Motivation and Behavioural Regulations of Children and Youth Related to Physical Activity Intensity during the COVID-19 Pandemic

by

Elizabeth Comeau
B.Sc., Dalhousie University, 2018

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We acknowledge with respect the Lekwungen peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day

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Abstract

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Background. Physical activity (PA) in children and youth is a necessary behaviour for health across the lifespan. Play and leisure time PA has also been declared as a right for children under the United Nations Convention on the Rights of the Child. Canadian levels of inactivity are highly concerning, with only 25% of children and youth aged 10-17 meeting national guidelines for PA behaviours in Canada. In 2020, COVID-19 pandemic regulations have additionally reduced the engagement of children and youth with leisure time PA. **Rationale.** Understanding key theoretical models of motivations and behavioural regulations for PA is necessary to developing appropriate interventions and strategies for targeting inactivity and ultimately changing PA behaviour for a healthier life. There is a gap in the literature regarding motivation for leisure time PA of children and adolescents, based on self-determination theory (SDT), and potential age and gender moderation or mediation. **Objective.** The purpose of this study was to investigate motivations for PA of children and youth, and any interactions between age and gender, utilizing Organismic Integration theory (OIT), a sub-theory of SDT. **Design.** The study was a cross-sectional design. **Participants.** Participants were children and youth aged 11-14 years, living in Canada at the time of questionnaire completion. The questionnaire was distributed from April 2020 to August 2020, and COVID-19 pandemic restrictions were in place during this period. **Methods.** Motivations and regulations were assessed online using the Behavioural Regulations in Exercise Questionnaire version 3 (BREQ-3) and PA was assessed

using the Godin Leisure Time Exercise Questionnaire (LTEQ). **Results.** Higher levels of PA intensity were correlated with more autonomous forms of regulations and motivation, whereas lower levels of PA intensity were not significantly correlated with more controlled forms of motivation. No BREQ-3 variables predicted PA intensity after controlling for age and gender, therefore mediation analysis was not completed. Gender moderated the relationship between integrated regulation and PA, explaining 7-8% of the variance. Males had significant prediction from integrated regulation (ß= 5.80, p<.01), whereas females did not (ß= 1.34, p=.210). Sub-analyses revealed no BREQ-3 variables significantly predicted different levels of strenuous or moderate PA, yet greater scores of the relative autonomy index (RAI), a general measure of autonomous motivation, predicted higher levels of PA intensity. **Conclusion.** The study supported some facets of SDT theory. Autonomous forms of motivation correlated with higher levels of PA behaviour, and a generalized measure of autonomous motivation predicted PA intensity levels. However, controlled forms of motivation did not predict lower levels of PA intensity, which is not consistent with theory but somewhat consistent with empirical findings. Gender was the key predictor of PA outcomes, indicating other variables beyond motivation and regulations should be further explored regarding children and youth's motivations for leisure time PA, in the context of the COVID-19 pandemic.

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Abbreviations

AM – Autonomous Motivation
AO- Autonomous Orientation
BNT – Basic Needs Theory
BREQ-3 – Behavioural Regulations in Exercise Questionnaire (Third Edition)
CET – Cognitive Evaluation Theory
CM – Controlled Motivation
CO – Control Orientation
COT – Causality Orientations Theory
COVID-19 – Coronavirus disease
EM – Extrinsic Motivation
GCT – Goal Contents Theory
IM – Intrinsic Motivation
IO – Impersonal Orientation
LTEQ – Leisure-Time Exercise Questionnaire
MET – Metabolic Equivalent of Task
OIT – Organismic Integration Theory
PA – Physical Activity
PLOC- Perceived Locus of Causality
RAI – Relative Autonomy Index
SDI – Self-Determination Index
SDT- Self-Determination Theory
SRQ- Self-Regulation Questionnaire
WHO- World Health Organization

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Lastly, a huge amount of gratitude is extended to the participants of this project, who despite the uncertainty of the pandemic took the time to complete the questionnaires and share their insights. Without their participation this research could not have been completed; thank you for helping us understand another small piece in promoting activity and health for all children and youth!

Dedication

I would like to dedicate this research to my parents, and all the coaches, gym teachers, and teammates I've had throughout my life; for instilling a life- long love of sport and physical activity since childhood.

Chapter 1: Introduction

The World Health Organization (WHO) consistently lists physical inactivity among top risk factors for mortality globally, with approximately 23% of adults aged 18 and older not participating in enough activity according to global guidelines in 2010 (World Health Organization, 2018). The statistics on children and youth physical activity (PA) today are perhaps more alarming; in 2018 over 80% of the world's youth population, aged 5 to 17 years old were insufficiently physically active based on global guidelines (World Health Organization, 2018). Canadian children are no exception to this trend with only 25% of children aged 10-17 meeting national guidelines for physical activity behaviours, and only 21% of children aged 5-11 years engaging in at least 1.5 hours per day of active play and unstructured physical activities (ParticipACTION, 2020). Canadian guidelines recommend at least 60 minutes of moderate-to-vigorous activity daily for children aged 5 to 11 years-old, and youth aged 12 to 17 years-old (Canadian Society for Exercise Physiology, 2016). This should include vigorous intensity activities at least 3 days per week, in addition to activities which strengthen bones and muscles, such as jumping, at least 3 days per week (Canadian Society for Exercise Physiology, 2016). Physical activity is a broad behaviour and therefore will be defined throughout this thesis as any bodily movement that results in an increase in energy expenditure (Bouchard & Shephard, 1994), and extends but is not limited to PA as a means for leisure, play, or active transportation.

PA is a health promoting behaviour, essential to children and youth's development and well-being (Janssen & LeBlanc, 2010). Regular PA in childhood decreases the likelihood of developing chronic disease later in life, while additionally promoting mental health through minimizing anxiety and feelings of stress, and increasing self-esteem and innovative ideas, among other benefits (Pan et al., 2016). In addition to the health benefits of PA, PA can act as a

means to social connection for youth (Guerrin et al., 2012), contributing to the establishment of building personal and social assets, which may act as predictors of positive psychological outcomes (Ullrich-French et al., 2012). Drawing from this evidence, the behaviour of PA thus spans numerous domains of an individual's well-being, underscoring the importance of PA engagement among children and youth.

Psychological correlates are an important piece of targeting the problem of physical inactivity among children and youth (Bauman et al., 2012; Rhodes et al., 2017). For example, self-efficacy and perceived behavioural control are correlated with greater PA levels, with self-efficacy acting as a strong positive determinant (Bauman et al., 2012). Likewise, prosocial psychological characteristics have been associated with greater levels of vigorous PA in boys and girls ages 11 to 12 years (Brodersen et al., 2005). While many factors influence PA, motivation is an important underlying factor at the individual level of PA promotion. In recent years, self-determination theory (SDT) has emerged as a popular framework in the humanistic tradition for explaining and predicting motivation for PA behaviours (Rhodes et al., 2019). The sub-theory of SDT, organismic integration theory (OIT) breaks down motivation for a behaviour into 6 regulations and motivations, which exist on a continuum of the degree to which the motivation is autonomous, from amotivation to intrinsic motivation (Deci, & Ryan, 2002). This thesis will utilize OIT as the framework for understanding motivation for PA in children and youth.

Purpose Statement

The purpose of this study is to investigate children and youth's motivation and behavioural regulations for leisure time PA, specifically focusing on possible interactions with gender and age. It is well understood through the literature that PA behaviours vary by gender

and age of children and youth, however, there remains a gap in understanding whether motivations or regulations in accordance with OIT have an important role in these outcomes.

Research Questions and Hypotheses

This study has three major research questions and four testable hypotheses:

Research question 1: *Do autonomous and more internalized behavioural regulations (identified regulation and integrated regulation), and intrinsic motivation, significantly correlate with and predict higher levels of PA intensity in children and youth? Subsequently, do less internalized and more external forms of behavioural regulations (external regulation and introjected regulation), and amotivation, significantly correlate with and predict lower levels of PA intensity in children and youth?*

H_1: Autonomous and more internalized behavioural regulations (identified regulation and integrated regulation), and intrinsic motivation, will significantly correlate with and predict higher levels of PA intensity in children and youth.

H_2: Less internalized and more external forms of behavioural regulations (external regulation and introjected regulation), and amotivation, will significantly correlate with and predict lower levels of PA intensity in children and youth.

Research question 2. *Does age predict PA intensity? Does it interact as a moderator or mediator in the predictor relationship between motivations/regulations and PA intensity?*

H_3: Age will predict PA intensity, where younger participants will have higher PA intensity, and older participants will have lower PA intensity. Age will have an interaction in the relationship between motivations/regulations and PA intensity.

Research question 3. *Does gender predict PA intensity? Does it act as a moderator or mediator in the predictor relationship between motivations/regulations and PA intensity?*

H_4: Gender will be a predictor where being male will predict greater PA intensity than being female. Gender will have an interaction in the relationship between motivations/regulations and PA intensity.

Operational Definitions

(1) Child: A child is defined legally in Canada as any individual under the age of 16 to 19 years (varies by province) (Government of Canada, 2013), however in the context of this research, we define a child as any individual 12 years old and below.

(2) Adolescent or Youth: The terms adolescent and youth are used interchangeably throughout this thesis. For the purpose of this research, adolescent or youth is defined as an individual between 12 and 18 years old.

(3) Exercise / Physical Activity: Physical activity is defined as any bodily movement that results in an increase in energy expenditure; for the purpose of this thesis exercise and physical activity will be used to both fit this definition.

Chapter 2: Literature Review

Physical Activity and Health in Childhood

The definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," was first articulated in the 1946 Constitution of the World Health Organization, and remains one of the most widely used and recognized definitions of the concept in academia and health professions alike (Constitution of the World Health Organization, 1946). By this definition, PA as a behaviour interacts with each facet of health articulated by the WHO, and is both necessary and beneficial to the health of children and youth across the spectrum of physical, mental, and social well-being,

Physical Health. The relationship between PA and physical health in children and youth is well established in the literature. Significant positive health outcomes have been noted with as little as 2 to 3 hours of moderate-to-vigorous intensity PA per week, including but not limited to; improvements to bone mineral density, improvements in metabolic health markers such as insulin resistance and abdominal obesity (ParticipACTION, 2018), and a lower likelihood of developing hypercholesterolemia in both boys and girls (Janssen & LeBlanc, 2010). Notably, while the Canadian recommendations state children need 60 minutes per day of activity, PA in childhood is found to have a dose-response relationship, indicating the more physical activity, the greater the health benefits, within a range (Janssen & LeBlanc, 2010). However, even moderate amounts of activity have been proven to yield important benefits for children, such as combatting obesity and improving sleep (Carson et al., 2016).

In addition to the immediate benefits, PA in childhood also decreases the likelihood of developing chronic disease later in life (Colley et al., 2019). Aerobic exercise is shown to improve glucose delivery and blood flow thereby adding to the effect of maximal insulin

concentrations in human skeletal muscle, contributing to the prevention of type II diabetes (Sothern et al., 1999). Additionally, behaviours developed in childhood often translate into adulthood, as such health behaviours and active lifestyle in childhood may translate into an active and healthy lifestyle as an adult (Baranowski et al., 2000). This therefore mitigates risk factors for chronic disease development; not only providing better health at the individual level across the lifespan, but subsequently at a population level, thereby lessening the economic burden on the healthcare system itself (Ács et al., 2020). Inactivity on a global scale is estimated to account for 80.8% of healthcare costs in high income countries, a substantial economic burden on society that can be mitigated through behaviour change (Ding et al., 2016).

Mental Health. Regular PA in childhood not only decreases the likelihood of developing chronic disease, but also promotes mental health through decreasing anxiety and feelings of stress, and increasing self-esteem and innovative ideas (Pan et al., 2016). Similarly, PA has been shown to influence mood disorders among children and youth, with findings indicating a small inverse relationship exists between PA and anxiety, and a strong inverse relationship between PA and depression (Biddle & Asare, 2011). PA additionally contributes to lower levels of trait anxiety (Biddle & Asare, 2011), and reduced subjective feelings of stress in children and youth (Pan et al., 2016), which may also have a beneficial somatic influence. PA influences mental health in children not only by treating and preventing mental illness, but also by promoting cognitive abilities and executive functioning which serve to be particularly important for children's adaptive functioning and cognitive development (Tomporowski et al., 2008). Lastly, children's cognitive test performance and academic achievement were found to be significantly improved after bouts of PA, particularly in terms of speed and accuracy of responses, suggesting immediate mental benefits from PA engagement (Donnelly et al., 2016).

Psychosocial Health. In addition to the physical and mental health benefits, PA can act as a means to social connection for youth (Smith et al., 2015), contributing to the establishment of building personal and social assets, which may act as predictors of positive psychological outcomes (Ullrich-French et al., 2012). A longitudinal study of boys and girls in the UK found significant improvement in peer relations at age 11 of children who engaged in higher levels of PA at age 7, versus those who had lower PA levels at age 7 (J. V. Ahn et al., 2018). It was previously believed that children who are obese may have increased psychosocial distress, and thus be more receptive to PA improving their psychosocial health, however, new findings have demonstrated many of the psychosocial benefits of PA occur regardless of children's weight to height ratio, BMI, or psychosocial stress levels (S. Ahn & Fedewa, 2011).

Physical Activity During Childhood into Adolescence

Investigating children and youth's PA behaviour is particularly important during transition years from childhood to adolescence, as this period shows normative changes in motivation-related variables (Barkoukis et al., 2010). Not only during this phase are children often experiencing transitions from middle to high school, which can substantially alter their social environment, but children are undergoing puberty, which encompasses marked physical and psychological changes (Ullrich-French & Cox, 2014). A study by Barkoukis et al. (2010) found a significant decrease in physical education enjoyment across three years of junior high school. Likewise numerous other studies have found the largest decreases in PA engagement to occur between 12 and 16 years old (Telama & Yang, 2000; Van Mechelen et al., 2000). In 2020, Canadian children aged 5-11 were found to engage in more PA than youth aged 12-17 (ParticipACTION, 2020).

Children and Youth Physical Activity During COVID-19 Pandemic. The WHO declared the COVID-19 outbreak a global pandemic on March 11, 2020 (*WHO Director-General's Opening Remarks at the Media Briefing on COVID-19 - 11 March 2020*, 2020). In order to curb transmission of the virus, the Government of Canada imposed restrictions that included limiting community and social gatherings, sport and playground use, and physical distancing of 2 meters between individuals not part of an immediate family or bubble (Government of Canada, 2020). As a result, the daily lives of children, youth, and their families were significantly altered (Moore et al., 2020). A study by Moore et al., (2020) found PA behaviour trends during the pandemic reflected similar pre-pandemic behaviour trends, with more children age 5 to 11 years (23.8%) consistently meeting the PA recommendations than youth aged 12 to 17 years (13.2%), and fewer girls (19.0%) aged 5-11 years engaging in sufficient PA compared with boys (27.9%) the same age. According to the same study, children and youth experienced a significant decline in all PA during the pandemic compared with pre-pandemic findings, with the largest decline being in outdoor PA and sport (Moore et al., 2020). Among young children under 5 years old, 52% of parents reported a significant decline in PA behaviour of their child during the pandemic (Carroll et al., 2020). Research in other countries has displayed similar findings; in China, the median time spent engaging with PA for children and youth aged 6-17 years decreased from 540min/week pre-pandemic to 105 min/week during the pandemic (Xiang et al., 2020). Likewise, 94% of parents interviewed of South Korean children reported their child's use of play and sports facilities decreased with the onset of the pandemic (Guan et al., 2020). The COVID-19 pandemic changed much of the normal social and physical environment in which children and youth's leisure time PA behaviours take place, therefore it is important to consider the findings of this study within this context.

Correlates of Physical Activity in Childhood and Early Adolescence

Understanding the correlates, determinants, and motivations for children and youth being physically active is a key area of research in approaching the problem of inactivity (Bauman et al., 2012; Rhodes et al., 2017). PA as a health behaviour spans socio-ecological dimensions (Bronfenbrenner, 1977), from individual to community to public policy levels, including correlates such as socio-economic status, built environment, and parental support (Clennin et al., 2019; Sterdt et al., 2014). Parental educational level and perceived social cohesion of the neighbourhood have been found to correlate strongly with outdoor PA in children under 12 in Germany (Boxberger & Reimers, 2019). Likewise, active transport, sport participation, and outdoor time afterschool have all been found to correlate with higher intensity PA activities of children 9-11 years in the United Kingdom (Wilkie et al., 2018). In Canada, a greater proportion of children who meet the recommended daily amounts of PA live in high-income households versus lower income homes (ParticipACTION, 2020). As such, many factors play a part in determining a child's or adolescents' PA behaviours, each interacting across socio-ecological levels (Rhodes et al., 2020).

Individual psychological motivations among these factors are equally critical to understanding PA behaviour (Rhodes et al., 2017). Numerous psychological correlates have been associated with increased PA behaviours among youth, such as perceived competence and intentions to be active (Bauman et al., 2012). The complexity of PA behaviour has been analysed from different psychological traditions across the past three decades, each stemming from various theories explaining and predicting PA behaviours (Rhodes et al., 2019). In recent years, self-determination theory (SDT), and its sub-theory of Organismic Integration (OIT), has

served as a popular framework in humanistic tradition for exploring the different facets of motivation in regard to PA.

Pandemic Related Correlations. The COVID-19 pandemic significantly altered children and youth's social and built environments, and has likely exacerbated the current health problem of low PA levels in children and youth (Bates et al., 2020). However, several correlates were identified that cushioned the decrease in pandemic PA from pre-pandemic findings. Having younger parents, parent's marital status and cohabitation, the family owning a dog, and living in a detached home were all correlated with less of a decrease in PA once the pandemic began for children and youth in Canada (Moore et al., 2020). Likewise, parental encouragement, engagement, and co-participation in healthy movement behaviours had the largest association with higher pandemic PA levels (Moore et al., 2020).

Sedentary behaviour, while not considered the polar opposite of PA (Sedentary Behaviour Research Network, 2012), has increased substantially with the COVID-19 pandemic, thereby decreasing the amount of time available to engage in PA related behaviours (Carroll et al., 2020). In particular, screen time and social media use by Canadian children and youth during the pandemic rose substantially compared with pre-pandemic levels (Moore et al., 2020). A survey of Chinese children and adolescents reported an increase of approximately 30 hours per week of total screen time with the onset of pandemic restrictions (Bates et al., 2020). Similarly, a study of American parents of 5 to 13 year-olds found parents reported their children spent on average over 8 hours per day of sitting during leisure activities (Bates et al., 2020). Pandemic restrictions have increased time spent indoors, making it more difficult for children and youth without easy access to outdoor space to find leisure activities where they can be physically active. Therefore,

many children and youth have resorted to video games, social media, and sedentary screen-based behaviours to fill their time, at the cost of less leisure time PA.

Effects of the COVID-19 pandemic on psychological correlates for PA have not yet been thoroughly investigated. Psycho-social consequences of the pandemic have been identified in child and youth populations including increased anxiety and depression symptoms, loss of or decrease in peer-to-peer contact resulting in feelings of isolation and irritability, and uncertainty regarding education and future endeavors (Stavridou et al., 2020). It is not yet understood how these factors may interact with motivation for PA behaviours.

Right to Play: Physical Activity as a Human and Child Right

The definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity," as first articulated in the 1946 Constitution of the World Health Organization, is one of the most widely used and recognized definitions of the concept in academia and health professions alike (Constitution of the World Health Organization, 1946). However, the 1946 Constitution further iterates a piece of this definition that is often left out; "the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" (Constitution of the World Health Organization, 1946). Different disciplines interpret this definition from their own unique perspectives.

Human rights are defined by the Universal Declaration of Human Rights as "rights inherent to all human beings, regardless of race, sex, nationality, ethnicity, language, religion, or any other status" (Universal Declaration of Human Rights, 1948). Human rights treaties in regard to health play an essential role in guiding and declaring the moral obligation of State Parties to provide equitable means to health in light of socially determined variables, as well as providing

the means to maintaining health across the lifespan equitably and fairly. This must not be misunderstood as the State's responsibility to guarantee good health, rather "the right to health refers to the right to the enjoyment of a variety of goods, facilities, services and conditions necessary for its realization" (OHCHR & World Health Organization, 2008). Overall, the means to health must be established in a manner that all individuals are provided choice regarding their health and health behaviours.

The United Nations Convention on the Rights of the Child (CRC), developed 1979-1989 and came into force in 1990, is the first human rights treaty that the recognizes specific rights for children under 18 years old (Convention on the Rights of the Child, 1989). Given the unique vulnerability and dependence of children under 18, the CRC aims to provide a legal and moral framework under which these rights are realized, protected, and facilitated by State parties (UNICEF, 2020). The CRC operates under four general principles that unify all 41 articles together; non-discrimination (Article 2), best interest of the child (Article 3, paragraph 1), maximal survival and development (Article 6), and child participation (Article 12).

While the CRC remains the most ratified treaty in history with over 196 State parties across the globe, the effective application of the CRCs principles varies greatly between State parties, especially regarding domestic law (UN Committee on the Rights of the Child, 2013). A lack of adequate and consistent recognition by individual State parties often leaves children invisible in national and local planning (UN Committee on the Rights of the Child, 2013). Common law in many nations effectively treats children as property of the parent or guardian (Freeman, 2011), and prioritizes children's time in ways that suitably equate to an adult's definition of success, such as increased work demands or educational pressures. The CRC as

such addresses children as both ‘being’ and ‘becoming’, aiming to not only speak to their development into adults, but their current lives as children.

The Right to Play - Article 31

Article 31 of the CRC (1989) is “The Right to Play”, which declares;

“*Every child has the right to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts. That member governments shall respect and promote the right of the child to participate fully in cultural and artistic life and shall encourage the provision of appropriate and equal opportunities for cultural, artistic, recreational and leisure activity*” (Convention on the Rights of the Child, 1989)

The CRC emphasizes the significance of play in a child’s full development, while scientific literature also establishes that play is essential to childhood; to both being a healthy child and becoming a healthy adult. Play is a necessary space where children may experience emotions without the consequences of real-world outcomes (Lester & Russell, 2010), and can develop self-choice through testing social and emotional relationships (Canning, 2007). This allows children to learn experientially, explore the world around them, and by doing so, construct and understand their social position in the world (UN Committee on the Rights of the Child, 2013). Child-initiated play enhances motivation, self-efficacy, conflict resolution, decision making abilities, and physical activity (UN Committee on the Rights of the Child, 2013). Physical play enhances social coordination, aids emotional regulation, and increases children’s awareness of self, in addition to numerous physical health benefits (Shackel, 2015). Article 31, and the conditions necessary for its realization, are thereby fundamental to the “quality of

childhood…entitlement to optimal development, promotion of resilience, and realization of other rights" (UN Committee on the Rights of the Child, 2013).

The value of play is often measured through its ability to facilitate outcomes such as academic achievement, rather than appreciated for its own intrinsic value as a behavior (Shackel, 2015). Play is an intrinsic form of participation in everyday life for a child, often undertaken purely in terms of enjoyment and pleasure (Canning, 2007; (UN Committee on the Rights of the Child, 2013). While children can benefit from play and recreation involving adults, benefits can be diminished if control by adults undermines the child's efforts to organize and conduct their own play (UN Committee on the Rights of the Child, 2013). Article 31 aims to protect the 'culture of childhood' that is established through freely chosen play and articulate the necessary factors for participation (UN Committee on the Rights of the Child, 2013).

Despite the widely recognized significance of play for child development, Right to Play is often overlooked and poorly recognized as a stand-alone right (Lester & Russell, 2010; UN Committee on the Rights of the Child, 2013). In societies across the globe, there exists weak or non- existent protective legislation and a lack of investment in adequate provisions in support of this right (UN Committee on the Rights of the Child, 2013); where investment does exist, it is often provided through structured and organized activities, rather than providing the means to free play (Shackel, 2015). All in all, this right is one of the most ignored and violated rights and is often referred to as the "forgotten right" (Lester & Russell, 2010).

The three P's of the CRC; participation, provision, and protection, are considered "universal elements of the organization of childhood in any society at any time" (Bardy, 2000). The Right to Play manifests itself in each of the three P's, and exists as a Participation Right, Protection Right, and Provision Right. Children create their own self-protection through play; the

development of self-efficacy, confidence and mental resiliency all act as protective factors during childhood and throughout the life span (Lester and Russell, 2010). Play acts as a means to participation in a child's community, representing a primary form of engagement in everyday life (Lester and Russell, 2010). For children; "play does not take place in a vacuum, it appears in the cultural, social, and physical fabric of everyday life" (Lester and Russell, 2010), and allows them to regulate their own experience and presence. The quality of the provided social and physical environment influences children's ability to actively engage their participation rights; with barriers such as constraints on independent mobility, fear and violence, oppression, the institutionalization of children's time and space, and mediocrity (Lester and Russell, 2010). The provision of the necessary environments and conditions for play is the responsibility of the powerful; in this situation of adults and State parties (UN Committee on the Rights of the Child, 2013). Place, and both social and physical environment, frame the circumstances of children's experiences; without adequately provided circumstances, "children's survival, well-being, development may be compromised" (Lester and Russell, 2010).

Physical activity (PA) as a human right; has also been stated in UNESCO's International Charter of Physical Education and Sport adopted by Canada in 1978, and a number of other treaties ratified by Canada such as; Article 24 of the Universal Declaration of Human Rights (1948) and Article 12 of the International Covenant on Economic, Social and Cultural Rights (1976).

Lastly, PA as a human right additionally carries the weight of a social function, through which other human rights may be implemented, realized, and advanced (A. Teixeira, 2012). In such a fashion, PA not only acts as an outcome of human rights principles, but a means facilitating the fulfillment of other rights as well.

Motivation and Self Determination Theory

Historical Overview

Historically, motivational psychology has understood human motivation as a means to fulfilling a drive, based on an idea of deficits, or as a conditioning process by pairing a stimulus with an outcome. Freud (1923), and further psychoanalysts, understood these drives to be dichotomous, centered around sex and aggression, whereas Hull (1943) claimed all behaviour could be explained by the drives for sex, hunger, thirst, and the avoidance of pain (Deci & Ryan, 1985; Freud, 1923; Hull, 1943).

In the late 1950s, this understanding of drive-based theories began to shift, with the introduction of Heider's perceived locus of causality (P-LOC), suggesting behaviours may be controlled by intrinsic energy (Deci & Ryan, 1985; Heider, 1958). White (1959) elaborated on this in a phenomenon he described as 'effectance motivation', claiming organisms are innately motivated to be effective in dealing with their environments (White, 1959). Both White and Heider were part of a shift in motivational psychology from understanding motivation as the works of various mechanisms to an organismic approach, which assumes that human beings act on their internal and external environments to be effective and to satisfy a full range of their needs (Deci & Ryan, 1985). Under this approach, behaviour is influenced by internal structures, that are continually elaborated and refined to reflect ongoing experiences. The human organism, however, is still vulnerable, and as such can develop rigid psychological functioning or fractioned internal structures in their attempts to fulfill their needs.

Self-Determination Theory

Ryan and Deci's self-determination theory, and it's five micro theories, centers on the concept of three core psychological needs, which subsequently aligns with a spectrum of

motivation based on the fulfillment of these needs, and the physical and social environment in which an individual exists (Deci & Ryan, 1985). Deci and Ryan (1985) elaborate the three human needs for healthy development and well-being throughout the lifespan are competence, autonomy, and relatedness; innate psychological nutriments that are essential to one's ongoing growth, integrity, and well-being.

Three Basic Needs of SDT. The need for competence derives from the idea of effectance, meaning the need for an organism to have an effect on its environment. Competence is the structure through which this effectance operates, and the need for competence thus energizes its learning. For example, Deci and Ryan (1985) demonstrated this through a study where children were given free choice to select an activity, and consistently chose activities slightly above their current competence levels. The need for competence keeps individuals involved in ongoing cycles of seeking and conquering optimal challenges, which is the optimal incongruity between internal structures and the external world (Deci & Ryan, 1985). Autonomy means to self-organize and have the freedom to integrate an activity or behaviour with one's sense of self and identity. Within SDT, autonomy often plays a regulatory role, where the greater the autonomous regulations the greater the needs satisfaction, and subsequently the greater the psychological well-being of the organism (Ryan & Deci, 2000). In accordance with self-determination theory, human development can be explained as movement toward greater autonomy through continual acquisition of a variety of competencies. Relatedness pertains to the need to be loved and love others, and to be cared for and care for others. Relatedness is the inherently social aspect of the three needs and speaks to the need of feeling interpersonally involved in warm relationships (Ryan & Deci, 2000; P. J. Teixeira et al., 2020). In its true essence, self-determination is understood as a quality of human functioning, and more than a

capacity; it is a need. Thwarting of this need results in compensatory behaviours that decrease health and well-being. To be self-determined is to experience an internal P-LOC, and the quality of this experience is determined by psychological flexibility and experience of choice.

Intrinsic Motivation. Motivation in the context of intrinsic motivation theory means to be moved by something, and to be energized and activated. Motivation is not a unitary value but instead can have different levels and different orientations (Ryan & Deci, 2000). Intrinsic motivation (IM) is motivation free from external controls, pressures, or rewards, whose value and satisfaction are inherent to the behaviour (Deci & Ryan, 1985). Extrinsic motivation leads to a separable outcome from the behaviour and contains four subcategories upon a subscale based on the degree to which the behaviour is autonomous (*See Organismic Integration Theory*). IM behaviours relate primarily to the needs for autonomy and competence, and distally to the need of relatedness. They are therefore performed out of interest to satisfy the innate psychological needs for competence and autonomy, making IM activity the prototype of self-determined behaviour (Ryan & Deci, 2000). IM activity is based on the need for self-determination, and subsequently the opportunity to be self-determining enhances intrinsic motivation.

The five micro theories of SDT elaborated below are as follows; causality orientations theory, goal contents theory, cognitive evaluation theory, basic needs theory, and organismic integration theory (Vansteenkiste et al., 2010).

Causality Orientations Theory

Causality orientations theory (COT) is one of the five mini-theories that make up self-determination theory, and focuses primarily on autonomous, controlled and amotivated functioning at the dispositional level. The theory posits that individuals differ in how they perceive their functioning and behavior initiation, which can be classified into three causality

orientations; autonomy orientation, control orientation, and impersonal orientation (Ryan & Deci, 2000). Each of the three orientations can exist within one individual however, one is often more dominant, whereas others may rise up when triggered. These orientations are malleable and more surface than personality dimensions, additionally they are shaped by socialization rather than by experiences (Vansteenkiste et al., 2010).

Autonomous orientation (AO) is related to positive ego-development and self-esteem, and negatively correlated with self-derogation (Ryan & Deci, 2000). AO tends to lead to more open and honest social interaction with others, and flexible psychological processes. AO additionally allows individuals to maintain self-determination in the presence of extrinsic controls. Control orientation (CO) means behavior is initiated and regulated by controls in the environment or inside the person (Ryan & Deci, 2000). This often creates for individuals who are highly sensitive to others evaluation, and as such often experience high levels of tension and stress (Vansteenkiste et al., 2010). Compared to AO, CO reports more biased and inaccurate self-perceptions, which in turn affects the way in which they process information about their capabilities, interests, and identities (Vansteenkiste et al., 2010).

Impersonal orientation (IO) is primarily defined by a sense of one's being incompetent to deal with life's challenges, leading to erratic and non-intentional behaviors (Ryan & Deci, 2000). IO also experiences the highest levels of depressive symptoms and social anxiety, as well as impaired ego-development and low self-worth, which support amotivation (Vansteenkiste et al., 2010).

The General Causality Orientations Scale is a method Deci and Ryan developed to measure the strength of people's orientations, which may differ by domain, such as in school, or related to work (Deci & Ryan, 2002). However, the empirical utility to the concept for a general theory

such as self-determination depends on capturing sufficient variance to allow predictability across domains. The scale has been used across various research projects that highlight its utility across a nomological network of constructs such as self-determination, self-actualization, self-esteem, and locus of control.

Goal Contents Theory

Goal contents theory (GCT) focuses on the different types of aspirations that individuals pursue, engaging the idea that not all goals are created equal (Ryan & Deci, 2000). Rather than being descriptive, GCT is prescriptive, aiming at forming clear predictions regarding correlates of goal contents that are consistent with human nature. GCT specifies two types of goals; intrinsic goals and extrinsic goals, which are not to be confused with motivations (Vansteenkiste et al., 2010). Intrinsic goals are considered goals likely to satisfy the basic psychological needs and are expressive of desires congruent with actualizing and growth tendencies natural to humans. Extrinsic goals are aspirations contingent on the reactions of others and are often engaged as a means to an end. According to GCT, intrinsic goals may engender an inward orientation that is conducive to need satisfaction, whereas extrinsic goals engender an outward orientation focused on increasing self-worth through achievement and external validation. GCT has been validated in cross cultural contexts with consistent results in individualistic, collectivist, and moderate collectivist cultures (Deci & Ryan, 2002).

Both intrinsic and extrinsic goals or aspirations may be pursued for autonomous or controlled reasons, however which goal is pursued differentially predicts well-being and adjustment, as well as differentially predicts satisfaction of the three basic needs (Ryan & Deci, 2000). Attainment of a goal in its relation to well-being is similarly differentially correlated between intrinsic and extrinsic aspirations. Upon achieving an intrinsic goal, there has been

found to be an improvement in well-being and a reduction of ill-being, whereas the attainment of an extrinsic goal often results in no change to well-being and can even result in an increase of ill-being. This is demonstrated in a study where the attainment of extrinsic goals, such as material wealth, positively predicted an outcome of despair (Kasser & Ryan, 1996).

Intrinsic goal contents have been shown to be able to be contextually promoted; where learning activities framed toward intrinsic goal attainment showed longer persistence, better achievement, and deeper learning regardless of the activity (Deci & Ryan, 2002). GCT also proposes the concept that individuals in needs supportive environments may come to readily endorse intrinsic goals, whereas extrinsic goal pursuits may be to cope with need deprivation. As goals are more cognitive in nature than motives, the pursuit of intrinsic goals represents a third manifestation of organismic growth tendency, where intrinsic motivation and internalization are the first and second respectively.

Cognitive Evaluation Theory

Cognitive evaluation theory (CET) was the first mini-theory of the five pertaining to self-determination theory and intrinsic motivation, with the aim of understanding the interplay of external events such as reward or choice, and how individuals subsequently enjoy the activity or pursue the interest (Deci & Ryan, 1985). CET thus essentially examines the factors that either undermine or support intrinsic motivation; for example, a controlling external event that may shift the perceived locus of control (P-LOC) for an activity from internal to external resulting in attenuated volition and interest.

CET suggests external events that thwart basic psychological needs undermine intrinsic motivation (IM), and external events that are conducive to need satisfaction may facilitate task interest, enjoyment, and IM (Vansteenkiste et al., 2010). Variables such as choice and social

context have the potential to both undermine IM; for example, findings demonstrating on average surveillance will undermine IM unless meaningful rationale is given for said surveillance, whereas optimal choice is shown to enhance feelings of IM (Boal & Cummings, 1981). However, when the choice is perceived as overwhelming, it may be seen as demotivating and thwart one's need for competence, subsequently undermining IM as well. External rewards additionally undermine IM, where when perceived to be contingent on a behaviour or outcome the P-LOC shifts from internal to external. However, unexpected rewards cannot thwart attaining one's psychological needs and as such do not undermine IM (Vansteenkiste et al., 2010). Similarly, competition and performance rewards do not impede IM if presented in a non-controlling manner, demonstrating the necessary understanding of the rewards attributed meaning to the individual (Boal & Cummings, 1981).

Basic Psychological Needs Theory

Basic psychological needs theory (BNT) explains the three basic needs of competence, relatedness, and autonomy, as innate psychological nutriments necessary for psychological and physical health, and social wellness (Deci & Ryan, 1985). Need satisfaction is conceptualized as an important experiential mediator between social context and a variety of outcomes. BNT maintains the same definitions of the three needs as self-determination theory; autonomy meaning a sense that one causes, endorses, and identifies with a behaviour, competence meaning an understanding that one is effective in their behaviour, and relatedness meaning a feeling that one is close, connected, and accepted by others whom they deem important (Deci & Ryan, 1985).

According to BNT, three dimensions of the social environment support these needs; autonomy-support, structure, and warmth and responsiveness. An autonomy-supportive

environment provides the amount of choice desired by the individual being socialized and provides an understanding of different perspectives (Sheldon & Gunz, 2009). Structure is necessary to the need for competence, allowing for clarity of social norms and providing the means to being competent in the situation. The warmth and responsiveness of an environment are necessary to the need of relatedness as it fosters compassion and empathy through which connection and acceptance can be understood. These dimensions of environments act across the lifespan, with studies demonstrating the need satisfaction of children as young as 1-year old benefit from these environmental dimensions when they are met (Vansteenkiste et al., 2010). Additionally, this strengthens the psychological needs argument as it demonstrates conscious, cognitive processing is not required to accrue the benefits.

Empirically, the satisfaction of each of the basic needs contributes unique variance to the prediction of psychological wellness, productivity, and social functioning. Need satisfaction is found to both impact immediate psychological functioning, in addition to long-term health behaviour change, and across the lifespan wellness (Sheldon & Gunz, 2009). BNT argues that the three needs additionally extend cross-culturally, though manifestations may appear different in collectivist versus individualistic cultures. For example, central to the need of autonomy is volition; volitional pursuit of either independence or interdependence regardless of the dominant culture is shown to promote optimal psychological functioning, and thus fulfill the need for autonomy (Sheldon & Gunz, 2009). Furthermore, BNT expresses regardless of whether one's behaviours fit or do not fit the social context, all humans require satisfaction of autonomy, relatedness, and competence for psychological growth and wellness (Vansteenkiste et al., 2010).

Organismic Integration Theory

Organismic integration theory (OIT) was the second of the self-determination mini theories to be developed (Vansteenkiste et al., 2010). OIT aims to explain extrinsic motivation (EM) not as an antagonist to intrinsic motivation (IM), but as a continuum in and of itself between amotivation and IM. OIT is an extension of the second manifestation of organismic growth tendency within self-determination theory which is internalization (Ryan & Deci, 2000). Internalization is found to facilitate social responsibility through the adoption of cultural values. The EM continuum varies to the degree that EM is internalized, which relates strongly to one's level of autonomy, but is equally influenced by the other two basic psychological needs of relatedness and competence.

An important consideration related to the OIT continuum of EM is that IM does not represent the endpoint of internalization. IM remains distinct from EM in that its value and enjoyment are inherent to the process whereas EM is a means to a separable outcome (Ryan & Deci, 2000). However, EM can be experienced as autonomous to the extent that individuals feel a sense of ownership over their behaviours and have fully endorsed the personal value and significance of their behaviour.

Within the continuum of OIT, EM contains four levels of internalization based on the degree to which the behaviour is autonomous; external regulation, introjected regulation, identified regulation, and integrated regulation (Ryan & Deci, 2000). The least internalized and least autonomous is external regulation; where the behaviour contains no internalized value and is motivated by obtaining a reward or avoiding a punishment. External regulation is considered difficult to maintain, as the behaviour is entirely contingent on external factors. Introjected regulation occurs when individuals are motivated by a partially internalized contingency to gain pride and self-esteem, or to avoid feelings of shame and guilt (Deci, & Ryan, 2002). Identified

regulation, the third level of internalization, occurs when individuals understand and endorse the personal value of a behaviour and as a result, experience a sense of freedom while doing it (Vansteenkiste et al., 2010). Often this means finding a sense of choice and personal meaning in the behaviour. The fourth level of internalization is integrated regulation, where the behaviour is a synthesis of various identifications that form a coherent sense of self. This process is likely to require considerable effort and self-awareness and does not come without challenges (Ryan, & Deci, 2000). Overall, well-internalized behaviours are still performed for a separable outcome, yet integration of EM can co-occur with the development of IM. Inherent to SDT is the ideology that autonomous motivations, the paramount of which is IM, will lead to favourable cognitive, behavioural, and affective outcomes, whereas controlled forms of motivation will undermine these outcomes (Sebire et al., 2013; Vansteenkiste et al., 2010). Furthermore, OIT suggests factors that support autonomy, competence, and relatedness, will facilitate internalization, and thus promote well-being (Ryan & Deci, 2000).

Measurement Considerations

Various measures, questionnaires, and assessments exist to investigate different facets of SDT. Regarding OIT, different approaches have been taken in scoring the continuum of motivations and regulations. The Behavioural Regulations in Exercise Questionnaire (BREQ), and the subsequent second and third versions, are some of the most widely used measurements for assessing OIT in exercise domains, as they breakdown regulations along the spectrum of amotivation and extrinsic to intrinsic motivation. First developed in 1997, the BREQ originally included external, introjected, identified and intrinsic, but removed amotivation due to high levels of skewness in the initial samples (Mullan et al., 1997). The subsequent BREQ-2 and BREQ-3 implemented additional questions to evaluate amotivation, and integrated regulation

(Markland & Tobin, 2004). This approach to scoring each OIT-construct has been referred to as 'item aggregation' when discussed in the literature (Wilson et al., 2012).

Another form of scoring OIT constructs is the relative autonomy index (RAI), or self-determination index (SDI) (Ryan & Connell, 1989). The single score RAI was developed on the assertion that adjacent regulations on the continuum display more positive associations with one another compared to distal regulations, creating a 'quasi-simplex pattern' (Deci & Ryan, 2002; Wilson et al., 2012). The RAI creates a solitary score using the BREQ continuum, representing the extent to which a person's behaviour is "more or less self-determined" (Mullan et al., 1997). A third method to scoring OIT constructs using the BREQ scale involves the 'bifurcation' approach of scores, which aims to separate regulations and motivations by autonomous and controlled exercise motives, which theoretically correlate with intrinsic and extrinsic goal contents, thereby creating two scores (Sebire et al., 2008; Wilson et al., 2012). Lastly, a similar single scoring procedure developed by Ryan & Connell (1989) that is commonly used is the self-regulation questionnaire (SRQ), which reflects simply the extent to which a behaviour is autonomous (Bagøien et al., 2010).

Criticisms for single scoring OIT measures such as RAI and bifurcation approaches, and SRQ, have arisen in recent literature. Wilson et al. (2012) argue single score measures may mask important conceptual distinctions between factors, and as such, behavioural regulations studies that utilize single score measures do not represent the full spectrum of motivation qualities (Amotivation to intrinsic motivation). The RAI has specifically been criticized for its lack of multidimensional conceptualization and is no longer recommended for use by some researchers (Chemolli & Gagné, 2014). The nuances between regulation levels may offer more information and important insights into specific targets for intervention. However, in situations where

multicollinearity may override the differences between OIT constructs, RAI or bifurcation can be justified as a measure of internalized motivation and self-determination (Sheldon et al., 2017).

Current OIT Measures in Child and Youth Populations. In a systematic review and meta-analysis of self-determined motivation and PA in children and adolescents conducted in 2014, fifteen studies investigating leisure time PA utilized a RAI score as a measure of motivation, and revealed weak to moderate positive correlations between these two variables (Fenton et al., 2016). Regarding the full spectrum of motivations and regulations; only one study included integrated regulation as a measure, with a moderate positive correlation found, and only nine studies included amotivation with a weak negative correlation found. The central tenets of OIT propose a direct correlation with the degree to which a positive behaviour is autonomous and participation in said behaviour; however, based on present literature there is more analysis needed with children and youth related to PA behaviours. Additionally, the use of a single index score versus item aggregation is an ongoing issue for SDT and OIT measurement and conceptualization, and merits further exploration in populations of children and youth.

Children's Physical Activity and Self Determination Theory

It is well supported in the literature that self-determination of children and adolescents is associated with PA levels (B. Owen et al., 2014; Sebire et al., 2013). For example, more autonomous motivational regulations in physical education classes are found to have a significant effect with the intention to practice sports outside of school (Cid et al., 2018). However, in specifically investigating the full spectrum of behavioural regulations, there are intermittent findings with their relationships to PA in children and adolescents. With adolescents, intrinsic and extrinsic forms of motivation have been found to positively predict PA behaviour, with amotivation negatively predicting PA behaviour (Chicote-López et al., 2018). A meta-

analysis of SDT studies including children and youth aged 10 to 17 years determined intrinsic motivation and autonomous regulations had moderate positive associations with PA, whereas controlled forms of regulation and amotivation had weak negative associations (B. Owen et al., 2014). A previous meta-analysis indicated autonomous regulations consistently had a moderate positive relationship with PA, however, controlled regulations showed no association or weak positive correlations (Lonsdale et al., 2013). Further research to this extent is needed to clarify these relationships, and ultimately define how behavioural regulations and motivations in the context of OIT relate to children and youth PA.

Gender Considerations. The literature on PA behaviours of children and youth consistently demonstrates significant differences by gender. In Canada, only 33% of girls aged 5 to 11 years met the PA recommendations, compared to 60% of boys (ParticipACTION, 2020). Between ages 12 and 17 years, only 17% of girls compared to 43% of boys met the guidelines (ParticipACTION, 2020).

During the middle age years of childhood, developmental variables differ between boys and girls, for example, the age at which they begin and conclude puberty, as well as social stereotypes and environmental boundaries. Middle -school age girls have shown greater extrinsic goal contents than boys, which was attributable to a pubertal status effect observed where children with greater physical maturity attached a higher value to extrinsic factors (Seghers et al., 2014). Within this study, 70% of girls observed and 31% of boys were of pubertal status, making this a significant consideration when understanding the motivations of middle-age children (Seghers et al., 2014). Along these lines, a similar finding by Broderson et al., (2005) determined girls who were more advanced developmentally, and who reported greater emotional symptoms, also engaged in more sedentary behaviors than boys and other girls their age.

During the transition period from middle to high school, Rutten et al. (2015) found girls had no association between physical school environment and autonomous motivation (AM) to engage in PE, whereas boys showed a significant negative relationship between changes in perceived physical school environment and AM for PE. The authors believed boys high in AM for PA might be more critical of their new school environment (Rutten et al., 2015), whereas other findings indicated there was no difference between boys and girls in AM to engage in PA (Rutten et al., 2012).

Along these lines, one study found girls less likely to engage in community sports than boys, which authors concluded was due to the lack of inclusivity of sports to all groups (De Meester et al., 2017). Lawler et al., (2017) found girls who participated in sports, either individual or team, had significantly higher levels of PA than girls who demonstrated other forms of PA engagement, whereas boys who participated in team sports had significantly higher levels of PA than boys who demonstrated other forms of PA engagement, even individual sport (Lawler et al., 2017). Similarly, a study of South Korean youth determined peer support was a significant motivating factor for boys PA, but was not found to be significant for girls (Hong et al., 2020). Bagøien et al., (2010) determined boys' scores compared to girls were significantly higher on perceived competence in leisure time physical activities and effort of PA.

While peer support was a significant motivating factor for boys PA (Hong et al., 2020), with respect to parental support and outdoor leisure time PA, a systematic review of 21 studies including children 0 to 12 years found a consistent significant relationship existed with girls only, suggesting boys were not reliant on parental encouragement (Boxberger & Reimers, 2019). Alternatively, a meta-analysis of behavioural regulations assessed using the BREQ/BREQ-2 including children and adults found no significant effects across regulations or motivations,

however failed to assess gender differences in the strength and direction of regulation-exercise relationship (Guerrin et al., 2012). Gender differences clearly exist in PA output measures with children and youth; however, the role gender plays in the motivation or regulation of these activities is not yet entirely understood and merits further investigation.

Age Considerations. In addition to gender, age plays a significant role in PA behaviours of children and youth. In Canada, approximately 52% of 5- to 10-year-olds take at least 12,000 steps daily, compared to 26% of 15- to 19-year-olds (ParticipACTION, 2020). An international study across 10 countries determined a decrease of 5.8% PA per year (4.7% boys, 6.8% girls) when the average activity level was assessed at age 12 (Cooper et al., 2015). Like gender, the effects of age are well established in PA outcome measures, however, the influence of age is less understood through motivations and behavioural regulations.

In populations of children and youth transitioning from middle to high school, changes in autonomous forms of motivation for PA were found to be significant predictors of trajectories of change in PA engagement (McDavid et al., 2014). This may be explained by findings indicating the social contextual changes that occur during this time may influence levels of autonomous motivation through increased ego-involving and competitive climate, and a notable increase in introjected regulation due to greater external pressures (Ullrich-French, & Cox, 2014).

Previous research suggests different forms of motivation may be more salient across different stages of life (B. Owen et al., 2014). For example, findings from Sebire and colleagues (2013) indicated children are primarily intrinsically motivated for PA, whereas adolescents may have greater PA levels with greater identified regulation scores. Meta-analysis by B.Owens and colleagues (2014) additionally found age moderated the association between identified regulation

towards leisure time PA. However, these findings are not well established as very few studies have specifically investigated motivation through OIT with child age specific populations.

Leisure Time PA Versus PE Class. A majority of research on children and youth's motivation for PA centers primarily on in-school settings for PA, physical education (PE) interventions, or structured sport settings. While these are important to investigate, there is a need for more research with a focus on leisure time PA relating to behavioural regulations and motivations in children and youth. PE class is a consistent form of PA exposure for school aged children, however, it follows a curriculum taught by a teacher and thus interacts differently with SDT than children's leisure time PA; for example, the compulsory nature of PE may render autonomy less relevant to motivation for PA in this setting (Ullrich-French, & Cox, 2014). The physical setting of PE may influence perceptions of competence by providing a comfortable structure for children and adolescents, in addition to creating an adequate social context for appropriate needs support (Rutten et al., 2012). Multiple OIT studies (Bryan & Solmon, 2007; Fenton et al., 2016; Rutten et al., 2015; Seghers et al., 2014) take a specific interest in how PE classes influence children's engagement with leisure time PA behaviours, however, few behavioural regulation studies choose to specifically use a leisure time PA setting as the means for obtaining their data.

Chapter 3: Methods

Research Design

This study utilized a cross-sectional design, with all data collection occurring through online surveys.

Participants

Inclusion and Exclusion Criteria. The inclusion criteria specified participants must be 11 to 14 years of age and living in Canada during the time of completing the questionnaire. Questionnaires were therefore not accepted if participants indicated their age to be outside this boundary, or their location to be outside of Canada.

Recruitment. Participants were recruited through various means. The first recruitment avenue was through one participating middle school from the Greater Victoria School District in Victoria, British Columbia, from April to June 2020. Teachers distributed the online questionnaire to students by email. A secondary avenue of recruitment was sharing the questionnaire through social media channels such as Facebook, Instagram, and Twitter, targeting parents, caregivers, and friends of potential participants from May to August 2020.

Measures

Motivation regulations were assessed using the third version of the Behavioural Regulation in Exercise Questionnaire (BREQ-3) according to Self-Determination Theory (SDT) framework (Markland & Tobin, 2004; Wilson et al., 2007, 2012). This is a 24-item self-report questionnaire including 6 subscales assessing intrinsic (n = 4), integrated (n = 4), identified (n = 4), introjected (n = 4), and external (n = 4) regulations, as well as amotivation (n = 4). Each item was rated on a 5-point scale from 0 = “not true for me”, 1 = “sometimes true for me”, 2 = “moderately true for me”, 3 = “often true for me”, and 4 = “very true for me”. Scores from the

BREQ-3 were computed into one total score per regulation per participant using Microsoft Excel for Mac version 16.2, following the multidimensional analysis guidelines (Markland & Tobin, 2004; Wilson et al., 2007). Cronbach's alpha for internal consistency was adequate for each item; intrinsic motivation (α = .92), integrated regulation (α = .91), identified regulation (α = .73), introjected regulation (α = .83), external regulation (α = .83), amotivation (α = .69). This is consistent with previous findings (Duncan et al., 2010). The Relative Autonomy Index (RAI) is a single score calculated using the sub-scale scores from the BREQ-3. Each sub-scale is weighted according to its degree of autonomy, multiplied by this weight, then summed together. Amotivation has a weight of -3, external regulation of -2, introjected regulation of -1, identified regulation of +1, integrated regulation of +2, and intrinsic motivation of +3.

PA was assessed using the Leisure Time Exercise Questionnaire (LTEQ); a self-report measure in which participants record the frequency of light, moderate, or strenuous activity they engage in for at least 15 minutes over a one-week period (Godin, 2011). The weighted sum of each exercise intensity was then used to generate a composite PA intensity behaviour score, or weekly metabolic equivalent of task (MET), according to this formula: (light x 3) + (moderate x 5) + (strenuous x 9), using Excel. Additionally, strenuous PA, moderate PA, and light PA can each be considered individually by their raw input scores. The LTEQ has been found to be a valid, reliable, and cost-effective self-report measure to determine levels of leisure time activity in children and adolescents, and has been used repeatedly across age groups (Eisenmann et al., 2002; Godin, 2011).

Demographics were collected through simple survey questions. The sex of participants was determined by a selection of "Male", "Female" or "Other'. Age was determined through a

self-report text box. Participants geographic locations were collected through a self-report text box asking “Location (City, Town, etc.)”.

Procedures

In accordance with COVID-19 regulations, all research procedures that included human participants were completed online. The LTEQ, BREQ-3, and demographic questions were combined into one online questionnaire using SurveyMonkey that was accessible on a computer or smart phone device, with data collection procedures taking approximately 10 minutes to complete by participants. Participants and their parents or guardians were required to electronically sign an informed consent form to be granted access to the questionnaire. Upon completion of the questionnaire, the responses were sent automatically to the researcher. All procedures were approved by the University of Victoria Ethics Board, protocol number 19-0487.

Data Analysis

Data was analysed using Microsoft Excel for Mac version 16.2 and SPSS for Mac version 26. G Power 3.1 was used for both a priori and post hoc power analysis. The analyses will be discussed by the research question.

Research question 1: *Do autonomous and more internalized behavioural regulations (identified regulation and integrated regulation), and intrinsic motivation, significantly correlate with and predict higher levels of PA intensity in children and youth? Subsequently, do less internalized and more external forms of behavioural regulations (external regulation and introjected regulation), and amotivation, significantly correlate with and predict lower levels of PA intensity in children and youth?*

To analyse this question, descriptive statistics and bivariate correlations were computed using significance score $p < 0.05$. In bivariate correlations, Pearson’s r coefficients were

interpreted as $0.1 < |r| < 0.3$ small or weak correlation, $0.3 < |r| < 0.5$ medium or moderate correlation, $0.5 < |r|$ large or strong correlation (Cohen, 1988). Sign of the effect sizes corresponds with the direction of the relationship, where +1 indicates a perfect positive relationship, -1 indicates a perfect negative relationship, and 0 indicates no direction or relationship (Cohen, 1988).

Multivariate linear regression was conducted to determine whether behavioural regulations and motivations predicted PA intensity. A priori sample size calculation for multiple regression indicated a minimum sample size of 175 is required with 6 predictors, a p-value = .05, effect size $f^2 = .08$, to achieve power = .80 (Faul et al., 2009). With N = 95 this was not achieved; therefore, post hoc testing determined altering to a medium effect size of $f^2 = .15$, would allow for power of at least .80 with 95 participants.

Research question 2. *Does age predict PA intensity? Does it interact as a moderator or mediator in the predictor relationship between motivations/regulations and PA intensity?*

Research question 3. *Does gender predict PA intensity? Does it act as a moderator or mediator in the predictor relationship between motivations/regulations and PA intensity?*

These two research questions were answered using the same analysis techniques. Gender was dummy coded with male as the base case of 0 and female as 1. Due to only one participant identifying their gender as 'Other', this participant was excluded from data analysis. T-tests were used to infer statistically significant absolute differences between the means of females and males, with Cohen's d scores of $d < 0.2$ indicating a small effect, $d < 0.5$ indicating a medium effect, and $d > 0.8$ indicating a large effect (Cohen, 1988). Fisher's Z-scores were used to assess statistically significant differences in bivariate correlations between females and males, with

alpha levels et at 0.05 (Fisher, 1915). Z-scores greater than 1.96 or less than -1.96 fall into the rejection region, indicating the two correlations are significantly different.

Multivariate linear regression was conducted to determine whether age and gender predicted PA intensity. Moderation was conducted through hierarchical linear regression with the inclusion of interaction terms. To improve statistical power due to the sample size, step-wise regression was used to allow all interaction terms to be considered for entry into the regression. This technique has been supported in the literature as suitable for exploratory data analysis (Cohen et al., 2013; Rhodes et al., 2005). The SDT variables, age, and gender were entered into the regression using a forced entry in block #1, followed by any significant ($p < .05$) interaction terms using a step-wise entry in block #2.

Hayes's PROCESS Macro for SPSS was used for mediation data analysis using Model 4 based on Hayes Templates (Hayes, 2018). Mediation occurs if the confidence interval of the indirect effect of X on Y does not include 0, therefore indicating an effect.

Chapter 4: Results

Data Screening

Data was screened prior to analysis for missingness and outliers. Questionnaires missing more than one response, or where the age range of participants was outside the inclusion range, were rejected (n= 13). Skewness and kurtosis of the data was assessed and deemed within appropriate variability ranges of skewness – 2 to + 2, and kurtosis - 7 to + 7 (Hair et al., 2010); PA intensity composite scores had a skewness of 1.12 and kurtosis of 1.15. After outliers were removed, all data met the regression analysis assumptions for normality, linearity, homogeneity, homoscedasticity and residuals.

Descriptive Statistics

Participants. Participants of this study (N = 95) were children and youth aged 11 to 14 years old (*M* age =12.59, *SD* = 1.06) living in Canada. Participants identified their gender as male (n = 39), female (n = 55), and other (n = 1), and were geographically dispersed through various provincial regions in Canada; Alberta (n = 3), British Columbia (n = 36), Ontario (n = 23), Prince Edward Island (n = 1), Nova Scotia (n = 30) and Quebec (n = 2). Mean age for females was M = 12.71, SD = 1.13, while mean age for males was M = 12.39, SD = 0.91. Descriptive statistics and inferential data for all participants can be found in Table 1.

The BREQ-3 scores for each motivation or regulation can have a maximum value of 16 and a minimum value of 0. BREQ-3 scores for females were on average highest in identified regulation (M = 11.11, SD = 3.67) and intrinsic motivation (M = 10.58, SD = 4.09), followed by integrated regulation (M = 8.76, SD = 4.99), introjected regulation (M = 5.67, SD = 4.29), external regulation (M = 4.33, SD = 3.81), and amotivation (M = 1.02, SD = 1.99). Males followed a similar pattern with highest average scores in identified regulation (M = 11.85, SD =

3.17) and intrinsic motivation (M = 11.82, SD = 3.71), followed by integrated regulation (M = 9.56, SD = 5.26), introjected regulation (M = 6.18, SD = 4.04), external regulation (M = 3.00, SD = 3.24), and amotivation (M = 1.05, SD = 1.75).

Comparisons Between Males and Females. Both males and females on average met the LTEQ threshold for 'Active' leisure time activity with PA intensity scores over 24 points (males M = 98.55, SD = 55.28, females M = 64.53, SD = 31.76). Ninety-two-point three percent of males achieved a score over 24 points and 96.8% of females. T-tests displayed that males and females differed significantly in composite PA intensity scores ($t(55) = -3.63$, $p < 0.01$), with a moderate effect size ($d = 0.75$), indicating males were more active than females. There were small effects found between genders in age and on all BREQ-3 variables, however none were significant.

Table 1

Descriptive Statistics and Comparison of BREQ-3 Scores and PA Intensity Among Male and Female Study Participants (N = 94)

	Females (n= 55)		**Males (n=39)**					
	M	***SD***	***M***	***SD***	***Cohen's d***	***t***	***p***	***95% CI***
Age	12.71	1.13	12.39	0.91	0.31	-1.54	0.13	[-0.74, 0.09]
Intrinsic motivation	10.58	4.09	11.82	3.71	0.32	1.53	0.13	[-0.37, 2.84]
Integrated regulation	8.76	4.99	9.56	5.26	0.16	0.74	0.46	[-1.34, 2.95]
Identified regulation	11.11	3.67	11.85	3.17	0.22	1.04	0.30	[-0.67, 2.15]
Introjected regulation	5.67	4.29	6.18	4.04	0.12	0.58	0.56	[-1.22, 2.23]
External regulation	4.33	3.81	3.00	3.24	0.38	-1.82	0.07	[-2.77, 0.12]
Amotivation	1.02	1.99	1.05	1.75	0.02	0.09	0.93	[-0.73, 0.80]
Intensity (METS)	64.53	31.76	98.55	55.28	0.75	3.63	0.00	[16.31, 56.42]

Bivariate Correlations (Pearson's *r*). Bivariate correlations between the six BREQ-3 variables and LTEQ measurement can be found in Table 2. For females, intensity was moderately positively correlated with identified regulation ($r = .438$, $p < 0.01$), and intrinsic motivation ($r = .392$, $p < 0.01$), and moderately negatively correlated with amotivation. ($r = -.314$, $p < 0.05$). For males, moderate positive correlations were found between identified regulation and intensity ($r = .375$, $p < 0.05$), and intrinsic motivation and intensity ($r = .497$, $p < 0.01$). Integrated regulation was strongly positively correlated with PA intensity ($r= .544$, $p < 0.01$). No Z-scores were found to be statistically significant at $p < 0.05$, or outside of ±1.96 range, therefore indicating males and females did not differ in bivariate correlations, as shown in Table 3.

Table 2

Bivariate Correlations Between Behavioural Regulations/Motivation and PA Intensity

		1	*2*	*3*	*4*	*5*	*6*	*7*
1	Amotivation	--	.219	.032	-.084	-.043	.046	.087
2	External	.272*	--	.018	-.028	-.080	-.187	-.073
3	Introjected	-.298*	.160	--	.450**	.369*	.336*	.151
4	Identified	-.450**	-.086	.499**	--	.667**	.534**	.375*
5	Integrated	-.491**	-.092	.392**	.720**	--	.616**	.544**
6	Intrinsic	-.558**	-.321*	.361**	.761**	.793**	--	.497**
7	Intensity (METS)	-.314*	-.183	.231	.438**	.212	.392**	--

*Correlation is significant at 0.05 level (2-tailed)
**Correlation is significant at 0.01 level (2 -tailed)
Note*: Female lower axis, male upper axis*

Table 3

Z-Test of Correlations Between Behavioural Regulations/Motivation and PA Intensity by Gender

		Male Fisher-Z	*Female Fisher-Z*	*Z-Score*
1	Amotivation	.087	-.325	1.952
2	External	-.073	-.185	0.516
3	Introjected	.152	.235	0.383
4	Identified	.394	.470	0.348
5	Integrated	.606	.215	1.800
6	Intrinsic	.545	.414	0.605

*p < 0.05
**p < 0.01

Multivariate Prediction of PA Intensity

Multivariate prediction of PA intensity can be found in Table 4. Only gender was found to be a statistically significant predictor of PA intensity (ß = -3.13, p < .01) through this analysis.

Table 4

Regression Predicting PA Intensity from Age, Gender, and Behavioural Regulations/Motivation

	F	***df***	***R^2***	***B***	***SE***	***ß***	**t**	**p**
	5.089	8	.260					
Age				-.273	4.410	-.006	-.062	.951
Gender				-29.743	8.902	-.313	-3.341	.001
Amotivation				1.993	2.457	.080	.811	.420
External				-.633	1.326	-.049	-.477	.634
Introjected				-.082	1.204	-.007	-.068	.946
Identified				1.941	1.957	.143	.992	.324
Integrated				1.092	1.355	.118	.806	.422
Intrinsic				2.720	1.760	.229	1.545	.126

Interaction Effects: Moderation

A significant moderation effect with gender was found for integrated regulation predicting PA intensity, as displayed in Table 5. Gender moderated the effect of integrated regulation on PA intensity, as evidenced by a statistically significant increase in total variation

explained of 7.8% [F_{change} (84) = 10.969, $p < .01$]. Males had significant prediction from integrated regulation (ß= 5.80, p<.01), whereas females did not (ß = 1.34, p = .210), as shown in Table 6. Figure 1 demonstrates this interaction.

Table 5

Gender Moderation of Integrated Regulation when Predicting PA Intensity

	Fchange	**df**	**R^2 change**	***ß*$_1$**	***ß*$_2$**
Block 1	5.089**	85	.324		
Amotivation				.080	.005
External				-.049	-.012
Introjected				-.007	-.024
Identified				.143	.151
Integrated				.118	.380*
Intrinsic				.229	.309*
Age				-.006	.022
Gender				-.313**	.218
Block 2	10.969**	84	.078		
Integrated x Gender					-.678**

Note: *p < .05; **p < .01.
$B_{1\text{-}2}$=standardized regression coefficients for equations #1, #2

Table 6

Conditional Effects of Integrated Regulation on PA Intensity

Gender	***ß***	**SE**	***p***	**95% CI**
Male	5.80	1.21	.000	[.236, 8.203]
Female	1.34	1.07	.210	[-.774, 3.470]

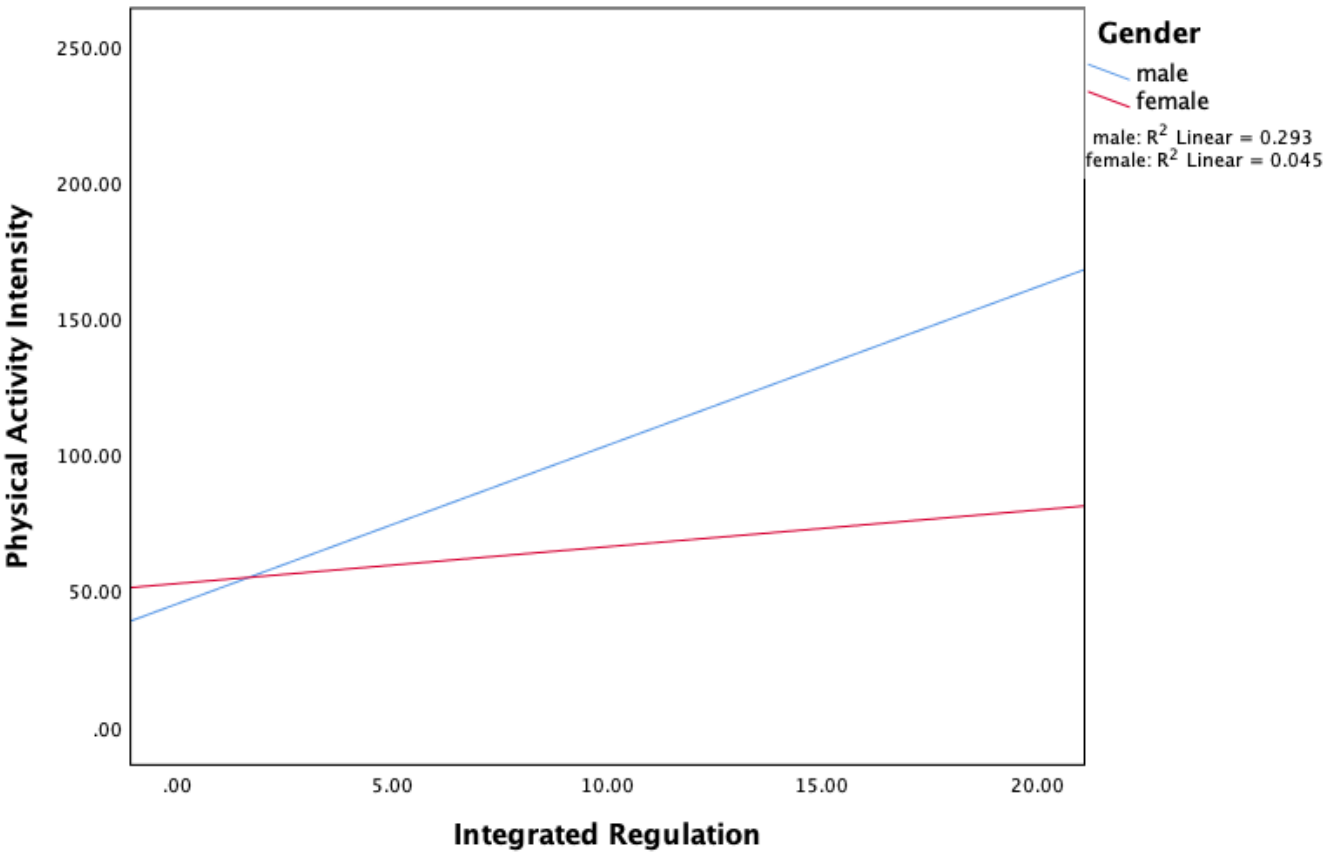

Figure 1

Gender Moderation on Integrated Regulation Predicting PA Intensity

Mediation Effects

No regulations or motivations were found to be significant predictors of PA intensity at $p < 0.05$, therefore there was no need to proceed with mediation analysis.

Sub – Analyses

Sub-analyses were conducted to further explore this data.

Research Sub-Question 1

Q1: *Is there a difference in prediction by PA intensities, using scores derived from the LTEQ, for strenuous PA and moderate PA?*

To answer this research question, a multilinear regression analysis was run using behavioural regulations/ motivations, age, and gender as predictor variables, with Strenuous PA and Moderate PA scores as dependent variables. The results are displayed in Table 8. T-test were additionally computed to assess statistically significant absolute differences between males and females on PA outcomes, presented in Table 7.

Sub-Analysis Comparisons Between Males and Females. T-tests displayed that males and females differed significantly in strenuous PA scores ($t(56) = 2.43$, $p < 0.05$), and moderate PA scores ($t(60) = 4.03$, $p < 0.01$). Each PA outcome had moderate or large effect size (strenuous; $d = 0.53$, moderate; $d = 0.87$), indicating males were more active than females.

Table 7

Sub-Analyses Descriptive Statistics and Comparison of RAI Scores, PA Intensity, Strenuous PA and Moderate PA Between Males and Females (N = 94)

	Females (n= 55)		**Males (n=39)**					
	M	***SD***	***M***	***SD***	***Cohen's d***	***t***	***p***	***95% CI***
RAI	43.00	29.36	51.13	23.27	0.31	-1.50	0.14	[-18.92, 2.67]
Intensity (METS)	64.53	31.76	98.55	55.28	0.75	3.63	0.00	[16.31, 56.42]
Strenuous PA	4.20	2.53	6.08	4.32	0.53	2.43	0.02	[0.33, 3.42]
Moderate PA	3.44	2.48	6.26	3.84	0.87	4.03	0.00	[1.42, 4.22]

Multivariate Prediction of Strenuous PA and Moderate PA. Only gender was found to be a significant predictor of strenuous PA (ß = -1.88, p = .058) and moderate PA (ß = -3.82, p < .01).

Table 8

Regression predicting Strenuous PA and Moderate PA Scores from Age, Gender, and Behavioural Regulations/Motivation

	F	***df***	***R^2***	***B***	***SE***	***ß***	**t**	**p**
Strenuous PA	3.755	8	.261					
Age				-.109	.342	-.033	-.318	.751
Gender				-1.328	.691	-.188	-1.920	.058
Amotivation				.106	.191	.057	.554	.581
External				-.108	.103	-.112	-1.052	.296
Introjected				.090	.094	.108	.966	.337
Identified				.055	.152	.055	.363	.718
Integrated				.141	.105	.206	1.344	.182
Intrinsic				.135	.137	.153	.988	.326
Moderate PA	3.965	8	.272					
Age				.119	.331	.037	.360	.720
Gender				-2.618	.667	-.382	-3.923	.000
Amotivation				.191	.184	.106	1.035	.303
External				.046	.099	.049	.458	.648
Introjected				-.163	.090	-.200	-1.807	.074
Identified				.198	.147	.203	1.352	.180
Integrated				.010	.102	.015	.101	.920
Intrinsic				.180	.132	.209	1.362	.177

Research Sub-Question 2

Q2: *Is a simplified score of autonomous motivation (RAI) predictive of PA intensity, given inherent collinearity present in the 6 motivations and regulations?*

To answer this research question, a multilinear regression analysis was run using the RAI scores, age, and gender as predictor variables, and PA intensity composite score as the dependent variable. The results are displayed in Table 9. T-test were additionally computed to assess

statistically significant absolute differences between males and females on RAI scores, presented in Table 7.

Sub-Analysis Comparisons Between Males and Females. Males and females did not differ significantly in RAI scores.

RAI Prediction of PA Intensity. Both gender (ß = -.326, $p < .01$) and RAI (ß = .377, $p < .01$) were predictive of PA intensity. A beta coefficient of B = .653 indicates for every 1 unit increase in RAI, PA intensity increases by .653.

Table 9

Regression Predicting PA Intensity from Age, Gender, and RAI Scores

	F	***df***	***R²***	***B***	***SE***	***ß***	**t**	**p**
	12.006	3	.286					
Age				-.228	4.031	-.005	-.056	.955
Gender				-30.990	8.660	-.326	-.3.578	.001
RAI				.653	0.156	.377	4.188	.000

Chapter 5: Discussion

The purpose of this study was to explore the behavioural regulations of children and youth for leisure time PA behaviours. We hypothesized more autonomous forms of motivation and regulations would be associated with higher levels of PA intensity and duration, and more controlled forms of motivation and regulations would be associated with lower levels of PA intensity and duration. We additionally hypothesized gender and age would predict and interact with the relationship between behavioural regulations and motivations and PA outcomes. Sub-analyses were conducted to investigate whether prediction differed between strenuous and moderate PA scores, and whether a simplified autonomous motivation score (RAI) was predictive of PA intensity. The results proved for mixed support of our hypotheses, and each finding will be discussed below.

Hypothesis 1

Our first hypothesis speculated autonomous and more internalized behavioural regulations and intrinsic motivation, would significantly correlate with and predict higher levels of PA intensity in children and youth; while less internalized and more external forms of behavioural regulations and amotivation, would significantly correlate with and predict lower levels of PA intensity. This was supported by the finding that autonomous motivations and regulations were significantly correlated with PA intensity in both females and males.

Both females and males had moderate positive correlations with intrinsic motivation and PA intensity, which is consistent with previous findings (B.Owen et al., 2014; Sebire et al., 2013; Taylor et al., 2010). Intrinsic motivation for most children manifests in the form of fun and enjoyment (Pellegrini & Smith, 1998), and leisure time PA for children is often undertaken through games or sports that focus on enjoyable experiential qualities. Fostering this relationship

as children and youth progress into adolescence and adulthood may lead to more PA engagement throughout the lifespan. Males in particular had a strong positive correlation between integrated regulation and PA, compared to females moderate positive. Integrated regulation represents the fourth level of internalization, and the most autonomous form of extrinsic motivation (Deci & Ryan, 2002). Both genders had moderate positive correlations with identified regulation and PA. Previous literature has indicated identified regulation is often found as a PA motivation in adolescents versus children due to the higher-level cognitive function required in self-identifying benefits of a behaviour (Ingledew and Sullivan, 2002).

Regarding less internalized forms of motivation, there was only one weak significant correlation between controlled forms of regulations or amotivation and PA intensity; a finding that is consistent in previous literature, though not supportive of our hypothesis (B.Owens, et al., 2014; Dishman et al., 2015; Duncan et al., 2010; Sebire et al., 2013; Taylor et al., 2010). Many of the empirical findings regarding controlled or less internalized motivation for PA with children and adolescents, seem to deviate from the theoretical framework of SDT. Sebire et al. (2013) have argued younger children may not be able to fully recognize feelings of shame or guilt, or differentiate these from external motivation due to the necessary level of cognitive development, calling into question the use of introjected motivation with young populations.

Our findings indicated no specific regulations or motivations predicted PA behaviour outcomes, however gender was a significant predictor. Based on these findings, it is difficult to recommend focus on any particular motivation. This may be due to low statistical power, and a relatively small sample size. Additionally, there was multicollinearity between BREQ-3 constructs in our study, resulting in overlapping variances. From a theoretical perspective, this suggests further investigation is needed into use of the BREQ-3 measure with children and youth

populations, to determine whether it is capturing the essence of OIT, and whether children and youth are able to differentiate between motivation and regulation constructs. Literature that supports single index autonomous motivation scores such as the RAI, cites the 'quasi-simplex' pattern of constructs as they move from amotivation to intrinsic motivation (Wilson et al., 2012), however the multicollinearity observed in our sample is a potential flaw in the aggregated item model with children and youth.

Hypothesis 2: Age

Our study determined age did not significantly interact with any motivations or behavioural regulations, nor did it predict any PA outcomes. This was interesting as it did not support the findings in previous research that younger children are primarily more intrinsically motivated than their adolescent peers (B.Owens, et al., 2014; Sebire et al., 2013). One possibility for this is with pre-pubescent and pubescent children and youth, age may not be wholly indicative of developmental maturity, therefore including a measure of cognitive, biological, or social development could provide greater insight into these findings. It is worth considering the different developmental stages of each participant, as our age sample was across childhood into adolescence. Another factor in our study may be the low sample size of the four subgroups within the construct of age, as well as restricted range of ages. In order to see an age effect, we may have needed to include younger children and older adolescents.

Hypothesis 3: Gender

Statistics in Canada indicate gender-related disparities between boys and girls exist regarding PA, with boys engaging in more PA than girls (ParticipACTION, 2020), which may coincide with differing levels of motivation for PA behaviour. In our initial predictor model, only gender was found to significantly predict PA intensity. Gender was not a manifestation of

motivation; therefore, there may be other variables not accounted for in our model that explain this relationship. Biological and psychological maturity may play a role in the differences between boys and girls, where girls of the same age may be developmentally advanced therefore attaching greater value to extrinsic factors (Ingledew and Sullivan, 2002). Along these lines, girls of greater biological and psychological maturity may begin the decline seen in general PA behaviours through adolescence earlier than their male counterparts, and age samples between 11 to 14 years old may not represent this difference (Dishman et al., 2015; ParticipACTION, 2020; Seghers et al., 2014).

Furthermore, our study found gender to be a significant moderator in the relationship between integrated regulation and PA intensity. Behaviour is often motivated by integrated regulation when it is part of one's sense of self and personally understood identity (Deci and Ryan, 2000). One may feel a sense of volition and personal freedom when engaging in said behaviour, while the core motivation remains extrinsic and not fully internalized (Vansteenkiste et al., 2010). Gender acting as a moderator on this regulation may have various causes. Boys may see PA as part of who they are or integrate PA as part of their identity, more so than girls, due to environmental and social factors supporting this convention (Drummond, 2020; Martínez-Andrés et al., 2017; Sánchez-Miguel et al., 2017). This underscores the necessity of targeting different motivation and regulations of boys and girls when designing interventions and aiming to change PA behaviour engagement with both groups, while taking into account factors such as developmental maturity, social and environmental supports.

As the item aggregated OIT model was not predictive of PA intensity in our sample, other variables regarding gender of children and youth may be important to consider in predicting leisure time PA outcomes. In the context of the COVID-19 pandemic, children and

youth were likely to be spending a majority of their time in home settings with their families, and parental influence may have played a stronger role than traditional peer influence or PE. Girls are more reliant on parental encouragement for leisure time PA (Boxberger & Reimers, 2019), and additionally have a stronger perception of subjective norms regarding PA, whereas boys have a more positive attitudes and higher intention to engage in PA (Wang & Wang, 2015). The pandemic and subsequent shift of social norms and behaviours regarding PA may therefore influence girls to a greater extent, where boys may have more resilience to these structural influences.

Sub-Analyses

Sub-Question 1. The first sub-analysis question we investigated was whether there was a difference prediction by PA intensities, using scores derived from the LTEQ, for strenuous PA and moderate PA. We were interested in whether differences in the categorized intensity of activity may highlight differences in motivations or regulations. The LTEQ provides examples of strenuous and moderate activities; with strenuous being defined by rapidly beating heart, and moderate being activity that is not exhausting, but still tiring (Godin, 2011). Strenuous activities include running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, or vigorous long-distance bicycling. Moderate activities include fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing. According to the ParticipACTION Full Report (2020), no gender related disparities exist in Canada regarding organized sports participation in childhood, suggesting that boys and girls may be near the same level of sport participation, however boys engage in greater amounts of more leisure-based PA.

As with the previous research questions, t-tests determined a significant difference in both strenuous PA and moderate PA scores between boys and girls. Furthermore, gender was found to be the only significant predictor of either PA outcome, however more significant in moderate PA.

Sub-Question 2. The second sub-analysis question we were interested in investigating was if a simplified score of autonomous motivation (RAI) was predictive of PA intensity, given inherent collinearity present in the six motivations and regulations. Our findings indicate the RAI was a significant predictor of PA intensity, as well as gender. While this does not inform us about the finer conceptual differences between children and adolescents' motivations and regulations, it does provide support for the general tenets of SDT that autonomous motivation predicts greater PA behaviour at a basic level, as well as supports the continuum approach to motivations.

Previous research has debated whether child and youth populations can entirely differentiate between BREQ subscales, and few studies have included the entire spectrum from amotivation to intrinsic motivation (B. Owen et al., 2014; Seghers et al., 2014). The interpretation of questions on autonomous and controlled motivation for example may differ between boys and girls or according to age, biological maturity, or race/ethnicity (Dishman et al., 2015). The collinearity of constructs in our study, with subsequent prediction from the total RAI, indicates the entire scale may not work very well for children and emerging adolescents, or instead questions need to be adapted to better fit this population. A similar lack of operational distinction has been found with children and the theory of planned behaviour, where children were positive or negative on constructs but lacked the ability to differentiate between said constructs (Rhodes et al., 2006).

Theoretically, greater levels of autonomous motivation and regulations in the context of OIT indicate high or full internalization (Vansteenkiste et al., 2010). This may include experiencing a sense of freedom while engaging in said behaviour, including the behaviour in one's sense of self, or feeling a sense of choice and personal meaning in the behaviour (Deci, & Ryan, 2002). In an applied setting, children and youth may display these factors through identifying themselves as an 'athlete' or 'sporty', having the option and necessary supports to choose different PA activities, or simply enjoying being active and engaging in PA for fun. Higher PA intensity prediction from greater RAI scores in our study suggests these traits of greater internalization and autonomous motivation result in higher leisure time PA engagement. This provides support to the theory that individuals who are more internally motivated to engage in PA are gaining the multiple health benefits of PA, more so than their less internally motivated counterparts. It additionally supports previous empirical findings using the RAI as a measurement tool with children and youth and leisure time PA behaviours (B. Owens et al., 2014). Applying these findings to intervention could include promoting enjoyment of PA behaviour, integrating leisure time PA into individuals' lives such that they associate the behavior as part of who they are, and ensuring the provision of the necessary built physical and social environments to be able to choose PA. Useful behaviour change techniques along the lines of these trends might include encouraging self-initiation and experimentation of PA behaviours thereby fostering autonomous action via intrinsic appeal, or addressing obstacles for change such as lack of equipment or necessary environmental factors to facilitate PA (P. J. Teixeira et al., 2020).

COVID-19 Implications

The occurrence of the COVID-19 pandemic immediately prior to executing our data collection plan is important to discuss in relation to our findings. The pandemic restrictions resulted in a change of data collection procedure from in-person questionnaires, to online questionnaires being sent to participants and their parents/guardians outside of a school setting. In-person questionnaires often generate a higher response rate in a school setting, thereby changing to online data collection affected recruitment and sample size (Fincham, 2008)

The pandemic has significantly altered children and youth's social and built environments, as well as their day-to-day reality. Factors such as access to safe outdoor areas for leisure time PA, living in a detached home, or parental co-participation, were not included in our data collection, however these have been found to be significant predictors of leisure time PA during the pandemic (Moore et al., 2020). Other motives such as peer and sibling support and remote learning PE classes, are worth investigating in the context of gender during the pandemic. The increased sedentary time during the pandemic has also been correlated to decreased PA, where children may choose to use their leisure time in screen related behaviours more so than PA. Feelings of increased anxiety, stress, and uncertainty may also alter children and youth's motivation for PA, however further investigation is needed regarding how the pandemic interacts with SDT principles. Pandemic restrictions additionally created barriers to oppourtunity for PA and thereby reduced individual autonomy. Children and youth who may have typically high internalized motivation for PA and be highly active, are placed in a non-typical environment where PA may be less relevant, subsequently disrupting their natural trajectory of motivation to behaviour.

As our study did not find any individual motivations or regulations to be predictive of PA outcomes, further research into other pandemic related correlates is needed, especially in relation

to gender. The use of the BREQ-3 as a measure of the OIT continuum was not effective in representing all the facets of the scale for children and youth. This warrants recommendations for future research with children and youth to use alternative or adapted measures for the OIT continuum, and include variables outside of individual motivation that are related to the pandemic restrictions such as built environment or parental support/ relationships.

Strengths

A major strength of this study included evaluating the whole range of regulations and motivations that make up the OIT continuum, as well as the RAI. Previous research has often neglected to include each facet or has used only the RAI when evaluating motivation levels (B.Owens et al., 2014; Taylor et al., 2010). The study was also strengthened by different avenues of data collection, allowing children and youth to not only participate through their school and class, but through notices on social media or via family and friends.

Study Limitations

This study was limited by various factors. Paramount of these was the undetermined nature of the influence of the COVID-19 pandemic. While we have a loose understanding of pandemic correlates with children and youth's PA, there are no longitudinal studies to provide concrete causal conclusions. Second, our study used a self-report measure for leisure time PA reporting. While the LTEQ has been validated consistently, objective measures such as accelerometers may yield more accurate depictions of children and adolescents' leisure-time activity levels. The LTEQ additionally only collected information on the intensity of leisure time PA but did not divide the findings into specific types, for example; sports, outdoor play, or recess. Our study was also limited by a non-representative sample across the regions in Canada, with participants primarily living in British Columbia, Ontario, or Nova Scotia. Furthermore, as

in previous studies, the BREQ measures did not explain more controlled and less autonomous levels of motivation well; that's to say more controlled forms of extrinsic motivation and amotivation were not significantly correlated with lower levels of PA. This was a discrepancy in the findings alternate to the foundations of SDT, however it was consistent with previous empirical findings as explained. Lastly, our study was limited by a cross-sectional design. Longitudinal evaluation of motivations and regulations for PA as children progressed across ages into adolescence or experimental manipulation of SDT needs satisfaction resulting in motivation and PA perhaps would have been better assessments of the OIT constructs.

Future Directions

This study has provided numerous future directions for continued research. Descriptive statistics revealed participants were mostly female (n=55) compared to male (n=39), with one participant identifying as other. This category was included to be mindful of all gender identities, however due to the lack of statistical significance, this participant was not included in the data analysis. It is important to note while traditional gender norms of boy and girl exist in Canadian society and have a large influence in children and youth's identity formation, as well as social and built environments, future research should pull the focus from gender and instead aim to determine what aspects of these societal constructs may interact with individual's motivation specifically.

Furthermore, increasing children and youth's leisure time PA is one target in reducing inactivity among this population (ParticipACTION, 2020). Our findings indicate children and youth's leisure time PA is associated with internalized motivations, though further experimental research is needed to examine these relationships with larger samples. Determining how the experiential qualities of leisure time PA relate to behavioural regulations and motivation levels

may provide insight into future interventions across genders. Promoting activities rich in intrinsic appeal such as playing sports, dancing, or outdoor education, especially for girls, may help them develop a sense of identity around PA behaviours. Further investigation of using the BREQ-3 with child and youth populations is necessary to determine whether this measure is capturing the essence of OIT, and whether children and youth can differentiate between sub-scale constructs. Different measures to assess controlled forms of external motivation and amotivation may be required with children and youth, as well as more objective measures of PA behaviour.

Conclusion

In conclusion, children and youth with high levels of PA outcomes have well internalized motivations for leisure time PA, as supported in this study and in past literature. In an applied setting, it is therefore important to foster the experiential qualities of PA, and promote activities rich in intrinsic appeal, in order to target inactivity in this population. Gender was significantly predictive of PA intensity, and should be specifically considered in future research. The differences between boys' and girls' motivation and regulations should not be overlooked in designing interventions to target inactivity, especially in considering how PA may be valued in a child or adolescent's self-identity. The current study adds to the literature insight into the need for better measurement of the full spectrum of OIT motivations and regulations in a child and youth population, as well as analysis of age and gender interactions with this continuum. This study provides a platform from which future studies may build, such as by including larger sample sizes and longitudinal or experimental designs, controlling for maturation and cognitive development across ages, and investigating further the influence of pandemic regulations on psychological correlates with leisure time PA.

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Appendices

Appendix A. University of Victoria Ethics Approval

University of Victoria
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 - Amendments

PRINCIPAL INVESTIGATOR	**Ziba Vaghri** (Supervisor)	**ETHICS PROTOCOL NUMBER** Expedited review - delegated	**19-0487**
PRINCIPAL APPLICANT	**Elizabeth Comeau** **Master's student**	ORIGINAL APPROVAL DATE	13-Jan-2020
UVIC DEPARTMENT	**Public Health & Social Policy**	APPROVED ON	18-Jun-2020
		APPROVAL EXPIRY DATE	12-Jan-2021

PROJECT TITLE **Exercising their Right: Exploring Children's Physical Activity through the Intersection of Self-Determination Theory and Human Rights**

RESEARCH TEAM MEMBERS
Ryan Rhodes - Co-Superviser, Professor

DECLARED PROJECT FUNDING **None**

DOCUMENTS INCLUDED IN THIS APPROVAL
Phase 1 and 2 - Safety Plan.docx - 07-Jan-2020
Elizabeth Comeau Complete Approval Package.pdf - 23-Mar-2020
BREQ3 and LTEQ.pdf - 23-Mar-2020
Letter of Intent for Parents.GuardiansOnline.pdf - 25-Mar-2020
Consent Form Text.pdf - 25-Mar-2020
Sample Script for TeachersOnline.pdf - 25-Mar-2020
Link to questionnaire.pdf - 25-Mar-2020
Study Description for School Principals 2020.2.pdf - 02-Apr-2020
Cover Letter to SD Requesting Approval.2.pdf - 02-Apr-2020
Online BREQ and LTEQ.pdf - 02-Apr-2020
Letter of Intent for Parents.Guardians_PHASE2_COVID_AMENDMENT.pdf - 29-May-2020
Phase 2 Consent Form COVID_1.pdf - 31-May-2020
Phase 2 Plan - COVID-19 AMENDMENTS_1.pdf - 31-May-2020
Sample Email Script F:F_1.pdf - 31-May-2020

CONDITIONS OF APPROVAL

This Certificate of Approval is valid for the above term provided there is no change in the protocol.

Modifications
To make any changes to the approved research procedures in your study, please submit a "Request for Modification" form. You must receive ethics approval before proceeding with your modified 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 ethcis as outlines by the University of Victoria Research Regulations Involving Human Participants.

Dr. Rachael Scarth
Associate VP Research Operations

Certificate Issued On: 18-Jun-2020

Appendix B. Letter of Intent to the School District

University of Victoria

Date:
Address:
To whom it may concern:

Please accept this letter and attachments as a request for School District approval so that we may recruit students from the Greater Victoria School District to take part in our Graduate Research Study Entitled: *Exercising their Right: Exploring Children's Physical Activity through the Intersection of Self-Determination Theory and Human Rights.*
We are inviting children in grades 6 to 9 to participate in Phase 1 of our study. To participate in Phase 1, we require the children to complete an online questionnaire. Students may Opt-In to participate in Phase 2, which will be completed at a later date. Please note students name will not be included in the research, and analysis and results will remain completely anonymous; however, if they opt-in to Phase 2 of the study we will require individual contact information. We guarantee that the contact information and all data collected will be kept completely confidential and only the research team will have access to the information.

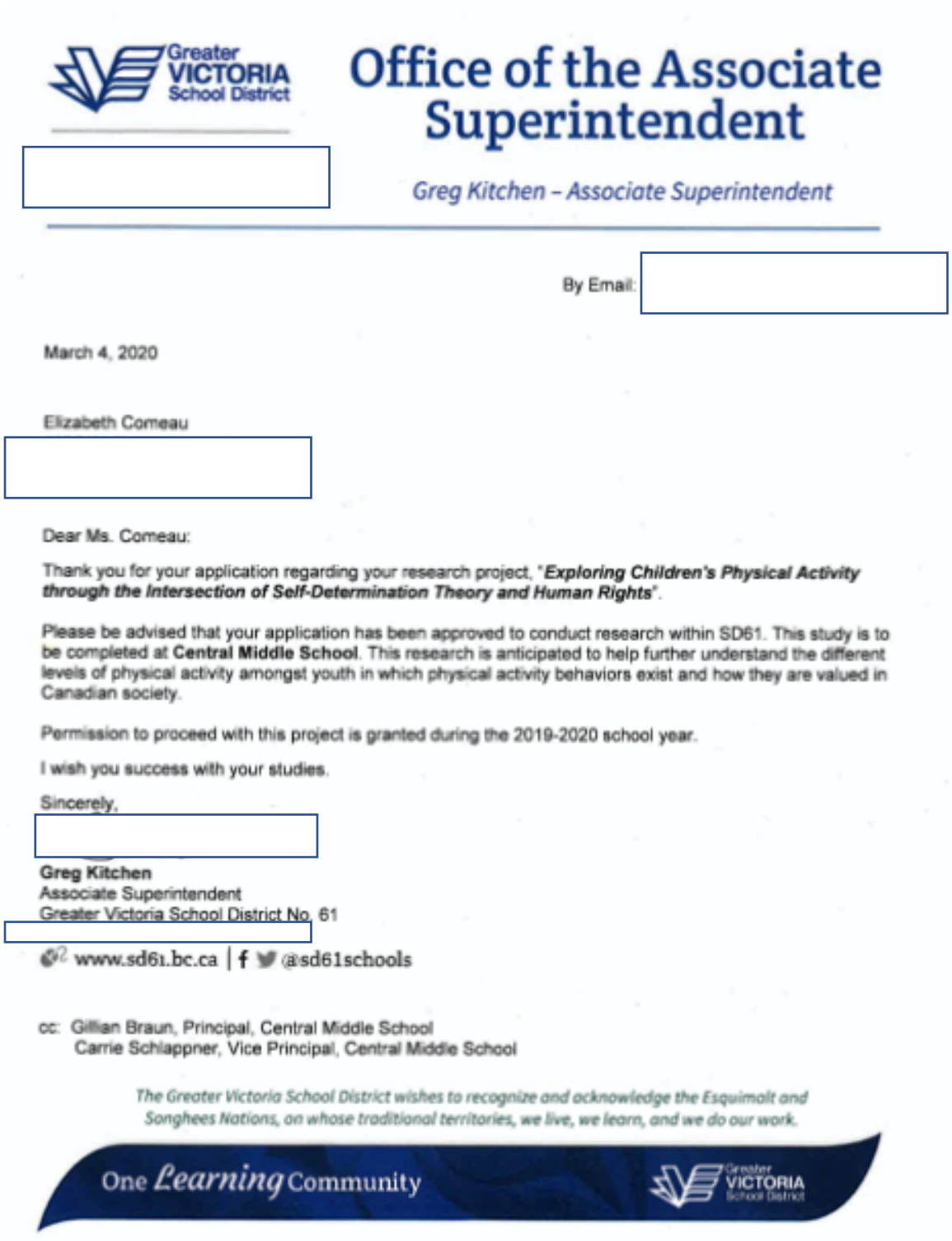
Please note the following: 1. Research participation is voluntary, and student and parents are under no obligation to participate 2. Schools, teachers and administrators are not conducting the study 3. Choosing to participate or not will not affect grades, relationships or class standing 4. Informed consent will be obtained for both Phase 1 and 2 of the study. For all purposes of data collection, participants identities will remain confidential and we guarantee that only the research team will have access to any contact information. For all purposes of the study post data collection (analysis and research results), all participants will remain anonymous and contact information and identifiers will be deleted.

This study has been reviewed by the University of Victoria Ethics Committee and is in the process of being approved, conditional upon school district approval. If you have any questions on the above noted and/or the attachments, do not hesitate to let us know!

Sincerely,
Elizabeth Comeau

Project Manager	Project Supervisor
Elizabeth Comeau	Ziba Vaghri
MSc Candidate, SDH, UVic	Assistant Professor, PHSP, UVic

Appendix C. School District Approval Form



Greater VICTORIA School District

Office of the Associate Superintendent

Greg Kitchen – Associate Superintendent

By Email:

March 4, 2020

Elizabeth Comeau

Dear Ms. Comeau:

Thank you for your application regarding your research project, "***Exploring Children's Physical Activity through the Intersection of Self-Determination Theory and Human Rights***".

Please be advised that your application has been approved to conduct research within SD61. This study is to be completed at **Central Middle School**. This research is anticipated to help further understand the different levels of physical activity amongst youth in which physical activity behaviors exist and how they are valued in Canadian society.

Permission to proceed with this project is granted during the 2019-2020 school year.

I wish you success with your studies.

Sincerely,

Greg Kitchen
Associate Superintendent
Greater Victoria School District No. 61

www.sd61.bc.ca | @sd61schools

cc: Gillian Braun, Principal, Central Middle School
Carrie Schlappner, Vice Principal, Central Middle School

The Greater Victoria School District wishes to recognize and acknowledge the Esquimalt and Songhees Nations, on whose traditional territories, we live, we learn, and we do our work.

One *Learning* Community

Greater VICTORIA School District

AGREEMENT

I/We certify the above information to be correct and agree to the conditions set by the Greater Victoria School District #61.

Signature of Researcher(s):

Signature of Supervisor:
(if different from above)

Quick Checklist

- Completed "Principal Form for Research" for each school to be attached
- Ethics approval from educational establishment to be attached
- Researcher and Supervisor signatures
- Questionnaires, surveys, consent forms, etc. to be attached

FOR OFFICE USE ONLY

DECISION: APPROVED

DATE: March 4, 2020

Please Send Completed Application to:

Greater Victoria School District #61

Appendix D. Letter of Intent to School Principals

University of Victoria

Brief Study Description for School Principals
Information about the 'Exercising their Right' Study

Recent findings indicate the majority of Canadian youth aged 5 to 17 years are not meeting the country's physical activity guidelines of 60 minutes of activity per day. Physical activity in childhood is vital to both biological and psycho-social health, as well as healthy physical and mental development, making inactivity among youth and children a priority health issue.

One can understand the phenomena of physical activity as an act of human development and a fundamental human right. Physical activity as a human right under the United Nations Convention on the Rights of the Child (UNCRC) declares the responsibility of a state party to create environments where children's needs are being met and thus physical activity participation is facilitated.

The UNCRC – signed since 1990 by 196 governments – is the most widely ratified human rights treaty in the world. The UNCRC explains many rights for all children under the age of 18 and was designed to promote their health and wellbeing. For example, children have the right to education, to healthcare, to protection from abuse, and to play. Under the UNCRC, all governments – as well as parents/guardians and all citizens – are expected to respect all rights for children. Several parts of the UNCRC state that when adults are making decisions that affect children, every effort should be made so that children have an opportunity to express their views on what should happen and to have those views taken into consideration. Children should also be encouraged to share their views in any medium that they choose, as long as their views will not be damaging to themselves or others.

There is limited literature framing low levels of physical activity in Canadian youth as a systemic social issue. This project aims to hopefully inspire further research into the way in which physical activity behaviors exist and are valued in the Canadian society, and drive policy directives to build social and cultural environments in which the right to physical activity, and its innate relationship to health, is prioritized.

We are inviting students in grades 6 to 9 to participate in this study. To participate in Phase 1 of this study, we require the children to complete an online questionnaire. Following this questionnaire, children may Opt-In to participate in Phase 2 of the study, which entails a workshop with further information to follow.

Informed consent will be obtained for both Phase 1 and 2 of the study. For all purposes of data collection, participants identities will remain confidential and we guarantee that only the research team will have access to any contact information**.** For all purposes of the study post data collection (analysis and research results), all participants will remain anonymous and contact information and identifiers will be deleted.

Please note the following: 1. Research participation is voluntary and student and parents are under no obligation to participate; 2. Schools, teachers and administrators are not conducting the study 3. Choosing to participate or not will not affect grades, relationships or class standing.

This study has been reviewed by the University of Victoria Ethics Committee and has been approved.

Questions? Please feel free to contact us!

Project Manager
Elizabeth Comeau
MSc Candidate, SDH, UVic

Project Supervisor
Ziba Vaghri
Assistant Professor, PHSP, UVic

Appendix E. Letter of Intent to School Parents

March 30th, 2020

Dear Parent/Guardian,

I am a Master of Science student at the University of Victoria studying in the areas of social dimensions of health, exercise science, and human rights.

The aim of this research project is to assess how motivated Canadian children and youth are to engage in physical activity (Phase 1), and how their "Right to Play" can be utilized to change their social environments for increased physical activity engagement (Phase 2).

Phase 1 of the project requires the participation of youth students in grades 6, 7, 8, and 9. The project is an opportunity for youth to provide feedback via online questionnaire on their motivation to be physically active. Phase 2 of the project will allow youth to express their thoughts, opinions, and hopes about their "Right to Play" in a group workshop day at the University of Victoria, and will be available to participants who chose to 'Opt-In' after the Phase 1 questionnaire. Phase 2 participants will be contacted following the completion of Phase 1 of the project.

We have obtained approval from the school principal, [redacted], to offer the opportunity to students at **Central Middle School** to participate in Phase 1 of this project. Your child's teacher will include a link with this letter to access the questionnaire on a smartphone, tablet or computer.

With this letter, I would like to request your consent to allow your child to participate in Phase 1 of the research project. Please read and sign the electronic consent form on the electronic questionnaire with your child prior to their participation. If you have any questions or comments about the project, please do not hesitate to contact me at [redacted], or the project supervisor Dr. Ziba Vaghri at [redacted]

With kind regards,
Elizabeth Comeau

Elizabeth Comeau, BSc
MSc Candidate, Social Dimensions of Health
Interdisciplinary Studies
University of Victoria
[redacted]

Appendix F. Email Template to Friends and Social Media Post Template

"Hello ___,

I hope this email finds you well!

As you know, I am a student in the Social Dimensions of Health MSc program at the University of Victoria. In light of COVID-19, I have recently had to get creative with recruitment strategies for participants for my MSc thesis project titled "Exploring Children's Physical Activity through the Intersection of Self-Determination Theory and Human Rights". **More information on the project can be found here:** https://onlineacademiccommunity.uvic.ca/globalchild/our-projects/determinants-pa/ . I am also happy to answer any emails or send along further information, so feel free to reach out!

The target population is children aged 11-14 living in Canada. If you have any children/youth in your life that you feel might be willing to participate, please do not hesitate to forward them this questionnaire! It is accessible on a laptop, smartphone, or tablet, and can be found at this link: https://www.surveymonkey.ca/r/whydoyou_exercise

Thank you kindly and stay well!

Best,

Liz Comeau"

Social Media Message:

Hello!

As you know, I am a student in the Social Dimensions of Health MSc program at the University of Victoria. In light of COVID-19, I have recently had to get creative with recruitment strategies for participants for my MSc thesis project titled "Exploring Children's Physical Activity through the Intersection of Self-Determination Theory and Human Rights".

The target population is children aged 11-14 living in Canada. If you have any children/youth in your life that you feel might be willing to participate, please do not hesitate to forward them this questionnaire! It is accessible on a laptop, smartphone, or tablet and can be found at this link: https://www.surveymonkey.ca/r/whydoyou_exercise

More information on the project can be found here:
https://onlineacademiccommunity.uvic.ca/globalchild/our-projects/determinants-pa/ . I am also happy to answer any messages or send along further information, so feel free to reach out! Thank you kindly and stay well ☺

Appendix G. Online Consent Form

PARTICIPANT CONSENT FORM

Project Title: Exploring Children's Physical Activity through the Intersection of Self-Determination Theory and Human Rights

Researcher(s):

Principle Investigator / Project Supervisor: Dr. Ziba Vaghri (Assistant Professor), the School of Public Health and Social Policy, University of Victoria,

Co-investigator / Project Manager: Elizabeth Comeau (MSc Student, Social Dimensions of Health), University of Victoria, Phone:

Three Main Objectives of the Research:

1) To provide you and your fellow students the opportunity to express **how motivated you are to engage in physical activity**

2) To provide you and your fellow students the opportunity to **express your views and opinions on what you think of physical activity as your right**, and **how this right can be utilized used to change your social environments for increased more physical activity engagement opportunities**

3) To provide us, social scientists and child right's researchers, **the opportunity to increase our understanding of youth's needs to engage in physical activity** through listening to and observing the expressions of your your views and opinions

This research is important because:

Recent findings show the majority of Canadian youth aged 5 to 17 years are not getting enough physical activity per day. Physical activity in childhood is important for both physical and mental health and development, making inactivity among youth and children a serious problem.

Physical activity is a fundamental human right as declared by the United Nations Convention on the Rights of the Child (UNCRC). It is the responsibility of a state party to provide opportunities for children to be active, where they can make the choice to take part. The UNCRC – signed since 1990 by 196 governments – is the most recognized human rights treaty in the world. The UNCRC explains many rights for all children under the age of 18 and was designed to promote their health and wellbeing.

There is limited research showing low levels of physical activity in Canadian youth is a systemic social issue. This project aims to inspire further research into the way in which physical activity behaviours are valued in Canadian society, and build environments where the right to physical activity and health is prioritized.

Participation:

You are invited to participate in this study because you are a student in grade 6 to 9, living in Victoria, British Columbia, Canada.
Please note the following:

1. **Research participation is entirely voluntary**, and student and parents are under no obligation to participate
2. For the data collection phase, **participants identities will remain confidential and we guarantee that only the research team will have access to any personal identifiers or contact information**. For the study after data collection (analysis and research results), **all participants will remain anonymous and contact information and identifiers will be deleted/ shredded**

Procedures:

If you decide to take part in this study, and you and your parent/guardians have provided consent, we will ask you to fill out a physical activity questionnaire on your laptop, tablet or smartphone.
The research team will then review and analyze all the submissions. The results of the study will inform many aspects of our work and may be published in scientific journals withou

Compensation:
Once Phase 1 of the study is complete, we will send your teacher a gift card to Staples; to buy classroom materials to show our appreciation for your time.

Benefits:
The main benefit to you if you take part in this study is that you may gain an understanding of why you take part in physical activity, and ways you could be even more active. You will also be contributing to a deeper understanding of the necessary social needs for youth to be active, which may have long term beneficial implications for children in Canada.

Risks:
The tasks that you may choose to undertake is similar to tasks that the you would be given on a regular school day and so your participation in our research would not cause any risk on you. However, if you feel any risks or harms to yourself, please remember that you can drop out of study at any time.

Withdrawal of Participation:
You may withdraw at any time without explanation or consequence by contacting the Project Manager, Elizabeth Comeau, by email . If you decide to withdraw, all related documentation will be deleted or shredded in a secure manner.

Anonymity and Confidentiality:
Your information will remain completely confidential through the data collection phase of the study. Once data collection is complete, all data will become anonymous and identifiers of participants will be deleted. We will keep all documents related to the study in a locked cabinet in our research office. All electronic files will be saved on Uvic's secure servers. All emails containing participant submissions will be kept on secure servers based at the University of Victoria.

Research Results May be Used/Disseminated in the Following Ways:
Research results may be used in conference and other presentations, academic publications and reports.

Questions or Concerns:
If you have any questions or concerns about your participation in this study, please contact the Project Manager, Elizabeth Comeau at the Project Supervisor Dr. Ziba Vaghri at , or the Human Research Ethics Office, University of Victoria at ethics@uvic.ca / 250- 472-4545.

* 1. **Consent:** Your signature below indicates that you understand the above conditions of participation in this study, that you have had the opportunity to have your questions answered by the researchers, and that you consent to participate in this research project. Your name will not be linked to your data and your data will remain autonomous.

By typing my name below, I am electronically signing this consent form.

Parent Signature

Participant Signature

* 2. **By checking this box and typing my name above, I am electronically signing this consent form.**

☐ I have read and understand the consent form, and I consent to my participation

For a PDF version of this Consent Form, please email

Appendix H. Online Questionnaire

BREQ-3

We are interested in the reasons people engage or do not engage in physical activity. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

Please indicate (by clicking the bubble) on the scale provided how true each statement is for YOU; on the scale of {Not true for me} to {Very true for me}.

1. It's important to me to exercise regularly

- ◯ Not true for me
- ◯ Sometimes true for me
- ◯ Moderately true for me
- ◯ Often true for me
- ◯ Very true for me

2. I don't see why I should have to exercise

- ◯ Not true for me
- ◯ Sometimes true for me
- ◯ Moderately true for me
- ◯ Often true for me
- ◯ Very true for me

3. I exercise because it is fun

- ◯ Not true for me
- ◯ Sometimes true for me
- ◯ Moderately true for me
- ◯ Often true for me
- ◯ Very true for me

4. I feel guilty when I don't exercise

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

5. I exercise because it is consistent with my life goals

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

6. I exercise because other people say I should

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

7. I value the benefits of exercise

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

8. I can't see why I should bother exercising

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

9. I enjoy my exercise sessions

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

10. I feel ashamed when I miss an exercise session

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

11. I consider exercise part of who I am

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

12. I take part in exercise because my friends/family say I should

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

13. I think it is important to make the effort to exercise regularly

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

14. I don't see the point in exercising

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

15. I find exercise a pleasurable activity

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

16. I feel like a failure when I haven't exercised in a while

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

17. I consider exercise a fundamental part of who I am

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

18. I exercise because others will not be happy with me if I don't

- ○ Not true for me
- ○ Sometimes true for me
- ○ Moderately true for me
- ○ Often true for me
- ○ Very true for me

19. I get restless if I don't exercise regularly

- Not true for me
- Sometimes true for me
- Moderately true for me
- Often true for me
- Very true for me

20. I think exercising is a waste of time

- Not true for me
- Sometimes true for me
- Moderately true for me
- Often true for me
- Very true for me

21. I get pleasure and satisfaction from participating in exercise

- Not true for me
- Sometimes true for me
- Moderately true for me
- Often true for me
- Very true for me

22. I would feel bad about myself if I was not making time to exercise

- Not true for me
- Sometimes true for me
- Moderately true for me
- Often true for me
- Very true for me

23. I consider exercise consistent with my values

- Not true for me
- Sometimes true for me
- Moderately true for me
- Often true for me
- Very true for me

24. I feel under pressure from my friends/family to exercise

- ◯ Not true for me
- ◯ Sometimes true for me
- ◯ Moderately true for me
- ◯ Often true for me
- ◯ Very true for me

LTEQ

1. During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).

a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY) (e.g., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

a) MODERATE EXERCISE (NOT EXHAUSTING) (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

a) MILD/LIGHT EXERCISE (MINIMAL EFFORT) (e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snow-mobiling, easy walking)