawyer, S. M., Afifi, R. A., Bearinger, L. H., Blakemore, S.-J., Dick, B., Ezeh, A. C., & Patton, G. C. (2012). Adolescence: A foundation for future health. *The Lancet*, *379*(9826), 1630–1640. https://doi.org/10.1016/S0140-6736(12)60072-5

Schoeppe, S., Oliver, M., Badland, H. M., Burke, M., & Duncan, M. J. (2014). Recruitment and retention of children in behavioral health risk factor studies: REACH strategies. *International Journal of Behavioral Medicine*, *21*(5), 794–803. https://doi.org/10.1007/s12529-013-9347-5

Schumacher Dimech, A., & Seiler, R. (2011). Extracurricular sport participation: A potential buffer against social anxiety symptoms in primary school children. *Psychology of Sport and Exercise - PSYCHOL SPORT EXERC*, *12*, 347–354. https://doi.org/10.1016/j.psychsport.2011.03.007

Shen, B. (2015). Gender differences in the relationship between teacher autonomy support and amotivation in physical education. *Sex Roles*, *72*(3), 163–172. https://doi.org/10.1007/s11199-015-0448-2

Shephard, R. J. (2003). Limits to the measurement of habitual physical activity by questionnaires. *British Journal of Sports Medicine*, *37*(3), 197–206. https://doi.org/10.1136/bjsm.37.3.197

Siedentop, D., & van der Mars, H. (2023). *Introduction to Physical Education, Fitness, and Sport* (9th ed.). Human Kinetics.

Silva, J. R. da. (2018, January 30). *A importância da prática de atividade física para adolescentes* [bachelorThesis]. https://repositorio.ufpe.br/handle/123456789/23432

Sireci, S. G., Yang, Y., Harter, J., & Ehrlich, E. J. (2006). Evaluating guidelines for test adaptations: A methodological analysis of translation quality. *Journal of Cross-Cultural Psychology*, *37*(5), 557–567. https://doi.org/10.1177/0022022106290478

Skunk, D., Meece, J., & Pintrich, P. (2014). *Motivation in education: Theory, research and applications* (4th ed.). Pearson Education Limited.

Slemp, G. R., Field, J. G., Ryan, R. M., Forner, V. W., Van den Broeck, A., & Lewis, K. J. (2024). Interpersonal supports for basic psychological needs and their relations with motivation, well-being, and performance: A meta-analysis. *Journal of Personality and Social Psychology. Advance Online Publication*. https://doi.org/10.1037/pspi0000459

Slingerland, M., & Borghouts, L. (2011). *Direct and indirect influence of physical education-based interventions on physical activity: A review*. https://doi.org/10.1123/jpah.8.6.866

Sojo Mora, B. (2023). Reasons why women participate in physical activities. *InterSedes*, *25*(51), 1–26. https://doi.org/10.15517/isucr.v25i51.54805

Sonstroem, R. J., & Morgan, W. P. (1989). Exercise and self-esteem: Rationale and model. *Medicine & Science in Sports & Exercise*, *21*(3), 329.

Standage, M., Gillison, F. B., Ntoumanis, N., & Treasure, D. C. (2012). Predicting students' physical activity and health-related well-being: A prospective cross-domain investigation of motivation across school physical education and exercise settings. *Journal of Sport and Exercise Psychology*, *34*(1), 37–60. https://doi.org/10.1123/jsep.34.1.37

Stormoen, S., Urke, H. B., Tjomsland, H. E., Wold, B., & Diseth, Å. (2016). High school physical education: What contributes to the experience of flow? *European Physical Education Review*, *22*(3), 355–371. https://doi.org/10.1177/1356336X15612023

Strong, Malcom, G. T., Newman III, W. P., & Oalmann, M. C. (1992). Early lesions of atherosclerosis in childhood and youth: Natural history and risk factors. *Journal of the American College of Nutrition*, *11*(sup1), 51S-54S. https://doi.org/10.1080/07315724.1992.10737984

Strong, W. B. (1986). Physical activity: Its relationship to chronic heart disease. In E. F. Doyle, M. A. Engle, W. M. Gersony, W. J. Rashkind, & N. S. Talner (Eds.), *Pediatric Cardiology* (pp. 1202–1205). Springer. https://doi.org/10.1007/978-1-4613-8598-1_319

Sulz, L., Gibbons, S., Naylor, P.-J., & Wharf-Higgins, J. (2020). Evaluation of an intervention to increase student motivation and enrollment in physical education. *The Physical Educator*, *77*(3). https://doi.org/10.18666/TPE-2020-V77-I3-9831

Sulz, L., Temple, V., & Gibbons, S. (2016). Measuring student motivation in high school physical education: Development and validation of two self-report questionnaires. *Physical Educator*, *73*(3), 530–554. https://doi.org/10.18666/TPE-2016-V73-I3-6370

Susman, E. J., & Rogol, A. (2004). Puberty and psychological development. In *Handbook of Adolescent Psychology* (pp. 15–44). John Wiley & Sons, Ltd. https://doi.org/10.1002/9780471726746.ch2

Tambalis, K. D. (2022). Physical activity, physical education, and health benefits in children and adolescents. *European Journal of Public Health Studies*, *5*(1), Article 1. https://doi.org/10.46827/ejphs.v5i1.112

Tanzer, N. K., Merenda, P. F., & Spielberger, C. D. (2005). Developing tests for use in multiple languages and cultures: A plea for simultaneous development. In *Adapting educational and psychological tests for cross-cultural assessment* (p. 235). Lawrence Erlbaum Associates.

Taylor, I. M., Ntoumanis, N., Standage, M., & Spray, C. M. (2010). Motivational predictors of physical education students' effort, exercise intentions, and leisure-time physical activity: A multilevel linear growth analysis. *Journal of Sport & Exercise Psychology*, *32*(1), 99–120. https://doi.org/10.1123/jsep.32.1.99

Telama, R., & Yang, X. (2000). Decline of physical activity from youth to young adulthood in Finland. *Medicine & Science in Sports & Exercise*, *32*(9), 1617.

Tessier, D., Sarrazin, P., & Ntoumanis, N. (2010). The effect of an intervention to improve newly qualified teachers' interpersonal style, students' motivation and psychological need satisfaction in sport-based physical education. *Contemporary Educational Psychology*, *35*(4), 242–253. https://doi.org/10.1016/j.cedpsych.2010.05.005

Thaqi, S., Kerr, H., & Torosoff, M. (2023). Effect of structured and regular physical activity on cardiovascular conditioning in high school students. *American Journal of Preventive Cardiology*, *15*, 100571. https://doi.org/10.1016/j.ajpc.2023.100571

Tirlea, L., Truby, H., & Haines, T. P. (2016). Pragmatic, randomized controlled trials of the girls on the go! Program to improve self-esteem in girls. *American Journal of Health Promotion*, *30*(4), 231–241. https://doi.org/10.1177/0890117116639572

Tremblay, M. S., Barnes, J. D., González, S. A., Katzmarzyk, P. T., Onywera, V. O., Reilly, J. J., & Tomkinson, G. R. (2016). Global matrix 2.0: Report card grades on the physical activity of children and youth comparing 38 countries. *Journal of Physical Activity and Health*, *13*(s2), S343–S366. https://doi.org/10.1123/jpah.2016-0594

Tremblay, M. S., Carson, V., Chaput, J.-P., Connor Gorber, S., Dinh, T., Duggan, M., Faulkner, G., Gray, C. E., Gruber, R., Janson, K., Janssen, I., Katzmarzyk, P. T., Kho, M. E., Latimer-Cheung, A. E., LeBlanc, C., Okely, A. D., Olds, T., Pate, R. R., Phillips, A., … Zehr, L. (2016). Canadian 24-hour movement guidelines for children and youth: An integration of physical activity, sedentary behaviour, and sleep. *Applied Physiology, Nutrition, and Metabolism*, *41*(6 (Suppl. 3)), S311–S327. https://doi.org/10.1139/apnm-2016-0151

Tremblay, M. S., Gray, C. E., Akinroye, K., Harrington, D. M., Katzmarzyk, P. T., Lambert, E. V., Liukkonen, J., Maddison, R., Ocansey, R. T., Onywera, V. O., Prista, A., Reilly, J. J., Martínez, M. D. P. R., Duenas, O. L. S., Standage, M., & Tomkinson, G. (2014). Physical activity of children: A global matrix of grades comparing 15 countries. *Journal of Physical Activity and Health*, *11*(s1), S113–S125. https://doi.org/10.1123/jpah.2014-0177

Trost, S. G., Pate, R. R., Sallis, J. F., Freedson, P. S., Taylor, W. C., Dowda, M., & Sirard, J. (2002). Age and gender differences in objectively measured physical activity in youth. *Medicine & Science in Sports & Exercise*, *34*(2), 350.

Trout, J., & Graber, K. C. (2009). Perceptions of overweight students concerning their experiences in physical education. *Journal of Teaching in Physical Education*, *28*(3), 272–292. https://doi.org/10.1123/jtpe.28.3.272

Udom, B. S., & Udongwo, G. E. (2022). A critical assessment of adolescence, the characteristics and developmental tasks of adolescent in the contemporary world. *International Journal of Advancement in Education, Management, Science and Technology*, *5*(1), 26–35.

UNESCO. (2015). *Quality Physical Education (QPE): Guidelines for policy makers*. https://unesdoc.unesco.org/ark:/48223/pf0000231101

UNICEF. (2024). *Adolescents*. UNICEF DATA. https://data.unicef.org/topic/adolescents/overview/

United Nations Population Fund. (2024). World Population Dashboard. https://www.unfpa.org/data/world-population-dashboard

Urbina, C. (2001). *Orígenes de la política deportiva en Costa Rica (1887—1942)*. https://www.efdeportes.com/efd34/crica.htm

U.S. Department of Health and Human Services. (2018). *Current guidelines: The physical activity guidelines for Americans*. https://odphp.health.gov/our-work/nutrition-physical-activity/physical-activity-guidelines/current-guidelines

U.S. Department of Health and Human Services (HHS). (2008). *Physical activity guidelines for Americans*. https://health.gov/our-work/nutrition-physical-activity/physical-activity-guidelines/previous-guidelines/2008-physical-activity-guidelines

Vallerand, Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, *52*(4), 1003–1017. https://doi.org/10.1177/0013164492052004025

van Daalen, C. (2005). Girls' experiences in physical education: Competition, evaluation, & degradation. *The Journal of School Nursing*, *21*(2), 115–121. https://doi.org/10.1177/10598405050210020901

Vasconcellos, D., Parker, P. D., Hilland, T., Cinelli, R., Owen, K. B., Kapsal, N., Lee, J., Antczak, D., Ntoumanis, N., Ryan, R. M., & Lonsdale, C. (2020). Self-determination theory applied to physical education: A systematic review and meta-analysis. *Journal of Educational Psychology*, *112*(7), 1444–1469. https://doi.org/10.1037/edu0000420

Villarruel, A. M., Jemmott, L. S., Jemmott, J. B., & Eakin, B. L. (2006). Recruitment and retention of latino adolescents to a research study: Lessons learned from a randomized clinical trial. *Journal for Specialists in Pediatric Nursing*, *11*(4), 244–250. https://doi.org/10.1111/j.1744-6155.2006.00076.x

Walseth, K., Engebretsen, B., & Elvebakk, L. (2018). Meaningful experiences in PE for all students: An activist research approach. *Physical Education and Sport Pedagogy*, *23*(3), 235–249. https://doi.org/10.1080/17408989.2018.1429590

Walsh, Ó., & Nicholson, A. J. (2022). Adolescent health. *Clinics in Integrated Care*, *14*, 100123. https://doi.org/10.1016/j.intcar.2022.100123

Weather Spark. (n.d.). *El clima y el tiempo promedio en todo el año en Guápiles, Costa Rica*. Retrieved June 1, 2025, from https://es.weatherspark.com/y/16161/Clima-promedio-en-Gu%C3%A1piles-Costa-Rica-durante-todo-el-a%C3%B1o#Sections-BestTime

Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology*, *71*(1), 3–25. https://doi.org/10.1037/0022-0663.71.1.3

White, R. L., Bennie, A., Vasconcellos, D., Cinelli, R., Hilland, T., Owen, K. B., & Lonsdale, C. (2021). Self-determination theory in physical education: A systematic review of qualitative studies. *Teaching and Teacher Education*, *99*, 103247. https://doi.org/10.1016/j.tate.2020.103247

Whitehead, M. (2021). Learner-centered teaching: A physical literacy perspective. In *Learning to teach physical education in secondary school: A companion to school experience* (5th ed., pp. 227–239). Routledge.

WHO. (2004). *WHO technical meeting on sleep and health* (No. WHO/EURO:2004-4242-44001-62044). Article WHO/EURO:2004-4242-44001-62044. https://iris.who.int/handle/10665/349782

WHO. (2009). *2009 Global School-Based Student Health Survey. Fact Sheet Costa Rica*. https://www.who.int/publications/m/item/2009-gshs-fact-sheet-costa-rica

WHO. (2010). *Global recommendations on physical activity for health*. 58.

WHO. (2013a). *GSHS módulos del cuestionario básico (2013–2017)*. https://www.who.int/es/publications/m/item/gshs-core-questionnaire-modules-(2013-2017)

WHO. (2013b). *GSHS preguntas de expansión del módulo básico (2013–2017)*. https://www.who.int/es/publications/m/item/gshs-core-expanded-questionnaire-modules-(2013-2017)

WHO. (2014). *Health for the world's adolescents: A second chance in the second decade* (pp. 1–14) [Summary]. World Health Organization.

WHO. (2020). *WHO guidelines on physical activity and sedentary behaviour*. https://www.who.int/publications/i/item/9789240015128

WHO. (2021a). *GSHS core questionnaire modules*. https://www.who.int/publications/m/item/gshs-core-questionnaire-modules-(2021)

WHO. (2021b). *GSHS core-expanded questionnaire modules (2021)*. https://www.who.int/publications/m/item/gshs-core-expanded-questionnaire-modules-(2021)

WHO. (2022). *Promoting physical activity through schools: Policy brief*. https://www.who.int/publications/i/item/9789240049567

WHO. (2024). *Physical activity*. https://www.who.int/news-room/fact-sheets/detail/physical-activity

WHO. (2025). *Noncommunicable disease surveillance, monitoring and reporting*. https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/global-school-based-student-health-survey/questionnaire

Wilhite, K., Booker, B., Huang, B.-H., Antczak, D., Corbett, L., Parker, P., Noetel, M., Rissel, C., Lonsdale, C., Del Pozo Cruz, B., & Sanders, T. (2023). Combinations of physical activity, sedentary behavior, and sleep duration and their associations with physical, psychological, and educational outcomes in children and adolescents: A systematic review. *American Journal of Epidemiology*, *192*(4), 665–679. https://doi.org/10.1093/aje/kwac212

Wilkinson, C., & Bretzing, R. (2011). High school girls' perceptions of selected fitness activities. *The Physical Educator*, *68*(2), 58–65.

Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, *15*(1).

World Health Organization. (2018). *Global action plan on physical activity 2018–2030: More active people for a healthier world*. https://www.who.int/publications/i/item/9789241514187

Youth Sport Trust. (2023). *Girls active national reports*. https://www.youthsporttrust.org/research-listings/research/girls-active-national-reports-2023

Youth Sport Trust. (2024). *Girls active national reports*. Girls Active National Reports 2024. https://www.youthsporttrust.org/research-listings/research/girls-active-national-reports-2024

Zarrett, N., Fay, K., Li, Y., Carrano, J., Phelps, E., & Lerner, R. M. (2009). More than child's play: Variable- and pattern-centered approaches for examining effects of sports participation on youth development. *Developmental Psychology*, *45*(2), 368–382. https://doi.org/10.1037/a0014577

Zhang, T., & Solmon, M. (2013). Integrating self-determination theory with the social ecological model to understand students' physical activity behaviors. *International Review of Sport and Exercise Psychology*, *6*(1), 54–76. https://doi.org/10.1080/1750984X.2012.723727

Ziaei, R., Dastgiri, S., Soares, J., Baybordi, E., Zeinalzade, A. H., Rahimi, V. A., & Mohammadi, R. (2014). Reliability and validity of the Persian version of Global School-based Student Health Survey adapted for Iranian school students. *Journal of Clinical Research & Governance*, *3*(2). https://urn.kb.se/resolve?urn=urn:nbn:se:miun:diva-22996

Appendix A: Summary of Costa Rican Studies on Physical Activity Levels Among Children and Adolescents

Costa Rican Youths and Their Life of Fun and Recreation
(Sabean, 1984 as cited in Araya & Claramunt, 2020)

Sample	Method	Measures	Results	Notes
934 Ss from 33 schools	Unknown	Participation in organized sports	35% - did not participate in organized sports 14%- have active participation in sports	-No gender or age group was provided. -First ever report on PA participation in Costa Rican population.

Brief Historical Overview of Female Participation in Sports and Recreation: Costa Rica's National Report
(Ministerio de Cultura, Juventud y Deporte, 1986 as cited in Araya & Claramunt, 2020)

Sample	Method	Measures	Results	Notes
7-50 years N=1.785.309 M=896.225 =50.2% F=889084 =49.8%	Participation in sports and recreational programs: e.g., sports entities, national sports games, school games, sport schools. Labor sport games, special sport games, recreational parks, recreational courses.	Participation in organized sports Participation in recreation programs (leisure time PA)	Participation in sports programs by gender: M=139.783=15.6% F=24.130 =2.7% 13-18 years: M=46753=81.09% F=10901=18.91% Participation in recreational programs by gender: M=190.378 = 21.2% F= 124.202 = 14%	- *N*= varied according to sports program.

National Report on the Physical Health Assessment of Basic General Education Students
(MEP & UCR, 1997)

Sample	Method	Measures	Results	Notes
N=2579	Unknown survey	PA habits	6% grade 9 Ss do PA 5 hrs per week	- Report of PA levels on children & youth in Costa Rica.
		Daily time of PA Mon-Fri		-Ss' age was unspecified
M=1233		≥ 5 hrs leisure PA 5 days		-5 hrs of PA is unknown if spread across days.
F=1346		Daily time of PA Sat-Sun	46% grade 9 Ss do 0-1 hrs PA on weekends	- Variables were not established (type of PA)
		0-1 hrs PA on Sat & Sun		-No gender-based data on PA.
(All 3rd, 6th & 9th grade)				- Ss report low levels of PA in general.

National Report on the Physical Health Assessment of Basic General Education Students
(MEP & UCR 1998 as cited inAraya & Claramunt, 2020)

Sample	Method	Measures	Results	Notes
N=2029	Unknown survey	Hrs of weekly PA	Grade 9 Ss spend:	-Overall results are reported by number of hours.
M=1090		Hrs doing PA on weekends	1.24 hrs on weekly PA	
F=939		Hrs viewing TV in a week	1.3 hrs doing PA on weekends	
16-17 years		Hrs viewing TV on weekends	2.18 hrs viewing TV On weekdays	
		Weekly hrs Reading/Studying	2.24 hrs viewing TV on weekends	
		Hrs Reading/studying on weekends	1.18 hrs reading/studying during the week	
			1.15 hrs reading/studying during the weekend	

National Studies on Tobacco, Alcohol and Other Drug Use in Costa Rica
(IAFA 1990, 1995, as cited in Araya & Claramunt, 2020)
(Chaves, 2006 as cited in (Araya & Claramunt, 2020)

Sample	Method	Measures	Results	Notes
N = unknown 12-70 years	-1 question regarding PA from IAFA questionnaire	Frequency of PA done during the last year.	ST (Never engage in PA) 1990=51.6% 1995=53.4% 2000-2001=40.1% 2006=39.4% 2015= 36.3%	-IAFA defined PA as 'physical exercise' as any PA of at least 15 minutes per day, two or more times per week with the purpose of improving body aesthetics and/or health. -The question asked was How frequently do you do PA? -Parameters used: Never, Once or twice per week, Three to four times per week, Five or more times per week. -Results were not reported by gender or age subgroups. - A new sample was considered at the time of each study. (cross-sectional study). -Study emphasized % of people incurring in ST rather than engaging in PA.

Global School-Based Student Health Survey – Costa Rica
(WHO, 2009)

Sample	Method	Measures	Results	Notes
Ss 7-9 grade 13-15 years *N*=2679	GSHS questionnaire	At least 60 min of daily PA on ≥ 5 days Attended PE class ≥ 3 days per week	Total: 27.4% M=35.9% F=19.0% Total: 34.9% M=36.5% F=33.4%	-School response rate=100%, student response rate=72% -Data was reported by gender.

National Studies on Tobacco, Alcohol and Other Drug Use in Costa Rica
(Sandra Fonseca Chaves, 2010 as cited in Araya & Claramunt, 2020)

Sample	Method	Measures	Results	Notes
N = unknown 12-70 years	-1 question regarding PA in the IAFA questionnaire	Frequency of PA done during the last year.	ST 47% Never engage in PA	-In 2010, the question was modified and asked How many days per month do you do PA? - Parameters used: Never = 0 days per month, once per month = 1 to 3 days per month, one or twice per week = 4 to 11 days per month, three to four times per week = 12 to 19 days per month, and five or more times per week = 20 or more days per month - Results from this year were not available to the public.

Global Trends in Insufficient Physical Activity Among Adolescents: A Pooled Analysis of 298 Population-Based Surveys with 1·6 Million Participants
(Guthold et al., 2020)

Sample	Method	Measures	Results	Notes
Ss 11-17 years	GSHS questionnaire		Boys 2001=79.2% Boys 2016=76.1% Grils2001=87.6% Girls2016=88.2% Adolescents2001=83.3% Adolescents2016=82.0%	Prevalence of insufficient PA in Costa Rica was reported.

Collegiate Survey on Nutritional Surveillance and Physical Activity
(Ministerio de Salud & MEP, 2020)

Sample	Method	Measures	Results	Notes
N=8297 M=47% F=53% Grades 8,9 & 10 Ss 13-19 years	IPAQ A questionnaire	Frequency of playing intensely, running, jumping, and throwing during PE. Preferred type of activity done before and after lunch Preferred type of PA Physically active during leisure time	29.5% are always active during PE 1.4% run and play intensely before and after lunch 42.6% prefer walking as the most common form of PA 23.2% are physically active more than 4 times a week during leisure time	- Results reported based on *N*= 174453. -PA was defined as any bodily movement produced by skeletal muscles that require energy expenditure. - Results on PA were given as doing certain types of physical exercises and sports, being active during PE, the type of activity done before and after lunch, being physically active during leisure time. -No gender subgroups. -No type of MVPA reported.

Physical Activity in Costa Rican Urban Population and its Relationship to Socio-Demographic and Anthropometric Patterns
(Gómez et al., 2023)

Sample	Method	Measures	Results	Notes
N= 780 15-65 yrs n=70 15-17 yrs	IPAQ (long version)	PA levels according to WHO's guidelines (+ anthrop. Measures) Average time spent doing weekly PA	37.4% - inactive 62.6%- active 15-17 years n=70 78.6% - active 21.4% - inactive	- Data are given by region: Limon is the 2nd with the highest inactivity rate with people who do not meet the minimum PA guidelines. -No gender distribution for teens 15-17 yrs. -Women have higher rates of inactivity (41.9%) compared to men (32.8%).

Note: IAFA = Instituto sobre Alcoholismo y Farmacodependencia, *N* = total number of cases, PA = physical activity, ST = sedentary time, MEP = Ministerio de Educación Pública, Universidad de Costa Rica, M = Male, F = Female, PA = physical activity, Hrs = hours, Ss = students, CPJ = Consejo Nacional de Política Púbilca de la Persona Jóven, WHO = World Health Organization, IPAQ = International Physical Activity Questionnaire, PE = physical education, GSHS = Global School-Based Student Health Survey.

Appendix B: Costa Rica's Physical Education Program's Thematic Matrix: Thematic and Transversal Axis and Contents per Trimester for Grade 9 (MEP, 2009)

Grade	Thematic axes	Trimester		
9		**1**	**2**	**3**
		Content		
	- Human movement: Study and practice of various forms of physical activity together with the development of skills to encourage a healthy lifestyle. - Games and sports: study and practice of various forms of motor games and individual or team sports activities with the aim of adopting a regular and daily practice, seen as an option for physical recreation and health promotion. - Dance activities or movement with music: study and practice of a variety of forms of individual and group expression using music to mobilize the body and improve its functioning, within a context of physical recreation.	Physical training	Baseball, softball, handball. Olympic Games.	Sports with rackets. Dance activities.
		The aim is for students to:		
		-Gain a deeper understanding of the principles of training. -Design and implement physical training and physical recreation plans, aimed at improving the quality of life and that can be applied in the different environments in which the students live, taking advantage of the available materials and spaces.	-Gain a deeper understanding of team sports by learning and practicing handball, baseball and softball, learning their history and basic rules, as well as the most appropriate way to prepare (warm-up and nutrition) for their practice. -Learn about sports dance and practice it. -Gain knowledge of the major sporting events that are organized at national and international level. -Organize, direct and participate in sporting events that integrate the sports and dance or music activities seen in the unit.	-Gain a deeper knowledge of individual sports by learning and practicing racket sports (table tennis, tennis, badminton, etc.), learning their history and basic rules, and the most appropriate way to prepare (warm-up and nutrition) for their practice. -Learn about other activities with music (pilates, aerobic dance, etc.), which serve as a means of physical-sports training and to practice them. -Organize, direct and participate in sporting events that integrate the sport and dance, or music activities seen in the unit.

Transversal axis	**Health:** Provides students with an education for the practice and promotion of healthy lifestyles, through the proper use of free time. **Transfer:** Encourages students to apply what they have learned in physical education class to any physical and temporal space, within the daily life of students. **Coexistence:** Educates students to practice harmonious interaction with the natural environment (environmental culture; sustainability) and the social environment (respect for human diversity; inclusiveness; cooperation; leadership).

Appendix C: Certificate of Approval

The following document is the certificate of approval granted by the University of Victoria's Human Research Ethics Board (Protocol Number 24-0078)

Office of Research Services | Human Research Ethics Board
Michael Williams Building Rm B202 PO Box 1700 STN CSC Victoria BC V8W 2Y2 Canada
T 250-472-4545 | F 250-721-8960 | uvic.ca/research | ethics@uvic.ca

Certificate of Approval – Annual Renewal

PRINCIPAL INVESTIGATOR:	**Viviene Temple** (Supervisor)	**ETHICS PROTOCOL NUMBER:** Expedited review - delegated	**24-0078**
PRINCIPAL APPLICANT:	**Elisa Sosa Nicora** **Master's student**	ORIGINAL APPROVAL DATE:	11-Mar-2024
		APPROVED ON:	24-Feb-2025
UVIC DEPARTMENT:	**Exercise Science, Physical and Health Education EPHE**	APPROVAL EXPIRY DATE:	10-Mar-2026

PROJECT TITLE: **A Cross-Sectional Examination of Costa Rican Youths' Motivation toward Physical Education**

RESEARCH TEAM MEMBERS:
Jennifer Gruno - Co-investigator, University of Victoria

DECLARED PROJECT FUNDING: **None**

DOCUMENTS INCLUDED IN THIS APPROVAL:
Email_Hannia_Quiros.doc.docx - 14-Feb-2024
TCPS2 Certificate.pdf - 14-Feb-2024
PEMS_Q1_ElisaSN.docx - 14-Feb-2024
PE.ARCS_Q2_ElisaSN.docx - 14-Feb-2024
GSHS_Q3_ElisaSN.docx - 14-Feb-2024
InfoSession_Script_ElisaSN2.docx - 07-Mar-2024
Infographic_ElisaSNC_Amend.png - 22-Apr-2024
OFFICIALConsent_ElisaSN3_Amend.docx - 22-Apr-2024
DVM_EngVersion.pdf - 23-Apr-2024
DREG_EngVersion.pdf - 23-Apr-2024

Conditions of approval

This Certificate of Approval is valid for the above term provided there is no change in the protocol.

Amendments
To make changes to the approved research procedure in your study, please submit "Amendments" or "Annual renewal with amendments" form. You must receive research ethics approval before proceeding with your amended protocol.

Renewals
Your ethics approval must be current for the period during which you are recruiting participants or collecting data. To renew your protocol, please submit a “Request for Renewal” form before the expiry date on your certificate. You will be sent an emailed reminder prompting you to renew your protocol about six weeks before your expiry date.

Project Closures
When you have completed all data collection activities and will have no further contact with participants, please notify the Human Research Ethics Board by submitting a “Notice of Project Completion” form.

Certification

This certifies that the UVic Human Research Ethics Board has examined this research protocol and concluded that, in all respects, the proposed research meets the appropriate standards of ethics as outlined by the University of Victoria's policies for research involving human participants.

Dr. Sandra Gibbons

Chair, Human Research Ethics Board

Dr. Cindy Holder

Vice-chair, Human Research Ethics Board

Certificate Issued On: 24-Feb-2025

Appendix D: Letter of Approval from Costa Rica's Ministry of Public Education's Vice Ministry of Academic Office

MINISTERIO DE EDUCACIÓN PÚBLICA | GOBIERNO DE COSTA RICA

Despacho Viceministerio Académico

09 de abril 2024
DVM-AC-0405-04-2024

Señora
Elisa Sosa Nicora
Estudiante de maestría
Facultad de Educación
Universidad de Victoria, Canadá

Estimada señora Sosa:

Reciba un cordial saludo de mi parte. En atención al documento con fecha 13 de marzo del presente año, mediante el cual se remite documentación con solicitud formal para implementar en centros educativos públicos de Costa Rica la investigación "La motivación de los jóvenes costarricenses en la Educación Física".

Al respecto, me permito indicar que al tomar en consideración el criterio técnico DVM-AC-DDC-DTCED-521-2024, DVM-AC-0342-03- 2024, me permito brindar el visto bueno para llevar a cabo una investigación según la documentación presentada.

Cordialmente.

Karla Salguero Moya
Viceministra Despacho Académico

MAR

C. Archivo/Consecutivo

Appendix E: Letter of Approval from Guápiles' Regional Director of Education

MINISTERIO DE EDUCACIÓN PÚBLICA | GOBIERNO DE COSTA RICA

Dirección Regional de Educación de Guápiles

18 de abril del 2024
DVM-PIRC-DREG-087-2024

Para: Elisa Sosa Nicora.
Estudiante de Maestría, Facultad de Educación.
Universidad de Victoria Canadá.

De: MSc. Bolívar Villanueva Villalobos.
Director Regional de educación Guápiles.

Asunto: Respuesta a su nota. Victoria, 17 de abril del 2024.

Reciba un cordial saludo de mi parte, analizada su solicitud, y visto el documento DVM-AC-0405-04-2024, suscrito por Carla Gabriela Salguero Moya, Viceministra del Despacho Académico, con fecha 09 de abril del 2024, doy visto bueno para realizar la investigación en los colegios citados, parte de esta dirección regional, haciendo la observación de que las coordinaciones deben realizarse con los directores y directoras de centros educativos, de forma que no se altere el orden en relación a las actividades institucionales y se asegure la continuidad del proceso educativo.

Además corresponde al director institucional, analizar desde su centro educativo, así como del desarrollo del proceso de investigación, tomar las medidas necesarias, atendiendo el interés superior del estudiante, autorizar cada acción o etapa de la investigación, que involucre la participación de estudiantes y personal de su centro educativo.

Por lo que le recomiendo ponerse en contacto con directores y directoras, de los centros educativos, para definir las estrategias y acciones que permitan el desarrollo y éxito de la investigación.

Atentamente.

MSc. Bolívar Villanueva Villalobos.
Director Regional de Educación Guápiles

Limón, Guápiles, 200 metros sur del C.T.P. de Pococí, teléfono (506)2710-9039 • Ext: 230, correo electrónico: DRE.Guapiles@mep.go.cr

Appendix F: Infographic Sent to Students During the Recruitment Stage [English Version]

Appendix G: Physical Education Motivation Scale (PEMS) [English Version]

We are interested in your experiences in physical education (PE) class. Using the scale below, please indicate by circling, to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about PE.

When I am in PE...	Strongly disagree			Neutral			Strongly agree
1. I participate in PE because it is fun.	1	2	3	4	5	6	7
2. I try to do well in PE so my teacher will think I am a good student.	1	2	3	4	5	6	7
3. I don't see the point of participating in PE.	1	2	3	4	5	6	7
4. I participate in PE because it is interesting.	1	2	3	4	5	6	7
5. I try hard in PE because I want a good grade.	1	2	3	4	5	6	7
6. I don't see why I have to take PE.	1	2	3	4	5	6	7
7. I find PE enjoyable.	1	2	3	4	5	6	7
8. I do my best so my PE teacher will like me.	1	2	3	4	5	6	7
9. PE is a waste of my time.	1	2	3	4	5	6	7

Please answer the following question:

Think about your experiences in PE, what would you change to make PE more appealing to you?

Why would you make these changes?

Appendix H: Physical Education Autonomy Relatedness Competence Scale (PE-ARCS)

[English Version]

We are interested in your experiences in physical education (PE) class. Using the scale below, please indicate by circling, to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about PE.

When I am in PE...	**Strongly disagree**			**Neutral**			**Strongly agree**
1. My classmates seem to like me.	1	2	3	4	5	6	7
2. I am good at the things we do.	1	2	3	4	5	6	7
3. I can choose which activities I want to practice.	1	2	3	4	5	6	7
4. I really like the people I am with.	1	2	3	4	5	6	7
5. I am able to perform well.	1	2	3	4	5	6	7
6. I make a lot of my own decisions.	1	2	3	4	5	6	7
7. I feel like my classmates accept me.	1	2	3	4	5	6	7
8. I feel skilled.	1	2	3	4	5	6	7
9. I have input in which skills I want to practice.	1	2	3	4	5	6	7
10. I feel connected to my classmates.	1	2	3	4	5	6	7
11. I am confident in my ability to learn.	1	2	3	4	5	6	7
12. I am doing what I want.	1	2	3	4	5	6	7

Continue onto the next page ⇒

Please answer the following question:

If you had the opportunity to design your ideal PE class, what activities would you include? Check all the boxes that apply.

- ☐ Outdoor recreation (e.g: hiking, nature walks, or orienteering activities)
- ☐ Dance fitness (e.g: zumba, hip-hop, breakdance)
- ☐ Parkour, skateboarding (movements to enhance agility, balance, and coordination)
- ☐ Yoga and mindfulness (exercises that promote well-being and stress reduction)
- ☐ Sports (basketball, soccer, badminton)
- ☐ Activities that incorporate the use of technology (video games, fitness apps or wearables to track personal progress, video games or virtual reality to simulate sports and activities)
- ☐ Fitness challenges (obstacle courses, high-intensity interval training (HIIT) sessions, or cross-fit style workouts)
- ☐ Circus arts (juggling, acrobatics, or circus skills)
- ☐ Team building games (cooperative games that foster teamwork, communication, and problem-solving skills)

☐ Other:_____

Appendix I: Global School-Based Student Health Survey (GSHS) - Questionnaire on Physical Activity Module [English Version]

We are interested in the amount of physical activity you do in your daily life. Read and answer all the questions by circling the letter that best fits your answer. The answers you give will be confidential. There are no right or wrong answers. Your grade in this class will not be affected by your answers. Answer the questions based on what you know or do. Once you are finished, return the paper to the teacher.

The next 8 questions ask about physical activity. Physical activity is any activity that increases your heart rate and makes you breathe hard. Physical activity can be done in sports, playing with friends, walking to school, or in physical education class. Some examples of physical activity are running, fast walking, biking, dancing, skateboarding, playing basketball, football, and volleyball.
***Remember to circle your choice.** E.g: E(4) days

1. During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day? ADD UP ALL THE TIME YOU SPENT IN ANY KIND OF

PHYSICAL ACTIVITY EACH DAY.

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days

Exercise refers to any leisure-time physical activity that is planned, structured, and repetitive which aims to enhance or maintain one's physical performance, health, or fitness.
2. During the past 7 days, on how many days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weightlifting?

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days

7. During the past 7 days, on how many days did you do stretching exercises, such as toe touching, knee bending, or leg stretching?

3. During the past 7 days, on how many days did you walk or ride a bicycle to or from school?

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days

4. During this school year, did any of your teachers provide short physical activity breaks during regular class time?

A. Yes
B. No

Sport is a term used to describe a variety of recreational and competitive activities that can be played by teams or individuals under a set of rules.
5. After school, do you play sports or games, exercise for fun, or get to be physically active on school grounds?

A. Yes
B. No

6. During this school year, on how many days did you go to physical education (PE) class each week?
A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 or more days

The next 4 questions ask about your knowledge, attitudes, and skills.

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days

8. During the past 12 months, on how many sports teams did you play?

A. 0 teams
B. 1 team
C. 2 teams
D. 3 or more teams

The next question asks about how much sleep you get.
9. On an average school night, how many hours of sleep do you get?

A. 4 or less hours
B. 5 hours
C. 6 hours
D. 7 hours
E. 8 hours
F. 9 hours
G. 10 or more hours

The following question asks about how much time you usually sit when you are not in school or doing your homework.

10. How much time do you spend during a typical or usual day sitting and watching television, playing computer games, talking with friends, using your mobile phone, or doing other sitting activities such as using a tablet, or playing board games?

A. Less than 1 hour per day
B. 1 to 2 hours per day
C. 3 to 4 hours per day
D. 5 to 6 hours per day
E. 7 to 8 hours per day
F. More than 8 hours per day

11. During this school year, were you taught in any of your classes how to develop a physical fitness plan for yourself?

A. Yes
B. No
C. I do not know.

12. During this school year, were you taught in any of your classes about preventing injury during physical activity?

A. Yes
B. No
C. I do not know.

13. During this school year, were you taught in any of your classes the benefits of physical activity?

A. Yes
B. No
C. I do not know.

14. During this school year, were you taught in any of your classes about opportunities for physical activity in your community?

A. Yes
B. No
C. I do not know.

The next question asks about how often you see, read, or hear advertisements on television, radio, videos, social media, the internet, or billboards; in newspapers or magazines; or at movie theaters, fairs, concerts, or sporting events.
15. During the past 30 days, how often did you see, read, or hear any advertisements about how to increase the amount of physical activity that you get?

A. Never
B. Rarely
C. Sometimes
D. Almost daily
E. Daily

Appendix J: Transcultural Adapted Items of the GSHS-PA Into Spanish Assessed with Semantic and Conceptual Equivalence

Item Number	Original – GSHS-PA (English version) (WHO, 2021a, 2021b)	Original – GSHS-PA (Spanish version) (WHO, 2013a, 2013b)	Translated and/or transculturally adapted version of the GSHS-PA	Explanation	Type of Equivalence	
					Semantic	Conceptual
1.	During the past 7 days, on how many days were you physically active for a total of at least 60 minutes per day?	Durante los últimos 7 días, ¿cuántos días practicaste una actividad física por un total de al menos 60 minutos al día?	Durante los últimos 7 días, ¿cuántos días realizó actividad física por un total de al menos 60 minutos al día?	The verb 'do', gives more cultural meaning to the phrase 'do physical activity' rather than 'being physically active' *'estuvo fisicamente activo'*		x
2.	During the past 7 days, on how many days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weightlifting?	Durante la última semana ¿Cuántos días has hecho ejercicios, como flexiones de brazos, sentadillas, o levantamiento de peso, para fortalecer o tonificar tus músculos?	Durante la última semana ¿Cuántos días hizo ejercicios, como lagartijas, sentadillas, o levantamiento de peso, para fortalecer o tonificar tus músculos?	'Lagartijas', is a common word used among youths to refer to 'push ups' which was used instead of 'flexiones de brazos'		x

Item Number	Original – GSHS-PA (English version) (WHO, 2021a, 2021b)	Original – GSHS-PA (Spanish version) (WHO, 2013a, 2013b)	Translated and/or transculturally adapted version of the GSHS-PA	Explanation	Type of Equivalence	
					Semantic	Conceptual
3.	During the past 7 days, on how many days did you walk or ride a bicycle to or from school?	Durante los últimos 7 días, ¿cuántos días fuiste de la casa a la escuela o regresaste caminando o en bicicleta?	Durante los últimos 7 días, ¿cuántos días fue o regresó de la casa al colegio o viceversa caminando o en bicicleta?	'Escuela' is used to refer to an elementary school whereas 'colegio' refers to 'high school'.	x	
5.	After school, do you play sports or games, exercise for fun, or get to be physically active on school grounds?	N.A	Después de clases, ¿practica algún deporte, juego o ejercicio para divertirse, o realiza alguna actividad física en las instalaciones escolares?	Costa Ricans 'practice' a sport rather than play it.		x
6.	During this school year, on how many days did you go to physical education (PE) class each week?	En este curso académico, ¿cuántos días a la semana fuiste a clase de educación física en la escuela?	*Durante este curso lectivo,* ¿cuántos días a la semana fuiste a clase de educación física en la escuela?	Curso lectivo refers to the school year whereas curso académico, tends to refer to a particular subject or course within the academic school offer		x

Item Number	Original – GSHS-PA (English version) (WHO, 2021a, 2021b)	Original – GSHS-PA (Spanish version) (WHO, 2013a, 2013b)	Translated and/or transculturally adapted version of the GSHS-PA	Explanation	Type of Equivalence	
					Semantic	Conceptual
7.	During the past 7 days, on how many days did you do stretching exercises, such as toe touching, knee bending, or leg stretching?	Durante la última semana ¿Cuántos días has hecho ejercicios de estiramiento, como flexión de rodillas, estiramiento de piernas, entre otros?	Durante los últimos 7 días, ¿Cuántos días hizo ejercicios de estiramiento? Como, por ejemplo: flexión de rodillas llevando talones a los glúteos o piernas extendidas intentando tocar los dedos de los pies.	'knee bending taking heels to the glutes'and 'extended legs, trying to touch the toes' was added. This additional information aims to provide detailed descriptions of the most common stretching exercises students perform in their PE class.	x	
15.	During the past 30 days, how often did you see, read, or hear any advertisements about how to increase the amount of physical activity that you get?	N.A	Durante los últimos 30 días, ¿con qué frecuencia usted vio, leyó o escuchó algún anuncio acerca de cómo incrementar la cantidad de actividad física que realiza?	The verb 'do' provides a more suitable expression in Costa Rica: 'realizar actividad física'		x

Appendix K: Participation in Schools' Sports Teams and Sedentary Time for all Students and by Gender

Figure K1

Participation in Schools' Sports Teams for all Students and by Gender

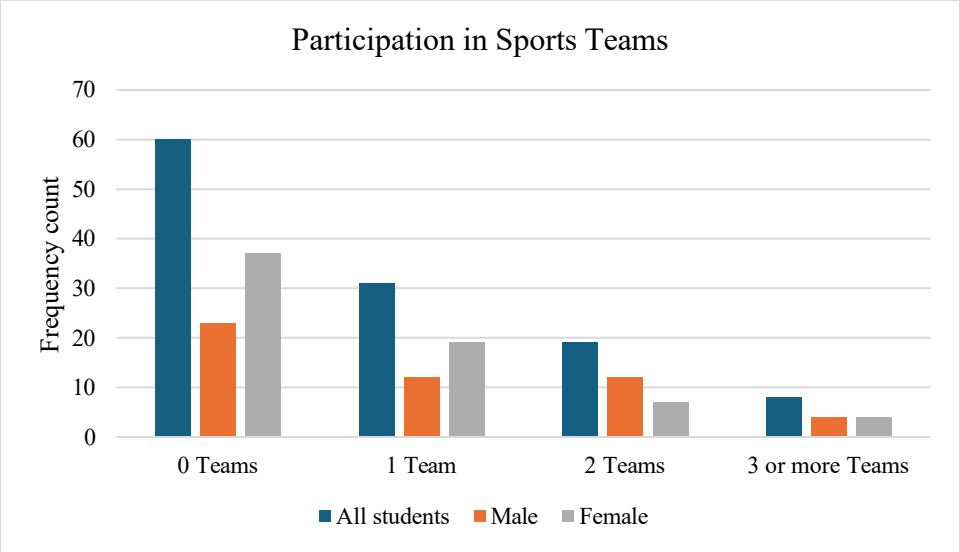


Figure K2

Sedentary Time for all Students and by Gender