Examining Correlates, Antecedents, and Outcomes of Children’s Imagery Use in Physical Activity Contexts

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Examining Correlates, Antecedents, and Outcomes of Children’s Imagery Use in Physical Activity Contexts

By

Michelle D. Guerrero

A Dissertation
Submitted to the Faculty of Graduate Studies through the Department of Kinesiology in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy at the University of Windsor

Windsor, Ontario, Canada

2018

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Examining Correlates, Antecedents, and Outcomes of Children’s Imagery Use in Physical Activity Contexts

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DECLARATION OF CO-AUTHORSHIP / PREVIOUS PUBLICATION

I. Co-Authorship

I hereby declare that this thesis incorporates material that is result of joint research, as follows: Chapter 2 of the thesis was co-authored with Dr. Matt Hoffmann, under the supervision of Dr. Krista J. Chandler. The key ideas, primary contributions, data collection, data analysis, interpretation, and writing were performed by Michelle D. Guerrero, and the contribution of co-authors was primarily through the provision of critical feedback to enhance the quality of the research. Dr. Hoffmann provided feedback on the refinement of ideas and interpretation of study results, and assisted with the editing of the manuscript.

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ABSTRACT

Imagery is described as a conscious internal experience, and involves re-experiencing past events and/or creating never-experienced events in one’s mind (Guerrero & Munroe-Chandler, 2018). The benefits of using imagery in physical activity contexts are well-documented (see Munroe-Chandler & Guerrero, 2018). People can use imagery in both structured and less-structured physical activity contexts. Children, for example, have reported using imagery in both active play (unstructured physical activity; Tobin et al., 2013) and sport (structured physical activity; Munroe-Chandler et al., 2007) settings. Children’s imagery use in active play has proven to increase motivation and physical activity participation, while children’s imagery use in sport has been shown to improve sport-specific skills and strategies, self-efficacy, and collective efficacy (see Munroe-Chandler & Guerrero, 2018). Research on children’s imagery use in both structured and unstructured settings continues to grow; however, there are a few lines of research that remain unexplored. Therefore, the purpose of this dissertation was to extend our knowledge on children’s imagery use by examining correlates and antecedents of active play imagery, and outcomes of sport imagery. This objective was accomplished in three empirical studies. In Chapter 2 the associations between active play imagery and personal and social skills and self-confidence (correlates) were examined. The underlying aim of this study was to determine whether active play imagery was linked to children’s personal development. Result showed that the types of active imagery (capability, social, and fun) were positively linked to personal and social skills, with social imagery accounting for the most variance. Additionally, capability and fun imagery emerged as significant predictors of self-confidence, and fun imagery accounted for the most amount of variance. The overall objective of Chapter 3 was to identify whether individual differences (antecedents) in physical activity participation and imagery ability
predicted children’s use of active play imagery. The primary antecedents of interest were physical activity participation and imagery ability, while age and gender served as control variables. Results of this study revealed that age and physical activity participation were positively associated with all three types of active play imagery. Furthermore, external visual imagery was positively related to fun imagery, whereas internal visual imagery and kinesthetic imagery had no associations with active play imagery. Lastly, in Chapter 4 the effects of children’s sport imagery on components of physical literacy (outcomes; i.e., motivation, confidence, perceived and actual competence) were examined. This study was conducted with two sport programs. Children in the experimental condition completed imagery sessions over four consecutive weeks while also participating in their regular weekly practices, whereas children in the control condition did not receive any imagery sessions, but continued participating in their weekly practices. No group differences were found at the end of the intervention; however, children in the experimental condition did report higher scores on perceived competence and received higher scores on actual competence from pre- to post-intervention. The findings of this dissertation can be used to inform future research designs, child practitioners, and physical activity programming and curriculum.
DEDICATION

To my husband, for everything you do for us. We did it.

To my sister, for always standing beside me in the “arena.”

To my mother, for showing me what courage and hard work looks like.
The Man in the Arena

It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who errs, who comes short again and again, because there is no effort without error and shortcoming; but who does actually strive to do the deeds; who knows great enthusiasms, the great devotions; who spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement, and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who neither know victory nor defeat.

- Theodore Roosevelt
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CHAPTER 1
INTRODUCTION

Mental imagery, herein referred to as imagery, is a conscious internal experience. Individuals can use imagery to re-experience past events, and to create never-experienced events (Guerrero & Munroe-Chandler, in press). Imagery can be performed from two different perspectives; an individual can image from their own vantage point (internal or first-person imagery) or from the perspective of an external observer (external or third-person imagery). While imagery is a widely researched topic within the field of sport and exercise psychology, there still remains much to be learned, particularly with respect to children’s imagery use in unstructured (active play; i.e., leisure-time physical activity) and structured (e.g., sport) physical activity settings. First, children’s active play imagery (i.e., images related to children’s unstructured moderate-to-vigorous physical activity) is a relatively new area of research, and thus little is known about the outcomes associated with active play imagery and the individual characteristics that influence active play imagery. Second, research on children’s sport imagery has generally focused on sport-specific performance-related correlates (e.g., self-efficacy in soccer) and outcomes (e.g., execution of tennis serve). What remains underexplored is the impact imagery can have on the skills necessary for children to be physically active across various environments. These skills include having the motivation, confidence, physical competence, and knowledge to engage in physical activities, and are fundamental aspects of physical literacy. Therefore, the purpose of this dissertation was to extend our knowledge of children’s imagery use by examining correlates (i.e., personal and social skills, self-confidence) and antecedents (i.e., physical activity participation, imagery ability) of active play imagery and outcomes (i.e., components of physical literacy; Whitehead, 2013) of sport imagery.
Theories, Frameworks, and Models of Imagery

Three main theories have been proposed to explain how imagery works. These theories include the psychoneuromuscular theory (Jacobson, 1930), bioinformational theory (Lang, 1979), and triple code theory (Ahsen, 1984). In the psychoneuromuscular theory, Jacobson (1930) proposed that muscular activity that is elicited when imaging a given skill is similar to the muscular activity detected when physically performing the skill. Lang’s (1979) bioinformational theory suggests that the effects of imagery are based on two factors of mental representation: stimulus propositions and response propositions. Stimulus propositions reflect the stimulus characteristics associated with an image, whereas response propositions reflect the physiological and affective responses of an image. Lang argued that the greatest effects of imagery are a result of images that include both stimulus and response propositions. The triple code theory (Ahsen, 1984) includes three components of imagery: the image itself, the somatic response, and the meaning. Ahsen (1984) believed that because individuals have their own unique set of experiences, each person will have different interpretations of an image, despite being provided with identical imagery instructions.

Paivio’s (1985) analytic framework was specifically developed to describe how imagery works in sport. It contends that imagery content comprises four distinct types, varying in both the nature (motivational vs. cognitive) and level (specific vs. general). These imagery types include: motivational general (MG) imagery (i.e., physiological arousal levels and emotions); motivational specific (MS) imagery (i.e., images of personal goals); cognitive general (CG) imagery (i.e., images of strategies, game plans, or routines); and, cognitive specific (CS) imagery (i.e., images of motor skills). Hall, Mack, Paivio, and Hausenblas (1998) extended this classification by separating MG imagery into MG-arousal (MG-A; i.e., images of arousal and
afect) and MG-mastery (MG-M; images of being mentally tough, in control, and self-confident). The aforementioned theories and framework have, to some extent, informed research, practice, and most importantly imagery models.

The most comprehensive, up-to-date imagery model is the revised applied model of deliberate imagery use (RAMDIU) in sport, exercise, dance, and rehabilitation (Cumming & Williams, 2013; see Figure 1). The RAMDIU was developed to highlight significant developments in imagery research since the conception of the original applied model of imagery use in sport (Martin, Moritz, & Hall, 1999). The RAMDIU is similar to the original model in that it includes the empirically supported "where", "when", and "why" components. However, the RAMDIU extends the strengths of the original model by focusing on deliberate imagery, as opposed to spontaneous, unintentional imagery, and by broadening its applicability to various domains other than sport. Additionally, the RAMDIU differentiates between the type of imagery (i.e., what is being imaged; e.g., MS imagery) and the function of imagery (i.e., why an individual is imaging). Imagery types acknowledged in the RAMDIU include those outline by Paivio (1985) and Hall et al. (1998) as well as others, such as those pertaining to exercise (e.g., technique imagery) and rehabilitation (e.g., healing imagery). Cumming and Williams (2013) also included ‘meaning’ in the revised model, and proposed that imagery content should be personalized and meaningful. Imagery is meaningful when the type of imagery and the function of imagery correspond with one another so that the imagery is appropriate for both the situation and the individual. Finally, the model underscores how individual characteristics (e.g., physical activity/competitive level) and imagery ability can impact both imagery use and imagery effectiveness. Other imagery models have been developed that are more context-specific, such as
the exercise imagery model (Munroe & Gammage, 2000) and the active play imagery conceptual model (Guerrero & Munroe-Chandler, 2018).

**Active Play Imagery Research with Children**

Aside from sporting arenas, children (7–14 years) have reported using imagery in their active play (Tobin, Nadalin, Munroe-Chandler, & Hall, 2013). Children image playing with others (e.g., family, friends, pets, professional athletes), playing activities they enjoy and perform most frequently, and feeling competent in their ability to participate in active play (Tobin et al., 2013). Cooke, Munroe-Chandler, Hall, Tobin, and Guerrero (2014) developed the Children’s Active Play Imagery Questionnaire (CAPIQ) to assess children’s frequency of active play imagery. The CAPIQ comprises three types of active play imagery: capability imagery reflects images of being physically competent, social imagery pertains to images of socializing and playing with others, and fun imagery comprises images of pleasure and enjoyment. Researchers examining active play imagery have found positive associations between the three types of active play imagery and the basic psychological need of competence (i.e., feelings of mastery) and relatedness (i.e., feelings of belongingness; Tobin, Munroe-Chandler, Hall, Guerrero, Shirazipour, & Cooke, 2017). Furthermore, active play-related imagery scripts positively influenced children’s self-determined motivation and active play participation (Guerrero, Tobin, Munroe-Chandler, & Hall, 2015).

Active play imagery remains in its infancy. Thus, more research is needed to build a foundation of knowledge on this topic. For example, the notion of using imagery as a strategy to facilitate developmental outcomes among children has been previously discussed among sport psychology researchers (e.g., Danish & Nellen, 1997; Jacobs & Wright, 2016). However, the relationship between imagery and developmental outcomes has yet to be empirically examined.
Images of active play may be particularly useful in facilitating developmental outcomes given that active play affords children the opportunity to be active agents in their own development by discovering and acquiring experiences that will influence future behaviors (Bateson & Martin, 1999). Additionally, examining individual characteristics that influence children’s active play imagery is important because such characteristics may influence the frequency and type of active play imagery. This line of research is particularly important as it can help inform future research designs, and can assist researchers and practitioners implement more effective imagery interventions with children.

**Sport Imagery Research with Children**

The vast majority of research on children’s imagery use has been conducted within the sport domain. Researchers have found that young athletes use both the cognitive and motivational types of imagery outlined by Paivio (1985) and Hall et al. (1998), and that various factors influence young athletes’ use and type of imagery such as level of competition (e.g., Arvinen-Barrow, Weigand, Thomas, Hemmings, & Walley, 2007) and practice time (e.g., Parker & Lovell, 2009). In cross-sectional studies, young athletes who used imagery more frequently also reported lower levels of anxiety (Strachan & Munroe-Chandler, 2006), higher levels of self-confidence, and greater self-efficacy (Munroe-Chandler, Hall, & Fishburne, 2008). Nascent findings have also been noted in experimental investigations; young athletes’ imagery has been shown improve self-efficacy (O, Munroe-Chandler, Hall, & Hall, 2014), collective efficacy (Munroe-Chandler & Hall, 2005), execution of sport-specific skills (Munroe-Chandler, Hall, Fishburne, Murphy, & Hall, 2012), and sport-related strategies (Munroe-Chandler, Hall, Fishburne, & Shannon, 2005).
Given that imagery has been linked with enhanced physical and psycho-social benefits in physical activity contexts (Hall, 2001; Munroe-Chandler & Guerrero, 2018), it seems plausible to assume that imagery could have similar positive effects on children’s development of physical literacy - an essential component to lifelong participation in sport and physical activity. Physical literacy is defined as the motivation, confidence, physical competence, knowledge and understanding to value and engage in physical activities for life (Whitehead, 2013). Put simply, physical literacy is a construct that enables individuals to live an active life. Not surprisingly, many physical activity stakeholders have become increasingly interested in identifying strategies that promote and develop physical literacy, especially among children (e.g., ParticipACTION, 2015). Moreover, it is widely recognized within the physical activity literature that psycho-behavioral skills (e.g., imagery, goal setting) are just as important as psychomotor skills for promoting lifelong physical activity engagement (e.g., MacNamara, Collins, Bailey, Toms, Ford, & Pearce, 2011). Exploring the effects of imagery and physical practice on children’s development of physical literacy can contribute to our knowledge regarding strategies that can help promote physical literacy.

Overview of Current Research Studies

The overarching aim of this dissertation was to examine correlates, antecedents, and outcomes of children’s imagery in physical activity settings. In Chapter 2, developmental correlates of children’s active play imagery were examined. Specifically, the association between active play imagery and personal and social skills and self-confidence was explored. The RAMDIU was used to guide Chapters 3 and 4. In Chapter 3, antecedents of children’s active play imagery were explored. These antecedents included physical activity participation (“who” component of the RAMDIU) and imagery ability (“imagery ability” component of the
RAMDIU), and potential control variables included age and gender. The objective of Chapter 4 was to examine the effects of children’s sport imagery (“what” component of the RAMDIU) on components of physical literacy (‘outcome’ component of the RAMDIU). Generally, this dissertation contributes to the existing body of imagery research by illustrating that imagery can serve as a mental skill that not only enhances performance-related outcomes, but can also play an important role in the holistic development of young people.

Herein sport imagery refers to the five types of imagery forwarded by Hall et al. (1998) as these types were initially explored in sport. Since Hall et al.’s work, researchers have successfully applied the five types of imagery to other settings such as dance, exercise, and rehabilitation (see Cumming & Williams, 2013), providing evidence that these imagery types are not exclusive to sport.
References


CHAPTER 2

CHILDREN’S ACTIVE PLAY IMAGERY AND ITS ASSOCIATION WITH PERSONAL AND SOCIAL SKILLS AND SELF-CONFIDENCE

Engagement in structured extracurricular activities, such as sport, has been shown to have a positive impact on children and youths’ developmental outcomes (e.g., personal and social skills and self-confidence; Fraser-Thomas, Côté, & Deakin, 2005). Such positive developmental outcomes have also been fostered in less structured leisure time activities such as play (Pellegrini, 2009). Sport psychology researchers (e.g., Danish & Nellen, 1997) and developmental psychologists (e.g., Singer & Singer, 2005) have proposed various strategies that could promote children and youths’ positive developmental outcomes. One psychological strategy that has recently been proposed is imagery (Jacobs & Wright, 2016). Thus, the present study sought to examine children’s active play imagery and its association with personal and social skills and self-confidence.

Developmental Experiences in Sport

Sport is one physical activity context that has been shown to contribute to children and youths’ positive development (Fraser-Thomas et al., 2005). For instance, participation in sport has been associated with youths’ physical (e.g., improved muscular strength), psychological/emotional (e.g., greater emotional regulation), and social (e.g., positive peer relationships) development (Fraser-Thomas et al., 2005). The positive developmental outcomes youth acquire through involvement in sport can have considerable value in other facets of life. Turnnidge, Côté, and Hancock (2014) proposed that the design of sport programs could facilitate

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youths’ transfer of skills through two approaches: explicit and implicit. In the explicit approach, it is suggested that leaders of sport programs should deliberately teach their athletes how the skills acquired in sport can be transferred and utilized in other areas of life (Petitpas, Cornelius, Van Raalte, & Jones, 2005). Advocates of the explicit approach suggest that youth might not be cognizant that the skills they are developing in sport have value in other settings. Some argue that even when youth understand the transferability of these skills, they may lack confidence in their ability to effectively implement these skills outside of sport (Danish, Petitpas, & Hale, 1993). Therefore, it is the responsibility of individuals such as sport leaders to help their athletes recognize the skills they are acquiring in sport, teach them about the transferability of these skills, and offer encouragement to help them gain confidence in using these skills in other areas (Petitpas et al., 2005). Examples of physical activity programs that aim to positively influence youths’ development by deliberately teaching them life skills include The First Tee (Weiss, Stuntz, Bhalla, Bolter, & Price, 2013) and Girls on the Run (Ullrich-French, Cole, & Montgomery, 2016).

Alternatively, the implicit approach assumes that leaders of sport programs should focus on promoting athletes’ positive developmental outcomes within the sport context, prior to teaching youth about the transferability of these outcomes to other non-sport contexts (Vierimaa, Erickson, Côté, & Gilbert, 2012). The premise of the implicit approach is that young people are active agents of their own development and therefore are not dependent on adults to teach them about skill transfer (Larson, Walker, & Pearce, 2005). For example, in support of the implicit approach, past research revealed that adolescent athletes reported learning skills (e.g., teamwork and leadership) through their involvement in sport, as opposed to being intentionally and systematically taught such skills (Camiré, Trudel, & Forneris, 2009; Holt, Tink, Mandigo, &
Fox, 2008). The explicit and implicit approaches are valuable as they illustrate the process of skill transferability. However, readers should exercise some caution when considering these approaches given that there is little empirical support for the assumption that skills can transfer from sport settings to other domains. In particular, more research examining specific conditions and factors necessary for facilitating skill transfer is required (Gould & Carson, 2008).

Sport psychology researchers adopting an implicit approach have recently examined the relationship between sport participation and athletes’ personal development using the Youth Experience Survey for Sport (YES-S; MacDonald, Côté, Eys, & Deakin, 2012). The YES-S assesses four positive dimensions (i.e., personal and social skills, cognitive skills, goal setting, and initiative) and one negative dimension (i.e., negative experiences). To date, researchers using the YES-S have primarily examined youths’ personal development experiences as an outcome. For instance, MacDonald, Côté, Eys, and Deakin (2011) found that affiliation with peers, effort expenditure, task climate, competitive excitement, and ego climate were positively related to the personal and social skills of those involved in school sports or non-elite community programs. Further, it was found that: (a) effort expenditure and other-referenced competency were positively associated with cognitive skills; (b) effort expenditure, affiliation with peers, task climate, and self-referenced competency were positively related to goal setting; and (c) effort expenditure, task climate, competitive excitement, and self-referenced competency were positively associated with initiative. More recently, Bruner, Eys, Wilson, and Côté (2014) examined the relationship between group cohesion and perceptions of personal development among high school sport team athletes. Task cohesion was positively associated with personal and social skills, goal setting, and initiative, whereas social cohesion was positively related to personal and social skills, goal setting, and cognitive skills. Taken together, the results of these
studies suggest that a number of psychosocial factors are linked to the personal development experiences of youth sport competitors.

**Developmental Experiences in Play**

Children and youth are engineered to play; they play almost anywhere, with almost anyone (Glenn, Knight, Holt, & Spence, 2013). Play behavior is commonly described as freely chosen, self-directed, intrinsically motivating, imaginative, and, most importantly, fun (Bergen, 2009; Gray, 2009). Young people can engage in various types of play (Smith, 2010), including object play (e.g., fitting Lego blocks together), pretend or fantasy play (e.g., using a wooden spoon as a sword), and physical activity or locomotor play (e.g., playing tag). Physical activity play involves gross bodily movements and may overlap with elements of other types of play (Pellegrini & Smith, 1998). For example, a group of children might pretend to be police officers or robbers during a game of tag. Active play, a specific type of physical activity play relevant to the current study, refers to activities that include “moderate-to-vigorous physical activity such that metabolic activity is well above resting metabolic rate” (Pellegrini & Smith, 1998, p. 577). Active play can be social or solitary, take place outdoors and indoors, and include a wide range of activities such as tag, hide and seek, bike riding, tobogganing, and ball games (e.g., “wall ball”). While some active play activities may possess a degree of rules, they are not to be confused with structured physical activities. Key characteristics that distinguish active play from structured physical activity are that the rules in active play are flexible, constantly changing, and negotiable (Gray, 2011), and activities are performed without direct guidance. For example, in a game of street hockey, children must decide how many players will compete against each other (e.g., 3-on-3), the number of goals that will be required to win the game (e.g., 10), and the sanctions for infractions.
In addition to organized sport, active play is another physical activity context that can foster positive developmental outcomes. Apart from the obvious physical benefits of active play participation (e.g., increased minutes of daily moderate-to-vigorous physical activity; Brockman, Jago, & Fox, 2010), this type of unstructured physical activity has been noted as serving a salient role in children’s social, emotional, and cognitive development (Burdette & Whitaker, 2005; Pellegrini, 2009). For example, children’s engagement in physical activity play during recess has been shown to be positively associated with social competence (e.g., sharing and cooperation; Veiga et al., 2016). Similarly, research with school-aged children and adolescents indicated that those who frequently participated in physical activity play also showed better social skills (Pellegrini, 1994). Engagement in frequent play behaviors has also been shown to be positively associated with emotional understanding (Seja & Russ, 1999), empathic responding to peers (Niec & Russ, 2002), and emotional regulation (Hoffmann & Russ 2012).

Active play also promotes youth-driven learning. Whilst playing, young people respond to new environments, invent and alter rules, test boundaries, experience uncertainty, resolve conflicts, and improvise and make compromises (Active Healthy Kids Canada, 2012). Many have argued that playing affords individuals the opportunity to be active agents in their own development by discovering and acquiring experiences that will influence future behaviors (Bateson & Martin, 1999). In sum, the characteristics of active play provide further support for the effectiveness of the implicit approach in facilitating youths’ developmental outcomes (Turnnidge et al., 2014).

**Children’s Imagery Use**

Imagery, in its most basic form, can be defined as creating or re-creating experiences in one’s mind (Vealey & Greenleaf, 2010). The vast majority of research examining children’s
imagery use in physical activity has been conducted within the sport domain. Young athletes (7-14 years) who use imagery more frequently have been found to also report lower levels of anxiety (Strachan & Munroe-Chandler, 2006), higher levels of self-confidence, and greater self-efficacy (Munroe-Chandler, Hall, & Fishburne, 2008). Within the sport psychology literature, the constructs of self-efficacy and self-confidence are most often used to measure an athlete’s sport confidence. Self-efficacy refers to one’s belief in their ability to successfully perform specific tasks (i.e., state sport confidence; Bandura, 1986), whereas self-confidence refers to one’s general belief in their ability to be successful in sport (i.e., trait sport confidence; Vealey, 1986). While past research has established a positive link between children’s imagery use and self-confidence in sport, little is known regarding the relationship between children’s imagery use and self-confidence in active play.

Aside from sporting arenas, children (7-14 years) have also reported using imagery in their active play (Tobin, Nadalin, Munroe-Chandler, & Hall, 2013). More specifically, children described how they imaged playing with others (e.g., family, friends, pets, professional athletes), playing activities they enjoyed and performed most frequently, and feeling skilled in their ability to participate in active play. These findings led to the development of the Children’s Active Play Imagery Questionnaire (CAPIQ; Cooke, Munroe-Chandler, Hall, Tobin, & Guerrero, 2014), which assesses children’s (7-14 years) frequency of imagery use in their active play. Cooke et al. (2014) identified three primary types of active play imagery utilized by children: capability imagery (images related to physical competence), social imagery (images pertaining to playing and engaging with others), and fun imagery (images related to enjoyment and interest). Research examining children’s active play imagery indicated that social imagery was positively associated with the basic psychological need of relatedness, while capability and fun imagery were
positively related to the basic psychological need of competence (Tobin et al., 2017). It was also revealed that children’s (9-14 years) use of fun imagery, as opposed to capability and social imagery, was most strongly related to self-confidence in active play (Tomayer, Munroe-Chandler, Hall, & Guerrero, 2015).

The Current Study

The concept of employing imagery as a strategy to facilitate youths’ developmental outcomes has been previously discussed in a broad sense among sport psychology researchers (Danish & Nellen, 1997; Gould & Carson, 2008). Recently, Jacobs and Wright (2016) proposed that imagery could be used to promote the transfer of developmental outcomes acquired in sport to other areas of life. They suggested that coaches and practitioners could encourage their athletes to image themselves applying the developmental outcomes they learned in sport (e.g., resolving conflicts, maintaining self-control) to non-sport contexts such as school and home. This perspective clearly aligns with the explicit approach, which involves implementing intentional strategies designed to teach athletes about the transferability of skills. However, and in line with the implicit approach, it may be important to first establish whether children’s imagery use can foster developmental outcomes within a specific context, either sport or active play, prior to determining whether imagery can be used as a strategy to promote skill transfer.

Thus, the purpose of the current study was twofold. The first purpose was to examine the relationship between children’s active play imagery and personal and social skills. It was hypothesized that all three types of active play imagery (i.e., capability, social, and fun) would be positively associated with personal and social skills. Given that active play with others can cultivate a variety of personal and social skills (Pellegrini, 2009), and that children frequently image themselves playing and socializing with others (Tobin et al., 2013), it was further
hypothesized that social imagery would account for a greater proportion of the variance in personal and social skills than capability and fun imagery. This hypothesis is fitting as images of engaging in positive peer interactions in active play (social imagery) would intuitively account for more variance in personal and social skills than images of being skilled at active play (capability imagery) and images of having fun in active play (fun imagery).

The second purpose of the current study was to examine the relationship between children’s active play imagery and self-confidence. Once again, it was hypothesized that all three types of active play imagery would be positively related to self-confidence. It was further hypothesized that fun imagery would account for a greater proportion of the variance in self-confidence than capability and social imagery. This hypothesis was based on findings that fun imagery was more strongly correlated with self-confidence in active play than capability and social imagery (Tomayer et al., 2015). Additionally, enjoyment in physical activity has been found to be positively associated with ability beliefs (Rovniak, Anderson, Winett, & Stephens, 2002), thus providing further support for the hypothesis that fun imagery would account for the most variance in self-confidence.

Method

Participants

A total of 105 male (n = 65) and female (n = 40) children (M_age = 9.84, SD = 1.41) ranging in age from 8-12 years participated in the present study. Children were recruited from various summer programs (e.g., chess, web design, multi-sport) in Southwestern Ontario.

Measures

Imagery use. The CAPIQ (Cooke et al., 2014) was used to measure children’s imagery use in active play. This 11-item questionnaire assesses the frequency of three imagery types
including capability imagery (4 items; e.g., “When thinking about active play, I imagine the movements that my body makes”), social imagery (4 items; e.g., “When thinking about active play, I imagine my friends with me”), and fun imagery (3 items; e.g., “When thinking about active play, I picture myself having fun”). Each item is rated on a 5-point Likert-type scale with anchors of 1 (not at all) and 5 (very often). Cooke et al. (2014) established the CAPIQ’s factorial validity (Comparative Fit Index = 0.95, Normative Fit Index = 0.92, Tucker-Lewis Index = 0.93, and Root-Mean-Square Error of Approximation = 0.07) and internal consistency (alpha coefficients ranged from 0.73 to 0.82) with a sample of 252 children aged 7 – 14 years.

**Personal and social skills.** Children’s personal and social skills in active play were assessed using the personal and social skills subscale from the YES-S (Macdonald et al., 2012). The complete version of the YES-S contains 37 items that measure five dimensions of positive and negative experiences in organized sport including: personal and social skills (14 items), cognitive skills (5 items), goal setting (4 items), initiative (4 items), and negative experiences (10 items). All items from the YES-S are rated on a 4-point Likert-type scale anchored at 1 (not at all) and 4 (yes definitely). In the current study, participants were asked to reflect on their experiences in active play rather than in organized sport. An example item of the personal development component of the personal and social skills subscale reads, “Made a new friend”, while an example item of the social development component of the personal and social skills subscale reads, “Learned how my emotions and attitude affect others in the group.” The personal and social skills dimension was shown to be internally consistent (α = .92) with athletes aged 9 – 19 years (MacDonald et al., 2012).

**Self-confidence.** Children’s self-confidence in active play was measured using the confidence subscale of the Competitive State Anxiety Inventory-2 for Children (CSAI-2C;
Stadulis, MacCraken, Edison, & Severance, 2002). The complete version of the CSAI-2C comprises 15 items assessing cognitive anxiety (5 items), somatic anxiety (5 items), and self-confidence (5 items). All items from the CSAI-2C are rated on a 4-point Likert-type scale anchored at 1 (not at all) and 4 (very much so). In the current study, children were asked to reflect on their experiences in active play while answering the questions. Given our goal was to examine trait (i.e., stable) self-confidence in active play, the items were worded to capture children’s typical perceptions of their ability to be successful in this setting. For instance, “I feel self-confident” was modified to read, “I usually feel self-confident.” Researchers in previous studies have also modified items from the self-confidence subscale of the CSAI-2C in order to assess children’s trait self-confidence (e.g., Munroe-Chandler et al., 2008). The trait self-confidence subscale has been shown to be internally consistent ($\alpha = .82$) with athletes aged 11-14 years (Munroe-Chandler et al., 2008). Furthermore, factorial validity of the CSAI-2C (Goodness-of-fit Index = 0.95; Adjusted Goodness-of-fit Index = 0.94, and Root Mean Squared Residual = 0.04) was established during its development (see Stadulis et al., 2002).

**Procedure**

Clearance to conduct this research study was obtained from the authors’ institutional ethics review board and from the coordinators of the summer camp programs (see Appendix A). Data collection took place over two months (July and August). The first and second authors informed parents and children about the nature of the current study during drop-off and pick-up times at the camp’s central location. Parents and children interested in participating in the study were given an information package containing additional details (letter of information; see Appendix B) as well as parent consent (see Appendix C) and child assent (see Appendix D) forms. Once parent consent and child assent forms were completed and returned, a time was
scheduled for children to complete the questionnaires (via paper and pencil method; see Appendices E-H). Depending on participant and space availability, the questionnaires were completed at various times. For instance, some children completed the questionnaires during their lunch break, while others completed it at the end of a camp day. All participants completed the questionnaires at the camp’s central location. The lead investigator read each question aloud while the participants self-recorded their answers. The second author and a research assistant were available to answer participants’ questions while completing the surveys. The average time to complete the questionnaire package was 25 minutes. A total of 108 parents and children agreed to participate in the study. However, the final sample was reduced to 105 participants following data screening procedures (see results section for more details).

**Results**

Data screening showed that less than 1% of the data were missing. Further, Little’s MCAR statistic was significant, suggesting these data were missing completely at random. It is appropriate to replace missing data when less than 5% are missing (Tabachnick & Fidell, 2007), thus the missing data points were replaced using case mean substitution. The next step involved testing for potential outliers using Mahalanobis distance. Based on a conservative estimate ($p < .001$), three outlier cases were detected and removed. Consequently, the final sample consisted of 105 participants. Further analyses revealed that the skewness and kurtosis values were near zero for the capability imagery, social imagery, and personal and social skills subscales, suggesting a normal distribution (Field, 2013). However, the fun imagery subscale had skewness and kurtosis values slightly exceeding -1 and 1 (skewness = -1.28, kurtosis = 1.17). These slightly elevated values are not surprising given that active play is inherently fun in nature (Gray, 2009), and thus one might expect children to generally report high levels of fun imagery. Similarly, the skewness
and kurtosis values exceeded -1 and 1 for the confidence subscale (skewness = 1.45, kurtosis = 2.27). However, it is not unusual for children between the ages of 6 to 12 to report high levels of confidence (Erikson, 1963). Similar confidence scores have also been reported in previous physical activity research with children (Munroe-Chandler et al., 2008; Strachan & Munroe-Chandler, 2006). Finally, the variance inflation factor values in the present study ranged from 1.03 to 1.18, suggesting a lack of multicollinearity.

Means, standard deviations, bivariate correlations, and internal consistencies are displayed in Table 1. Fun imagery had the highest mean value ($M = 4.28$) of the three types of active play imagery, followed by social imagery ($M = 3.88$) and capability imagery ($M = 3.10$). In addition, the mean score for the subscale of personal and social skills was 3.23, while the mean value for self-confidence was 3.52. The bivariate correlations among study variables were positive and ranged from $r = .10$ to $r = .43$. Cronbach alpha coefficients for all subscales ranged from $\alpha = .69$ to $\alpha = .76$.

For the main analyses, hierarchical multiple regressions were conducted to examine active play imagery and its association to personal and social skills and self-confidence in active play. These regression analyses adjusted for age and gender given previous research has shown that these variables may influence imagery use (Munroe-Chandler & Hall, 2016). The results of the main analyses are presented below, and are further summarized in Table 2.

The first regression model assessed the relationships between the three types of active play imagery (capability, social, fun) and personal and social skills. The types of active play imagery acted as the independent variables, while personal and social skills served as the dependent variable. To adjust for potential age and gender differences, these two variables were first entered into Block 1. Age and gender accounted for no significant ($p = .664$) variance in
personal and social skills. Next, social imagery was entered into Block 2 and was significant, $F(3, 101) = 5.20, p < .001$, accounting for 13% of the variance. Finally, capability imagery and fun imagery were simultaneously entered into Block 3. Results showed that Block 3 was significant, $F(5, 99) = 7.19, p < .001$, accounting for an additional 13% of the variance. Overall, all three types of active play imagery were significantly and positively related to personal and social skills, with social imagery accounting for the most variance.

The second regression model assessed the relationships between the three types of active play imagery (capability, social, fun) and self-confidence. The types of active play imagery served as the independent variables, while self-confidence functioned as the dependent variable. As in the first regression model, age and gender were entered into Block 1 and did not account for any significant variance in self-confidence ($p = .581$). Subsequently, fun imagery was entered into Block 2 and was significant, $F(3, 101) = 5.15, p = .002$, accounting for 12% of the variance. Lastly, capability imagery and social imagery were concurrently entered into Block 3 and were significant, $F(5, 99) = 5.04, p < .001$, accounting for an additional 7% of the variance. Inspection of the results indicated that only fun and capability imagery were significantly and positively associated with self-confidence, with fun imagery accounting for the most variance.

**Discussion**

The first purpose of the current study was to examine the relationship between children’s active play imagery and personal and social skills. It was hypothesized that the three types of active play imagery would be positively related to personal and social skills, and that social imagery would account for the most variance. The findings were consistent with these hypotheses. The second purpose of the current study was to investigate the relationship between active play imagery and self-confidence. It was predicted that the three types of active play
imagery would be positively associated with self-confidence, with fun imagery accounting for
the most variance. The results partially supported these hypotheses. Specifically, fun imagery
and capability imagery emerged as the only significant predictors of self-confidence, and fun
imagery accounted for the most amount of variance.

The results pertaining to the first purpose indicated that the three types of active play
imagery (capability, fun, and social) were positively related with personal and social skills. That
is, children who reported higher levels of all three types of active play imagery also reported
better personal and social skills. Specifically, it was found that social imagery accounted for the
most variance in personal and social skills. This finding can be supported through theoretical and
empirical work on children’s play and social competence. Developmental psychologists (Piaget,
1962; Vygotsky, 1967) have argued that play with others is conducive to children’s personal and
social development, suggesting it provides children with the opportunity to learn and practice
valuable skills (e.g., cooperation, sharing, helping, and developing friendships). Further support
from a longitudinal study found that children’s participation in play with others (i.e., pretend and
physical activity play) contributed to their development of emotional expressiveness and
emotional regulation (Lindsey & Colwell, 2013). Additional studies have found that play with
others was positively associated with ratings of positive peer interactions, whereas play alone
was negatively related to ratings of positive peer interactions (Gagon & Nagle, 2004; Newton &
Jenvey, 2011). This body of literature helps explain the findings of the current study, such that
children who imaged playing and socializing with others also reported engaging in personally
and socially competent behavior. From a theoretical standpoint, it is not surprising that children’s
use of social imagery would explain the most variance in personal and social skills given that
social imagery focuses exclusively on images pertaining to interactions with others.
The finding that capability imagery was positively linked to personal and social skills aligns with the body of literature on children’s physical competence. Researchers have found that children and youth with higher perceptions of physical competence also reported greater peer acceptance (Lyu & Gill, 2012). Further, through observational data on children’s play behaviors during recess, children with high physical competence engaged in more active types of play and were more likely to try new challenges and take risks than children with low physical competence (Barbour, 1996). Additionally, children with low physical competence were less likely to consider other children’s perspectives, were often egocentric, and frequently played alone. Overall, Barbour (1996) argued that because children with high physical competence are able to engage in various activities, they are likely provided with more opportunities to learn and practice social skills than those with low physical competence. These findings can be used to understand the results of the current study, which suggested that children who imaged being physically competent in active play reported greater personal and social skills. Generally, this interpretation implies that children who use capability imagery may also be more physically competent and therefore may engage in positive personal and social skills. However, it is equally plausible that children with low physical competence may use capability imagery as a means to increase their level of competence, which may in turn elicit more positive perceptions of personal and social skills. Clearly, these interpretations are speculative as physical competence data were not collected in the current study. A future direction for researchers may be to investigate how children’s physical competence influences the relationship between capability imagery and personal and social skills.

An association between fun imagery and personal and social skills was also found in the current study. Theoretical underpinnings of play incorporate fun or enjoyment as integral
characteristics (Smith, 2010). In fact, children have articulated that play must be fun, and that once an activity is no longer fun, it is no longer considered play (Glenn et al., 2013). Children have also indicated that enjoyment and social interactions with peers are reasons to engage in active play (Brockman, Jago, & Fox, 2011). Thus, it is plausible that when children image themselves having fun in active play, they also create images of engaging in positive peer interactions. In support of this possibility, past research conducted with youth sport athletes revealed that components of enjoyment (e.g., affiliation with peers) positively predicted personal and social skills (MacDonald et al., 2011).

On a global level, the finding that imagery was positively related to personal and social skills provides support for Jacob and Wright’s (2016) proposal that imagery might be used as a strategy to facilitate young people’s developmental outcomes. Sport and exercise psychology researchers have been primarily interested in examining how imagery may improve one’s physical and cognitive performance in physical activity settings (Munroe-Chandler & Hall, 2016). Consequently, little attention has been devoted to understanding the role imagery might have on the psychological development of children and youth, both within and outside physical activity contexts. The findings pertaining to the current study’s first purpose suggest that imagery may be an avenue that can facilitate children’s personal and social skills. However, because personal and social skills were subjectively rated, it should be noted that higher ratings of personal and social skills may not be indicative of whether children were in fact more personally and socially competent.

With regard to the current study’s second purpose, two types of children’s active play imagery (i.e., fun and capability imagery) were positively associated with self-confidence. In other words, children who more frequently imaged themselves having fun and being physically
competent also indicated higher levels of self-confidence. Further, fun imagery was shown to account for the most variance in this outcome variable. This finding aligns with past research indicating that both fun and capability imagery were positively related to children’s self-confidence, but that fun imagery was more strongly related to self-confidence than capability imagery (Tomayer et al., 2015). Additionally, the finding that fun and capability imagery were positively related to self-confidence parallels previous research examining the relationship between active play imagery and the basic psychological needs (i.e., competence, relatedness, and autonomy; Tobin et al., 2017). In their study, Tobin et al. (2017) found that fun and capability imagery were positively related to competence, a construct closely tied to confidence. Competence refers to effectively interacting with one’s social environment while feeling confident in one’s ability to master tasks (Ryan & Deci, 2002), whereas self-confidence refers one’s belief in their ability to successfully execute an activity (Vealey, 1986). Despite the similarities, competence is unique in that it can be influenced by one’s social environment (e.g., by teachers, parents, or peers; Ryan & Deci, 2002). This emphasis on one’s social environment is not highlighted in the definition of self-confidence. Nevertheless, the present study and Tobin et al.’s research are complementary in showing that fun and capability imagery are positively related to one’s belief in their abilities.

Contrary to our hypothesis, social imagery was not significantly related to self-confidence. This absence of a relationship suggests that imaging positive peer interactions may not play an influential role in enhancing children’s self-confidence in active play environments. This lack of relationship between social imagery and self-confidence is somewhat surprising. Theories addressing children and youths’ psychosocial development indicate that both adult and peer relationships can influence outcomes such as competency beliefs, self-perceptions,
motivation, and behavior (e.g., Harter, 1987; Ryan & Deci, 2002). Thus, it seems reasonable to assume that images of positive interactions with friends and playmates might also provoke images of feeling confident in one’s ability to participate in active play. Based on the results of the current study, it appears that the social imagery-self-confidence relationship warrants further investigation. Researchers might consider investigating how the nature of the imaged peer interaction (e.g., close friends vs. neighbours) impacts children’s self-confidence in active play.

The implications of this study are clear and are of interest to those who can positively impact the overall psychological well-being of children and youth. Parents, teachers, after-school program leaders, and other adult gatekeepers could support children’s imagination by encouraging them to create and recreate active play scenarios in their minds. Specifically, prompting children to image themselves socializing with others, being physically competent, and having fun in active play may facilitate their personal and social skills. Further, eliciting images of enjoyment and physical competence in active play could be used to enhance children’s self-confidence. Similarly, gatekeepers could also support children’s use of active play imagery by expressing interest in, asking questions about, and even offering ideas and suggestions concerning children’s imagery. Obviously, we are not advocating that gatekeepers overwhelm children with questions and probes, nor are we suggesting they “spoil” or disturb the spontaneous and creative nature of children’s imagery by instructing children what to image. Rather, we are simply suggesting that gatekeepers help create an accepting and supportive environment that can nourish children’s imagination.

There are limitations of the current study which should be highlighted. Notably, children’s weekly active play participation was not considered. It is possible that children who participate in active play more frequently use imagery more often than those who participate in
active play less frequently. Within the adult exercise domain, researchers have found that imagery was used more regularly by high-frequency exercisers compared to low-frequency exercisers (Gammage, Hall, & Rodgers, 2000). Consequently, understanding how active play participation influences children’s imagery use is an avenue for future research. Additionally, a limitation shared among all correlational studies is the inability to determine cause and effect. Future researchers might consider exploring the causal effect of active play imagery on psychosocial outcomes. This could be accomplished by replicating the current study using a longitudinal design or by conducting guided active play imagery interventions targeting psychosocial outcomes. Lastly, exploring associations between active play imagery and negative affective states (e.g., feelings of isolation, loneliness) would shed light on the potential negative consequences of active play imagery. For example, a child may use social imagery (imagine themselves joining a game of tag), which may subsequently elicit feelings of ostracism.

Future researchers might also consider examining the relationship between active play imagery and other positive developmental outcomes. Apart from personal and social skills, play has several cognitive benefits including enhanced creative thinking (Hoffmann & Russ, 2012), improved decision-making, higher executive functioning, and greater flexibility in problem solving (Russ, 2004). Although the YES-S contains a cognitive skills subscale, the items (e.g., “improved academic skills (reading, writing, math, etc.)” and “improved computer/internet skills”) do not necessarily align with the cognitive skills researched within the play literature. In fact, some researchers have argued that the cognitive skills items from the YES-S may be irrelevant to sport experiences (Cronin & Allen, 2015). In the present study, we adopted a similar perspective to that of Cronin and Allen (2015) in that we believed the cognitive skills items included in the YES-S were likely unrelated to children’s experiences in active play.
Involvement in play is one way to facilitate positive developmental outcomes (Pellegrini, 2009), and based on the findings of the current study, active play imagery may be another. The results of the current study provide some initial support for the notion that active play imagery is related to children’s personal and social skills as well as self-confidence. Specifically, it was found that: (1) social, capability, and fun imagery were positively related to personal and social skills, with social imagery accounting for the most variance, and (2) fun and capability imagery were positively associated with self-confidence, with fun imagery accounting for the most variance. The present research has contributed to the imagery literature by providing evidence for the utility of using imagery to promote children’s personal and social skills and self-confidence.
References


CHAPTER 3
EXAMINING CHILDREN’S PHYSICAL ACTIVITY, IMAGERY ABILITY, AND ACTIVE
PLAY IMAGERY

There is ample research documenting the effectiveness of imagery in sport, and growing
evidence supporting its use in exercise, dance, and rehabilitation. Despite the countless benefits
of imagery (see Cumming & Ramsey, 2009), its use and effectiveness can be influenced by
various factors pertaining to the individual imaging (e.g., age, gender, level of participation, and
imagery ability; Munroe-Chandler & Hall, 2016). And while there is an impressive body of
literature that has considered how such factors affect imagery use (e.g., Gregg, Hall, McGowan,
& Hall, 2011; Gregg, O, & Hall, 2016), much of this work has been conducted with adults and
adolescents in organized physical activity settings.

An emerging topic within the imagery literature is children’s imagery use in active play.
Through the development of the Children’s Active Play Imagery Questionnaire (CAPIQ),
Cooke, Munroe-Chandler, Hall, Tobin, and Guerrero (2014) identified three types of active play
imagery: capability imagery (imaging oneself being physically competent), social imagery
(imaging oneself socializing and playing with others), and fun imagery (images of pleasure and
enjoyment). Researchers examining active play imagery have found positive associations with
the basic psychological need of competence and relatedness (Tobin et al., 2017), personal and
social skills, and self-confidence (Guerrero, Hoffmann, & Munroe-Chandler, 2016).

Furthermore, active play-related imagery scripts positively influenced children’s self-determined

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activity, imagery ability, and active play imagery. In Imagination, Cognition, and Personality:
Consciousness in Theory, Research, and Clinical Practice. Advance online
publication. doi:10.1177/0276236617739398
motivation and active play participation (Guerrero, Tobin, Munroe-Chandler, & Hall, 2015). While these findings are promising, there is a gap in the literature concerning the factors that may impact the effectiveness of active play imagery. Thus, the purpose of the current study was to extend the existing imagery literature by examining factors that can influence children’s use of active play imagery.

Imagery models serve to guide research and applied work, and therefore are important when seeking to identify factors that can affect individuals’ imagery use. The most comprehensive, up-to-date imagery model is the revised applied model of deliberate imagery use (RAMDIU) in sport, exercise, dance, and rehabilitation proposed by Cumming and Williams (2013). The RAMDIU was designed to represent significant developments in imagery research since the conception of Martin, Moritz, and Hall’s (1999) original applied model of imagery use in sport. The RAMDIU is similar to the original model in that it includes the empirically supported "where", "when", and "why" components. However, the RAMDIU extends the strengths of the original model by focusing on deliberate imagery (as opposed to spontaneous, unintentional imagery) and by broadening its applicability to various domains other than sport. Additionally, the RAMDIU differentiates between the type of imagery (i.e., what is being imaged; e.g., motivational specific [MS], motivational general-mastery [MG-M], motivational general- arousal [MG-A], cognitive specific [CS], cognitive general [CG]) and the function of imagery (i.e., why an individual is imaging). Cumming and Williams also included ‘meaning’ in the revised model, and proposed that imagery content should be personalized and meaningful in order for it to be effective. Imagery is meaningful when the type of imagery and the function of imagery correspond with one another so that the imagery is appropriate for both the situation and the individual. Finally, the model underscores how individual characteristics (the “who”
component) and imagery ability can impact both imagery use and imagery effectiveness. Individual characteristics can include, but are not limited to, competitive level (or participation level), experience, and the individual’s disposition or personality. Two factors that were relevant to the current study were level of participation and imagery ability.

That greater participation (or experience) in an activity influences imagery use is well-documented. In sport, athletes at higher competitive levels or with more experience often report greater use of imagery compared to athletes at lower competitive levels or with less experience (e.g., Cumming & Hall, 2002). More specifically, elite athletes used more cognitive imagery than novice athletes (Arvinen-Barrow, Weigand, Thomas, Hemmings, & Walley, 2007), and those athletes who practiced more than 12 hours per week used more motivational imagery than athletes who practiced less than 12 hours per week (Parker & Lovell, 2009). Similar findings have been noted in the exercise context, with physically active individuals reporting greater use of imagery than less physically active individuals (Gammage, Hall, & Rodgers, 2000; Hausenblas, Hall, Rodgers, & Munroe, 1999). While no known research with children has determined a link between physical activity participation and imagery use, it is reasonable to propose that this relationship may exist. Children’s levels of physical activity have been found to be positively associated with perceived physical competence (Bai, Chen, Vazou, Welk, & Schaben, 2015; Carroll & Loumidis, 2001) and presence of and social support from friends (Maturo & Cunningham, 2013). Furthermore, children have reported enjoyment and social interaction with peers as primary reasons to be active (Allender, Cowburn, & Foster, 2006). Thus, high levels of physical activity may elicit images of mastery, friendship, and enjoyment.

Imagery ability has been a topic of interest among imagery researchers for decades. It is commonly referred to as "an individual's capability to form vivid, controllable images and retain
them for sufficient time to effect the desired imagery rehearsal" (Morris, 1997, p. 37). Many researchers have noted that while everyone has the ability to generate images, not all generated images are effective (e.g., Cumming & Williams, 2013; Paivio, 1986). The quality of an image, for instance, can vary on aspects such as vividness, controllability, visual representation, kinesthetic feelings, ease, emotional experiences, and effectiveness of image formation (Hall, 1998). Fortunately, the ability to image is considered a skill and can therefore be improved through practice (Cumming & Ste-Marie, 2001; Rodgers, Hall, & Buckolz, 1991) and through layered stimulus response training (Cumming et al., 2016).

Motivation and cognitive imagery ability are two types of imagery ability commonly researched within sport and exercise psychology. Movement imagery ability, a form of cognitive imagery ability, comprises visual imagery (i.e., internal and external) and kinesthetic imagery. Internal visual imagery (first-person perspective) is described as movements that are viewed through one’s own eyes, which is akin to images produced using a GoPro camera. External visual imagery (third-person perspective) is described as movements that are viewed through others’ eyes, which is analogous to watching oneself on television. Lastly, kinesthetic imagery is described as the feelings and sensations associated with the imaged movements.

While greater movement imagery ability has been found to be associated with greater imagery use in adult athletes (Gregg et al., 2011; Gregg, Hall, & Nederhof, 2005; Vadocz, Hall, & Moritz, 1997), there has been less attention on how children’s movement imagery ability influences their imagery use. In sport, researchers examining youth’s movement imagery ability found no differences in imagery use between athletes (16-18 years) with high and low imagery ability (Parker & Lovell, 2009), and found that older athletes (20-21 years) reported greater kinesthetic imagery than younger athletes (12-13 years; Parker & Lovell, 2012). In both of their
studies, Parker and Lovell (2009, 2012) used movement imagery ability questionnaires that were developed for adults because no such questionnaire existed for children. However, using a questionnaire designed for adults with children is problematic for several reasons (e.g., comprehension), and as such brings into question the trustworthiness of the findings (Martini, Carter, Yoxon, Cumming, & Ste-Marie, 2016). In fact, children noted several difficulties (e.g., rating scale, length) when using an adult movement imagery questionnaire (Taktek, Zinsser, & St. John, 2008). Martini et al.’s (2016) recent development of the Movement Imagery Ability Questionnaire for Children (MIQ-C) not only minimizes these potential difficulties for future child participants, but also helps to enhance the validity and reliability derived from the MIQ-C scores in future studies examining children’s movement imagery.

Identifying factors that affect children’s active play imagery is important for several reasons. First, this information can help advance the active play imagery literature by identifying factors that should be considered when conducting future research. Second, such findings can help researchers and practitioners design more effective imagery interventions with children. If, for example, active children use more imagery than less active children then researchers and practitioners might consider emphasizing specific images (e.g., images of competence) or incorporating specific response and stimulus propositions when designing imagery scripts for less active children. Third, the associated benefits of active play imagery have been documented (e.g., Guerrero et al., 2016) and thus learning about the factors associated with greater imagery frequency is important if children are to experience such benefits. Therefore, the purpose of the current study was to investigate whether physical activity participation (the “who” component in the RAMDIU) and imagery ability predicted children’s frequency of active play imagery. Based on previous exercise imagery literature (e.g., Gammage et al., 2000) and physical activity
literature with children (e.g., Maturo & Cunningham, 2013), it was hypothesized that greater physical activity participation would predict greater frequency of active play imagery (capability, social, fun). Based on the sport imagery literature (e.g., Gregg et al., 2011), it was hypothesized that greater movement imagery ability (visual and kinesthetic) would predict greater frequency of active play imagery. Finally, given that physical activity participation, as opposed to movement imagery, is more conceptually related to images of competence, social interactions, and enjoyment, it was also hypothesized that the relationship between physical activity participation and active play imagery would be stronger than the relationship between movement imagery ability and active play imagery.

**Method**

**Participants**

A total of 120 children (62 males, 58 females) participated in the current study. Participants were between the ages of 9 and 11 years ($M = 9.94$, $SD = .81$). Children were recruited from elementary schools in Southwestern Ontario.

**Measures**

**Demographics.** Participants were asked to identify their age and gender.

**Imagery ability.** The MIQ-C (Martini et al., 2016) was used to assess children’s visual (external and internal) and kinesthetic imagery ability. The MIQ-C is an adaptation of the Movement Imagery Questionnaire – 3 (Williams et al., 2012) and includes pictures to help children understand the different types of imagery ability (i.e., internal vs. external imagery) and the concept of the ease/difficulty of imaging (i.e., very hard to see or feel vs. very easy to see or feel). The questionnaire comprises 12 items and four simple movements (i.e., knee raise, arm movement, waist bend, and jump). For each item, participants are first asked to physically
perform the movement and then image the movement (without moving) using external visual imagery, internal visual imagery, or kinesthetic imagery. Participants are then asked to indicate the difficulty of seeing/feeling the image using a 7-point Likert scale anchored at 1 (very hard) and 7 (very easy). In the current study, the lead author demonstrated the movements and read the instructions of each item to the participants. The MIQ-C has shown to have good psychometric properties (Martini et al., 2016) and internal reliability (Guerrero et al., 2015; Quinton et al., 2014). In the present study, omega coefficients suggested acceptable internal consistency for external visual imagery ($\omega = .80$), internal visual imagery ($\omega = .86$), and kinesthetic imagery ($\omega = .82$).

**Physical activity.** The Physical Activity Questionnaire for Older Children (PAQ-C; Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997) was used to measure children’s levels of physical activity both within and outside school settings. This 9-item questionnaire is designed to assess older children’s (Grades 4-8; approximately 8-14 years old) general levels of moderate and vigorous physical activity over a 7-day period. The PAQ-C describes moderate-to-vigorous physical activity as “sports, games, or dance that make you breathe hard, make your legs feel tired, or make you sweat” (Crocker et al., 1997, p. 1345). Items on the PAQ-C include memory cues (e.g., at lunch, right after school, on the last weekend, etc.) to enhance the recall ability of children. A sample item reads, “In the last 7 days, what did you do most of the time at recess?”, with response options including: “sat down (talking, reading, doing schoolwork)”, “stood around or walked around”, “ran or played a little bit”, “ran around and played quite a bit”, and “ran and played most of the time.” For each item, children select the statement that best represents their levels of physical activity in the past 7 days. Each response option is assessed from low physical activity (i.e., first response option) to high physical activity (i.e., fifth response option). An
overall PAQ-C activity score is calculated by taking the mean of all 9 items. Scores range from 1 to 5, where higher scores indicate greater physical activity levels. Scores of the PAQ-C have shown to be valid and reliable in previous studies with school-aged children (Crocker et al., 1997). In the present study, the omega coefficient for the PAQ-C revealed acceptable internal consistency ($\omega = .80$).

**Imagery use.** The CAPIQ (Cooke et al., 2014) was used to assess children’s frequency of active play imagery. The CAPIQ consists of 11 items and includes three subscales: capability imagery (e.g., 4 items; e.g., “When thinking about active play, I imagine the movements that my body makes”), social imagery (4 items; e.g., “When thinking about active play, I imagine my friends with me”), and fun imagery (3 items; e.g., “When thinking about active play, I picture myself having fun”). The response format is a 5-point Likert scale anchored by 1 (*not at all*) and 5 (*very often*). The CAPIQ has been shown to be a valid and reliable inventory (Cooke et al., 2014). In the present study, omega coefficients suggested acceptable internal consistency for capability imagery ($\omega = .89$), social imagery ($\omega = .81$), and fun imagery ($\omega = .85$).

**Procedures**

Ethical clearance for this study was obtained from the authors’ institutional ethics review board and from school boards. Principals were contacted to participate in the study (see Appendix I), and those who volunteered to participate provided permission to recruit participants from their respective schools. The lead author visited Grade 4 and 5 classrooms and provided children with a brief overview of the study. Children interested in participating in the study were provided with an information package including a detailed description of the study as well as consent and assent forms (see Appendices J-L). Data collection began once signed forms (consent and assent) were returned to the homeroom teacher or lead author and took place in
groups. The questionnaires (see Appendices M, N, and F) were verbally administered, and the average time to complete the questionnaire package was 30 minutes.

Results

Data Screening

Data were screened for accuracy of data entry, missing values, and outliers (Tabachnick & Fidell, 2013). Examination of descriptive statistics of all variables confirmed that the data were accurately entered. Missing values (less than 1% of data) were imputed using the method of series-mean replacement. One case was found to be a univariate outlier and was therefore deleted from the data set. Four variables (i.e., external visual imagery, internal visual imagery, kinesthetic imagery, and fun imagery) were negatively skewed. Consequently, logarithmic transformations were applied. Examinations of the transformed distributions revealed univariate normality for each of the four variables. Regression analyses were performed using the transformed and original untransformed variables. The results for the transformed variables were nearly identical to the results for the untransformed variables, with the exception of slight changes to the beta weight values. Therefore, for ease of interpretation the results for the original untransformed variables are presented in the analyses below. No multivariate outliers were identified using a Mahalanobis distance statistic of $p < .001$. All other assumptions of multivariate analyses (multivariate normality, linearity, homoscedasticity, and multicollinearity) were examined and met.

Descriptive Statistics and Bivariate Correlations

Table 3 shows the means, standard deviations, and Pearson correlations among age, active play imagery, imagery ability, and physical activity. Mean values for the imagery ability subscales ranged from 5.70 to 6.04 and for the active play imagery subscales ranged from 3.44 to
4.17. The mean value for the physical activity subscale was 3.35. Bivariate correlation analyses were moderate among the imagery ability subscales ($r = .66$ to $r = .73$) and the active play imagery subscales ($r = .53$ to $r = .66$). The imagery ability subscales and physical activity subscales were significantly and positively related to all three types of active play imagery.

**Regressions**

Hierarchical regression models were conducted to examine the influence of physical activity and imagery ability on frequency of capability, social, and fun imagery (see Table 4). Three separate models were conducted for each of the CAPIQ subscales. In each regression model, age and gender were entered into Step 1 to account for any differences in imagery use. Results from the first run of the regressions revealed that age, but not gender, significantly predicted all three types of active play imagery. Consequently, age was retained in the first step of all regression models. Gender, on the other hand, was removed from further analyses as a way to avoid reduction in statistical power and Type I error (Cohen, Cohen, West, & Aiken, 2003). Subsequently, physical activity was entered into Step 2 and the MIQ-C subscales (i.e., external visual imagery, internal visual imagery, and kinesthetic imagery) were entered into Step 3.

A significant overall model was found for predicting capability imagery, $F(5, 114) = 7.42, p < .001$, accounting for 26% of the variance (adj $R^2 = .23$). Age significantly predicted capability imagery ($\beta = .20$) in Step 1 and accounted for 3.8% of the overall variance (adj $R^2 = .03$). In Step 2, physical activity significantly predicted capability imagery ($\beta = .45; \Delta R^2 = .22, p < .001$), accounting for 24% of the overall variance (adj $R^2 = .23$). In Step 3, the MIQ-C subscales did not significantly contribute to the regression ($\Delta R^2 = .02, p = .430$). Examination of the beta weights and $p$ values revealed that age ($\beta = .18$) and physical activity ($\beta = .45$) positively and significantly predicted capability imagery.
For predicting social imagery, a significant model was found, $F(5, 114) = 4.18, p = .002$, accounting for 15.5% of the variance (adj $R^2 = .12$). In Step 1, age significantly predicted social imagery ($\beta = .23$) and accounted for 5.4% of the overall variance (adj $R^2 = .05$), and in Step 2, physical activity significantly predicted social imagery ($\beta = .26$) and accounted for 12% of the overall variance (adj $R^2 = .11$). In Step 3, the MIQ-C subscales did not significantly contribute to the regression ($\Delta R^2 = .03, p = .226$). Inspection of the beta weights and $p$ values revealed that age ($\beta = .21$) and physical activity ($\beta = .19$) positively and significantly predicted social imagery.

A significant overall model was found for predicting fun imagery, $F(5, 114) = 6.94, p < .001$, accounting for 23.3% of the variance (adj $R^2 = .20$). Age significantly predicted fun imagery ($\beta = .27$) in Step 1, accounting for 7% of the overall variance (adj $R^2 = .07$), and physical activity significantly predicted fun imagery in Step 2, accounting for 15% of the overall variance (adj $R^2 = .14$). In Step 3, the MIQ-C subscales significantly contributed to the regression ($\Delta R^2 = .08, p = .010$). Examination of the beta weights and $p$ values indicated that age ($\beta = .22$), physical activity ($\beta = .23$), and external imagery ($\beta = .29$) positively and significantly predicted fun imagery.

**Discussion**

The overarching aim of the current study was to extend our knowledge of active play imagery. More specifically, we were interested in whether individual differences in physical activity participation and imagery ability predicted children’s use of active play imagery. We found that age (control variable) and physical activity participation were positively associated with all three types of active play imagery. Furthermore, external visual imagery was positively related to fun imagery, whereas internal visual imagery and kinesthetic imagery had no associations with active play imagery.
Older children reported frequent use of capability imagery. The age-capability imagery relationship can be explained by drawing upon the child developmental literature. Developmental researchers have generally found that children’s competency beliefs across various domains (e.g., movement and academic) decline around 10 to 11 years of age (Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991), which is in part due to a shift in children’s cognitive maturity (Nicholls, 1989). Whereas younger children tend to be optimistic about their competencies, older children are often more accurate, or realistic, in their self-assessments. Older children develop more accurate competency beliefs because of their ability to understand and interpret evaluative feedback, and because they engage in more social comparisons with their peers (Nicholls, 1989; Wigfield, Byrnes, & Eccles, 2006). Thus, it seems reasonable to suggest that older children in the current study were experiencing a cognitive shift from “optimism” to “realism” and consequently were engaging in capability imagery as a means to maintain or increase their physical competence in active play. It is also possible that older children want to be perceived as physically competent by others and therefore frequently used capability imagery as a means to facilitate feelings of physical competence.

Age was positively related to social imagery, thereby suggesting that older children frequently imaged playing with others during active play. This finding aligns with developmental psychology research that has identified several age-related differences regarding the meaning and nature of friendship (Berndt & Hanna, 1995; Newcomb & Bagewell, 1995). For instance, younger children tend to view a friend as someone who shares similar physical characteristics and activity interest, while older children consider a friend as someone who shares similar psychological qualities and who is loyal, trustworthy, and supportive. Furthermore, by 11 years of age, most children report that the majority of their peer interaction takes place within small
groups of close friends, also known as cliques (Kindermann, McCollom, & Gibson, 1995). Researchers have also shown that as children get older they become increasingly concerned with peer acceptance and peer-group affiliation (Eccles, 1999), thus highlighting the value of friendships during middle to late childhood. When considered collectively, it is possible that older children in the current study may have relied on social imagery as means to either maintain satisfying, healthy peer-relationships or to facilitate feelings of relatedness and connection.

Age was also positively related to fun imagery. Coupled with the previous finding that older children reported frequent use of social imagery, an argument can be made as to why older children also reported frequent use of fun imagery. It is possible that as older children image themselves playing with others (e.g., friends, neighbours, pets), they also generate images of enjoyment. Indeed, researchers have shown that 10 and 11-year-old children are primarily motivated to participate in active play because of the sense of enjoyment they experience through social interactions with others (Brockman, Jago, & Fox, 2011). To this end, developmental psychologists have noted that play becomes increasingly social as children age (Eccles, 1999), and inherently has fun or pleasurable characteristics (Smith, 2010). In the current study, the bivariate correlation between social and fun imagery revealed a moderate to strong correlation, thus providing further support for this argument.

As predicted, physical activity participation was a significant predictor of all three types of active play imagery. These findings are consistent with those noted in the sport and exercise imagery literature, in which participation level positively influenced frequency of imagery use (e.g., Cumming & Hall, 2002; Gammage et al., 2000). While this relationship may be attributed to athletes’ and exercisers’ high level of commitment to their activity (Hall, 2001), the positive
relationship between physical activity and active play imagery may be due to associated characteristics of physically active children.

Physically active children in the current study reported frequent use all three types of active play imagery. This finding parallels previous research showing that physical activity participation is influenced by greater perceptions of physical competence (Babic et al., 2014; Bai et al., 2015), peers, and physical activity enjoyment (e.g., Maturo & Cunningham, 2013). For example, in their systematic review on physical activity and self-concept in youth, Babic et al. (2014) found that perceived competence had the strongest association with physical activity. In an another systematic review, Maturo and Cunningham (2013) examined the role of friends on children’s physical activity participation and found that physical activity was positively influenced through: (a) social support or encouragement from friends, (b) friends’ own physical activity, and (c) the presence of friends during physical activity. Maturo and Cunningham also found that children’s experience of enjoyment was a primary motivator for participating in physical activity, which aligns with past research showing that children’s enjoyment is a precursor of physical activity (Allender et al., 2006). In the current study, it is possible that active children frequently engaged in images of competence, social interaction, and enjoyment because they likely had more positive experiences upon which to draw. Taken together, these findings highlight how specific characteristics of physically active children may influence one’s use of active play imagery.

External visual imagery, but not internal visual imagery, was a positive predictor of fun imagery. These results can be explained using Libby and Eibach’s (2011) model of imagery perspective. Drawing on the tenets of construal level theory (Trope & Liberman, 2010) and action identification theory (Vallacher & Wegner, 1985), Libby and Eibach’s model suggests
that the imagery perspective people use to image an event is connected to their understanding and interpretation of that pictured event. When people image an event using the first-person perspective (internal visual imagery), they make meaning of this event using a bottom-up approach in which the concrete aspects of the pictured event are the primary focus and define understanding. When people image an event using the third-person perspective (external visual imagery), they make meaning of this event using a top-down approach in which the pictured event is incorporated with broader contexts and goals. Therefore, people who image events using the first-person perspective tend to think about events in concrete terms (e.g., getting a good mark on an exam), whereas people who image events using the third-person perspective tend to think about events in abstract terms (e.g., being a successful student; Libby, Shaeffer, & Eibach, 2009). For example, activities and actions that are construed in high-level, abstract terms are linked to a superordinate purpose (the “why”), and activities and actions that are construed in low-level, abstract terms are linked to a subordinate purpose (the “how”). Furthermore, Libby et al. (2009) found that the relationship between imagery perspective and meaning is bidirectional in nature wherein “imagery perspective influences the meaning people see in actions, and the meaning they see influences the perspective they use” (Libby & Eibach, 2011, p. 196). Applying Libby and Eibach’s model of imagery perspective to the findings of the current study, it is possible that children’s external visual imagery facilitated their use of fun imagery because images of enjoyment are more abstract (i.e., focus is on “why” of having fun) than concrete (focus is on “how” of having fun). That said, Libby and Eibach’s model also serves as a rationale for why internal visual imagery did not predict fun imagery as children’s use of internal visual imagery likely did not prompt them to think about concrete aspects of having fun in active play.
The findings of the current study have important implications for future research and application. That the “who” (physical activity and age) and “imagery ability” (external visual imagery) components of the RAMDIU were linked to active play imagery (“what”) offers support for the use of the RAMDIU when conducting future active play imagery research and interventions. Specifically, researchers could use the components of the RAMDIU as a guide to extend the active play imagery literature by identifying specific elements related to active play imagery. Predictions between elements could be tested, and the extent to which these elements influence outcomes could be examined. The present study findings are also useful for applied practitioners seeking to implement imagery interventions. For instance, encouraging children to use external visual imagery may elicit images of active play enjoyment. Taken together, the information gleaned from this study can be used to design effective imagery interventions for children that promote affective, behavioral, and cognitive outcomes.

One limitation of the current study is its cross-sectional nature, preventing any conclusions regarding the causation between variables to be drawn. Future researchers might consider exploring the directional relationships between physical activity, imagery ability, and active play imagery. For example, do children with greater levels of physical activity and imagery ability use more active play imagery, or does greater use of active play imagery lead to higher imagery ability and levels of physical activity. This research question could be explored using structural equation modeling wherein the hypothesized model is compared against the alternative model. A second limitation of the current study is that only movement imagery ability was assessed. Some have noted that using one imagery ability assessment tool may be limiting (Collet, Guillot, Lebon, MacIntrye, & Morin, 2011). In fact, researchers have suggested that various measures of imagery ability can be utilized concurrently to provide a more
comprehensive assessment of an individual’s overall imagery ability. Future researchers might consider using a companion scale to the CAPIQ that assesses one’s ability to image the three types of active play imagery. This approach is similar to the one taken by Cumming (2008). Finally, it should be noted that children in the current sample did report relatively high levels of physical activity and imagery ability, and thus understanding how these factors impact active play imagery in a more diverse sample is needed. In particular, using various methodological approaches beyond cross-sectional self-reports (e.g., case studies, participatory action research) with different samples (inactive children, non-frequent imagers) may help inform future research designs.

Despite these limitations, there are key strengths of the current study. This study contributes to the limited research on children’s movement imagery. For instance, the MIQ-C subscale scores obtained in the current study offer further support (Guerrero et al., 2015; Martini et al., 2016) for children’s capability to use movement imagery and provide validity evidence for the MIQ-C. Another strength of this study is the use of McDonald’s (1999) omega coefficient as an estimate of reliability. Omega coefficients, as opposed to the traditional coefficient alpha, were utilized as measures of reliability because of the overwhelming body of literature advising against the use of coefficient alpha due to its strict and often violated assumptions (McNeish, 2017), and because of the recent push from sport and exercise psychology researchers to move away from coefficient alpha and to adopt more appropriate, modern estimates of reliability (Zhu, 2012).

In sum, the current study contributes to the existing active play imagery literature. More specifically, the current study provided support for the consideration of imagery ability as well as the “who” component of the RAMDIU. External visual imagery was positively related to fun
imagery, whereas internal visual imagery and kinesthetic imagery had no association with active play imagery. Furthermore, age and physical activity were positively associated with capability, social, and fun imagery. Although various individual characteristics are associated with differences in active play imagery, more research examining the role of imagery ability, physical activity, and age is needed.
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CHAPTER 4

USING IMAGERY TO IMPROVE COMPONENTS OF PHYSICAL LITERACY

The term physical literacy has recently gained considerable attention, though early articulations of this term date back to the mid-1900s (e.g., McCloy, 1957). Whitehead (2013) defined physical literacy as the motivation, confidence, physical competence, knowledge and understanding to value and engage in physical activities for life. It comprises four dynamic, interconnected components: affective (motivation and confidence), physical (physical competence), cognitive (knowledge and understanding), and behavioral (engagement in a physically active lifestyle; Whitehead, 2013). A physically literate child is one who has the motivation, confidence, knowledge, skills, and fitness necessary to enjoy a physically active lifestyle. Given that physical literacy has been touted as an essential component to an active life (ParticipACTION, 2015), physical activity stakeholders have made physical literacy a priority within their programs by identifying strategies that promote and develop physical literacy, especially among children (e.g., ParticipACTION, Canadian Sport for Life). More recently, the concept of physical literacy has been heavily integrated within Canadian community sport programming (e.g., YMCA Canada). The aim of the current study was to contribute to the discussion on physical literacy by determining whether children’s imagery use, coupled with physical practice, could improve the affective and physical components of physical literacy.

Physical Literacy

Some physical activity stakeholders have proposed various tools to monitor physical literacy (e.g., Physical Literacy Assessment for Youth, Canadian Sport for Life, 2013). The Canadian Assessment for Physical Literacy (CAPL) is perhaps the most valid and reliable physical literacy assessment tool (e.g., Francis et al., 2016; Longmuir et al., 2015). The CAPL
was developed by the Healthy Active Living and Obesity Research Group (HALO, 2014) for monitoring physical literacy among Canadian children aged 8 to 12 years. Aligned with the definition of physical literacy, the CAPL combines multiple assessments that measure children’s motivation and confidence, health-related fitness, motor skills, knowledge and understanding, and engagement in physical activity (Longmuir et al., 2018). The CAPL is unique in that it is the first tool to monitor a broad spectrum of components that influence physical literacy. Since the development of the CAPL, our knowledge of physical literacy among Canadian children has flourished. Preliminary evidence from a national survey indicates that 39% of Canadian children aged 8-12 years met or exceeded the minimum level recommended for physical literacy (ParticipACTION, 2015). More specifically, 35% of children met or exceeded the minimum level recommended for the motivation and confidence domain, 26% for the physical competence domain, 59% for the knowledge and understanding domain, and 41% for the daily behavior domain. Given our advancement in physical literacy knowledge, the CAPL was recently revised to ensure that each assessment accurately and reliably measured children’s current physical literacy levels. Assessments of over 10,000 Canadian children resulted in the development of the CAPL-2 (Longmuir et al., 2018).

**Imagery**

Imagery is a mental skill that utilizes different sensory modalities to create and/or re-create images in one’s mind (Vealey & Greenleaf, 2010). Such images can be viewed from a first-person perspective (also referred to as internal visual imagery) or from a third-person perspective (also referred to as external visual imagery). Images can also vary in terms of speed, duration, frequency, colour, function, and type (Munroe-Chandler & Guerrero, 2018). Imagery function refers to the purpose of imaging, whereas imagery type refers to the content and
characteristics of the images (Cumming & Williams, 2013). Within the sport domain, children’s and adults’ imagery content has generally been classified as either motivational or cognitive, operating at either specific or general levels (Hall, Mack, Paivio, & Hausenblas, 1998; Paivio, 1985). Motivational imagery types include motivational specific (MS; images of goals and achievements), motivational general-arousal (MG-A; images of arousal and affective states), and motivational general-mastery (MG-M; images related to being in control, confident, and mentally tough). Cognitive imagery types comprise cognitive specific (CS; images of skills) and cognitive general (CG; images related to strategies and routines). These imagery types, when used deliberately and systematically, have been shown to improve affective, behavioral, and cognitive outcomes in sport (see Munroe-Chandler & Guerrero, 2018).

Imagery is most commonly known for its positive impact on psychosocial outcomes. In fact, the link between imagery and greater levels of self-confidence and self-efficacy, lower levels of anxiety, and higher levels of self-determined motivation has been noted in correlational and experimental research (Munroe-Chandler & Guerrero, 2018). For instance, MG-M imagery training increased three out of five young squash players’ self-efficacy (O, Munroe-Chandler, Hall, & Hall, 2014). More recently, three out of five students (10-12 years) participating in a Special Olympics program demonstrated improvements in perceived competence following a six-week MG-M imagery intervention (Catenacci, Harris, Langdon, Scott, & Czech, 2015). Similarly, adult athletes who received mastery-based imagery training reported improvements in their sport confidence from pre- to post-intervention (e.g., Callow, Hardy, & Hall, 2001), and reported higher levels of self-efficacy compared to athletes who did not receive imagery training (Jones, Roger, Bray, MacRae, & Stockbridge, 2002).
Imagery has also been shown to improve the quality and/or consistency of athletic performances, particularly as they pertain to sport-specific strategies and skills. Some researchers have examined the imagery-performance relationship using a multicomponent intervention approach wherein imagery training was coupled with both physical practice and other strategies, such as relaxation and video modeling (e.g., Atienza, Balaguer, & Gracia-Merita, 1998; Li-Wei, Qi-Wei, Orlick, & Zitzelsberger, 1992). In Atienza et al.’s (1998) study, 9-12-year-old tennis players were divided into three conditions: (a) physical practice (control); (b) physical practice + video model observation (experimental); and (c) physical practice + video model observation + imagery (experimental). At the end of the intervention, both experimental conditions showed greater improvements in the technique of service (specific tennis performance measure) than the control condition. Although these multicomponent interventions have contributed to the sport imagery literature, it is not possible to determine exactly how imagery affected young athletes’ tennis performance given that the experimental conditions included other components (e.g., relaxation, video observation) in addition to imagery.

A more common approach to testing the effect of imagery on athletic performance is adding imagery training to athletes’ regular physical practice. Munroe-Chandler, Hall, Fishburne, Murphy, and Hall (2012) assessed whether imagery could improve the speed and accuracy of young (7-14 years) soccer players’ performance on a series of game-like soccer skills (e.g., dribbling, passing, shooting). Participating soccer teams were randomly assigned to either the experimental condition (received imagery training on the specific skills of the soccer task) or control condition (received imagery training on arousal regulation), and then players were assessed on the soccer task. During the intervention phase, teams in the experimental and control conditions received their respective imagery training and engaged in regular soccer activities.
(e.g., team practices). At the end of the intervention, players were again tested on the soccer task. Athletes (those aged 7-10 years) in the experimental condition performed faster on the soccer task post-intervention than those in the control condition. Imagery researchers have used similar experimental designs with adult athletes (e.g., Blair, Hall, & Leyshon, 1993), and have also provided support for the use of imagery as a tool to improve the execution of sport strategies and skills.

**Study Aims and Hypotheses**

Physical literacy encompasses behavioral, psychological, and physical components (Whitehead, 2007). These components serve as the foundation of lifelong engagement in sport and physical activity, and thus identifying strategies that can help children become physically literate is paramount. In our study, we were interested in whether imagery, coupled with physical training, could serve as one potential strategy. The revised applied model of deliberate imagery use (RAMDIU; Cumming & Williams, 2013) was used to guide our intervention, whereby the effects of sport imagery (“what” component of the RAMDIU) on the affective and physical components of physical literacy as well as imagery use and ability (“outcomes” component of the RAMDIU) were examined. Our primary purpose was to examine the effects of a 4-week imagery intervention on the affective (i.e., motivation, confidence, and perceived competence) and physical (i.e., actual and perceived physical competence) components of physical literacy among children. A secondary purpose was to examine the effects of the imagery intervention on children’s imagery use and imagery ability. The intervention was implemented with sport programs that were specifically developed using core principles of physical literacy (i.e., Long-Term Athlete Development 2.1; Canadian Sport for Life, 2017). Based on the literature review outlined above as well as the decades of experimental evidence highlighting the benefits of
imagery use (see Cumming & Ramsey, 2009; Murnoe-Chandler & Guerrero, 2018), our hypotheses were that: (1) children in the experimental condition would report higher autonomous (self-determined) motivation, confidence, perceived competence, imagery use, and imagery ability at post-intervention than children in the control condition; (2) children in the experimental control would perform better on the actual physical competence assessment (obstacle course) at post-intervention than children in the control condition; (3) children in the experimental condition would report higher autonomous motivation, confidence, perceived competence, imagery use, and imagery ability from pre- to post-intervention, and (4) children in the experimental condition would perform better on the actual physical competence assessment from pre- to post-intervention.

**Method**

**Participants**

A total of 9 children (male = 6, female = 3) completed the intervention. Children were between the ages of 8 and 10 years old ($M = 9.11, SD = .60$), and were recruited from a YMCA in Ontario, Canada. The experimental condition comprised 5 children, and the control condition comprised 4 children.

**Measures**

**Demographics.** Participants were asked to self-report their age and gender. Height and weight measurements were conducted using the Healthometer Scale 500KL, and with children’s shoes off, feet together, and backs to the adjustable meter and digital reader. BMI was calculated by dividing body weight (in kg) by height (in m$^2$).

**Imagery use.** Children’s imagery use was assessed using the Sport Imagery Questionnaire for Children (SIQ-C; Hall, Munroe-Chandler, Fishburne, & Hall, 2009). The SIQ-
C is a 21-item self-report questionnaire which assesses the frequency of the five types of imagery: MG-M, MG-A, MS, CS, CG. Examples of items are, “I imagine myself being confident in competition” (MG-M), “In my head, I imagine how calm I feel before I compete” (MG-A), “I see myself doing my very best” (MS), “Before trying a skill, I see myself doing it perfectly” (CS), and “I make up new game plans or routines in my head” (CG). Participants are asked to rate how often they use the five types of imagery using a 5-point Likert scale ranging from 1 (not at all) to 5 (very often). Scores of the SIQ-C have produced adequate internal reliability estimates (e.g., Simonsmeier & Buecker, 2017), and have supported the five-factor model of the SIQ-C (Hall et al., 2009).

**Imagery ability.** Children’s visual (internal and external) and kinesthetic imagery ability was assessed using the 12-item Movement Imagery Questionnaire for Children (MIQ-C; Martini, Carter, Yoxon, Cumming, & Ste-Marie, 2016). The MIQ-C comprises 12 items and asks participants to physically perform one of four movements (i.e., knee raise, arm movement, waist bend, and jump) and then image the movement they previously performed without any movement. Participants are asked to image each of the four movements using internal visual imagery, external visual imagery, and kinesthetic imagery. All items are rated on a 7-point Likert scale anchored at 1 (very hard) and 7 (very easy). Scores of the MIQ-C have produced adequate internal reliability coefficient values (e.g., Guerrero, Tobin, Munroe-Chandler, & Hall, 2015) and psychometric properties (Martini et al., 2016). All children in the imagery condition had adequate imagery abilities (scored more than 4 on a 7-point Likert scale for all items) prior to the start of the intervention.

**Motivation.** Children’s motivation toward physical activity was assessed using the child-adapted version of the Behavioural Regulation in Exercise Questionnaire (BREQ; Sebire, Jago,
Fox, Edwards, & Thompson, 2013). The adapted BREQ is a 12-item questionnaire assessing four subscales, each comprising three items: intrinsic motivation (e.g., “Being active is fun”), identified regulation (e.g., “I value the benefits of being active”), introjected regulation (e.g., “When I am not active I feel bad”), and external regulation (e.g., “Other people say I should be active”). All items are rated on a 5-point Likert scale ranging from 1 (not true for me) to 5 (very true for me). Past research has provided evidence to support the construct validity and reliability of the child-version BREQ scores (Sebire et al., 2013). The adapted BREQ intrinsic motivation subscale is used in the CAPL-2 to measure children’s intrinsic motivation. However, we measured the remaining three subscales in order to gain a broad understanding of children’s motivation toward physical activity. The intrinsic motivation and identified regulation subscales were combined to create an autonomous motivation score, while the introjected and external regulation subscales were combined to create a controlled motivation score.

Confidence. The 5-item confidence subscale of the Competitive State Anxiety Inventory-2 for Children (CSAI-2C; Stadulis, MacCracken, Eidson, & Severance, 2002) was used to assess children’s confidence within a physical activity context. An example item is, “I feel self-confident in physical activity.” Each item is rated on a 4-point Likert scale anchored at 1 (not at all) and 4 (very much so). Scores of the confidence subscale have produced adequate internal consistency estimates (e.g., Hall et al., 2009).

Perceived competence. Children’s perceived competence within a physical activity context was assessed using 6-items from a measure used previously with children in a physical activity setting (Sebire, Jago, Fox, Edwards, & Thompson, 2013). Example items read, “I am

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4 A direct measure of children’s self-confidence is not included in either the CAPL or CAPL-2, despite the domain title, (“Motivation and Confidence”). Thus, we included a measure of self-confidence to determine the effects of the intervention on this outcome.
pretty skilled at physical activity”, and “I am happy with how good I am at doing active games.”

All items were rated on a 5-point Likert scale anchored at 1 (not like me at all) and 5 (really like me). Scores on this subscale have shown strong evidence of factorial validity (Sebire et al., 2013). In the CAPL-2 only 3 items from this subscale are used to measure perceived competence; however, we included all 6 in an attempt to enhance reliability.

**Actual competence.** Children’s actual competence was assessed using the Canadian Agility and Movement Skill Assessment (CAMSA; Longmuir et al., 2015) from the CAPL-2. The CAMSA (obstacle course) was used to measure fundamental (e.g., jumping, catching, throwing, kicking), combined (e.g., balance, precision), and complex (e.g., hand-eye coordination) movement abilities that are essential to physical literacy. Children were assessed on the quality of each performed skill and the time to complete the CAMSA course. A total of four trials were conducted per child, two practice trials and two scored/timed trials. Overall, CAMSA scores were calculated for both scored/timed trials and the highest overall CAMSA score was used. A higher CAMSA score indicates greater physical competence. Further details regarding the protocols and calculations of the CAMSA are outlined in the CAPL-2 manual (www.capl-eclp.ca/capl-manual).

**Experimental Procedures**

The YMCA director and youth program manager were contacted and agreed to incorporate the study’s assessments and protocols into two of their youth sport programs (see Appendices O), Learn to Train Basketball (9-12 years) and Learn to Train Soccer (9-12 years). These programs were selected because their curriculums specifically targeted aspects of physical literacy, and ran for a total of 8 weeks. It should be noted that these programs primarily focused on the proper delivery and teaching of fundamental movement skills (e.g., running, kicking,
throwing) within the context of the sport. Furthermore, while over 75 children were registered in the programs at Week 1, only 9 children completed the entire intervention (e.g., completed assessments at both pre- and post-intervention, followed intervention protocols). The low participant completion rate was due to significant drop-out rates in the programs and incomplete pre- and/or post-intervention assessments. The basketball program served as the control condition and the soccer program served as the experimental condition. Because the study’s assessments and protocols were incorporated into the programs, assessments were collected from all children. Secondary data approval was obtained from the authors’ Ethics Review Board. Parents were informed of the study details at Week 1 (see Appendices P and Q).

Pre-intervention assessments were conducted at Weeks 1 and 2, the intervention occurred during Weeks 3-6, and post-intervention assessments were conducted at Weeks 7 and 8. Motivation (see Appendix R), confidence (see Appendix H), perceived competence (see Appendix S), actual physical competence (i.e., CAMSA [Appendix U]), imagery use (see Appendix V), and imagery ability (see Appendix N) were measured at pre- and post-intervention. Height and weight were measured at Week 1. The CAMSA (objective assessment) was conducted by trained CAPL assessors who were unaware of the purpose of the study.

Children in the experimental condition received imagery training for four consecutive weeks (Weeks 3-6). Imagery training sessions (see Appendix W for a sample imagery script) were completed during weekly practices and were played through the gymnasium’s speakers. Children met with the first author for 10-15 minutes at each weekly practice. Questions and concerns were addressed first and then the imagery training session began. During the first week

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5 All CAPL-2 data were collected at pre-intervention. However, for the purpose of the current study, only selected measures were used (refer to Measures section).
of the intervention phase, children were provided with an introduction to imagery, a brief overview of the intervention, and completed their first imagery session. Aside from completing imagery training at practices, children were asked to complete an additional two imagery training sessions at home before the next practice. Children were asked to record the number of imagery training sessions they completed at home. A total of four imagery scripts were created. Two movement skills were targeted in each script: (1) running and dribbling, (2) running and kicking, (3) hopping and jumping, and (4) dribbling and throwing. Each script lasted approximately 4 minutes, and included stimulus (i.e., information concerning the stimuli) and response (i.e., cognitive, behavioral, and physiological responses to the stimuli) propositions (Lang, Kozak, Miller, Levin, & McLean, 1980). Imagery training sessions were delivered via a website. Children were taught how to use the intervention website at the beginning of the intervention phase. Children in the control condition participated in their regular weekly practices, and did not receive imagery training.

**Planned Analyses**

The data were screened for missing values, violations of assumption, and outliers. Skewness and kurtosis z-scores greater or less than 1.96 suggested that the variable was not normally distributed. In cases where distributions were non-normal, transformations were conducted. Analyses were run with non-corrected and corrected variables, and were examined for discrepancies. Outliers were detected if z-scores exceeded ± 3.29.

Analyses were conducted within a frequentist and Bayesian framework. A series of t-tests were conducted to examine group differences on the dependent variables at pre- and post-intervention, and whether scores on the dependent variables changed from pre- to post-intervention for both groups. In addition to t-tests, Bayesian t-tests were conducted to examine
between- and within-group comparisons. Unlike frequentist methods, Bayesian methods are not restricted to sample sizes, provide evidence for, and magnitude of, the alternative hypothesis as well as the null hypothesis, and allow for integration of previous knowledge (McNeish, 2017). All Bayesian statistical analyses were conducted in JASP (JASP Team, 2016). The relationships between the study’s variables at pre- and post-intervention were examined using Pearson’s and Bayesian correlations. Default non-informative prior distributions (Cauchy prior width = 0.707) were used for analyses with the self-reported variables (i.e., imagery use and ability, motivation, confidence, and perceived competence). An informed prior distribution ($r = .48$) was used for the CAMSA, and was selected based on evidence generated in Feltz and Landers’ (2007) meta-analysis on imagery and motor performance. Robustness checks were calculated to assess whether the non-informed and informed prior widths influenced the Bayes factor. Bayes factors were used to make conclusions about the strengths of the evidence for the alternative and null hypotheses, and were interpreted as odds ratios. A Bayes factor of 10 (i.e., BF$_{10}$) compares the Bayes factor of the alternative hypothesis ($H_1$) against the null hypothesis ($H_0$). BF$_{10}$ values between 1 and 3 were interpreted as anecdotal (weak/inconclusive) evidence for the for $H_1$, while values between 3 and 10 were interpreted as substantial evidence for $H_1$. Similarly, BF$_{10}$ values between .33 and 1 were interpreted as anecdotal evidence for $H_0$, while values .1 between .33 were interpreted as substantial evidence for $H_0$ (Jeffreys, 1961). Although both $t$-tests and Bayesian analyses were conducted, conclusions were drawn based on the results of the Bayesian analyses given that they are not restricted by small sample sizes.

**Results**

One data point was missing from the self-reported data, and was replaced using the participant’s aggregate mean of the remaining scale items. Three variables at post-intervention
(i.e., MG-A imagery, kinesthetic imagery, and visual imagery) were found to have non-normal distributions and thus were subjected to log transformations. All transformations improved the variables’ distribution. Because the results of the non-corrected and corrected variables revealed identical conclusions, the correlations and main analyses reported here were conducted with non-corrected variables. No univariate outliers were detected.

**Preliminary analyses**

Means, standard deviations, and reliability scores are presented in Table 5. Coefficient omegas were used to assess the scales’ internal reliability. Group differences on autonomous motivation⁶ and CG imagery at pre-intervention could not be examined as both subscales showed poor reliability (ω < .50). Because these subscales showed adequate reliability at post-intervention, they were retained in the analyses comparing group differences at post-intervention. MS imagery at post-intervention revealed a low reliability coefficient (ω = .30) and therefore was excluded from all further analyses. Some subscales were slightly modified (i.e., item deletion) in order to improve their reliability.

The results from the Bayesian correlations analyses showed substantial evidence (BF₁₀ > 3) for several positive relationships between the study variables at pre- and post-intervention (see Table 6). At pre-intervention, visual imagery was positively associated with CS imagery, kinesthetic imagery, and confidence, and confidence was positively related to MGA imagery, CS imagery, and kinesthetic imagery. At post-intervention, MG-A imagery was positively associated with CS imagery and visual imagery.

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⁶Two items from the BREQ intrinsic subscale (“I enjoy being active” and “I like being active”) had variances of zero and therefore could not be included when calculating the internal reliability of autonomous motivation.
Between-group differences at pre-intervention. Independent samples \( t \)-tests comparing group differences on the study variables at pre-intervention revealed \( p \) values above .05 (with the exception of controlled motivation), suggesting that the groups did not differ prior to the start of the intervention. Children in the control group scored significantly higher on controlled motivation \( (M = 4.15) \) than those in the imagery group \( (M = 2.88) \). In terms of the Bayesian independent \( t \)-tests, results yielded \( BF_{10} \) values between .509 and .862 for all dependent variables (except controlled motivation), indicating that the data were more probable under \( H_0 \) (i.e., no between-group differences) than \( H_1 \) (i.e., between-group differences). The sizes of the Bayes factor values suggest that the data were anecdotal (inconclusive) as to whether or not group differences existed at pre-intervention. Examination of the posterior and prior distributions provided further support that the data were more likely under \( H_0 \) than \( H_1 \). Furthermore, while the Bayes factor for controlled motivation \( (BF_{10} = 2.04) \) suggested that the data were approximately 2 times more probable under \( H_1 \) than \( H_0 \), the size of the Bayes factor suggested anecdotal evidence as to whether or not there were between-group differences on controlled motivation. Table 7 shows the means, standard deviations, \( t \)-tests, Bayes factors, and interpretation of the Bayes factor for between-group differences at pre-intervention.

Between-group Differences at Post-intervention

Independent samples \( t \)-tests revealed \( p \) values greater than .05, suggesting no differences at post-intervention between the imagery group and control group on any of the dependent variables. Results of the Bayesian independent \( t \)-tests results yielded \( BF_{10} \) values between 1.153 and 2.191 for the following seven dependent variables: MG-M imagery, MG-A imagery, CG imagery, visual imagery, confidence, and competence. These \( BF_{10} \) values suggest that the data were more probable under \( H_1 \) than \( H_0 \). Examination of the means showed that children in the
imagery group scored higher on these variables than children in the control group. Given the sizes of the BF\textsubscript{10} (< 3), the data provided only anecdotal support for H\textsubscript{1}. For CS imagery, kinesthetic imagery, autonomous motivation, and controlled motivation, BF\textsubscript{10} values (ranging from .39 to 1.34) provided anecdotal evidence for H\textsubscript{0}. Finally, a Bayesian independent t-test (with a Cauchy prior of .48) comparing group differences on the CAMSA revealed a BF\textsubscript{10} of .36. Robustness checks revealed anecdotal evidence in favor of H\textsubscript{0} when a Cauchy prior is set to < 1. A Cauchy prior greater than 1 provided moderate evidence in favor of H\textsubscript{0}. Table 7 shows the means, standard deviations, t-tests, Bayes factors, and interpretation of the Bayes factor for the between-group differences at post-intervention.

**Within–group Differences**

**Experimental condition.** Paired samples t-tests revealed that the imagery group scored higher from pre- to post-intervention on perceived competence, \( t(4) = -4.99, p = .008 \), and on the CAMSA, \( t(4) = -4.54, p = .010 \). No significant within-group differences (\( ps > .05 \)) were found for the remaining dependent variables. Bayesian analyses confirmed results of the t-test results.

The Bayes factor for perceived competence (BF\textsubscript{10} = 17.11) revealed that the data were 17 times more likely under H\textsubscript{1} than H\textsubscript{0}, while the Bayes factor for the CAMSA (BF\textsubscript{10} = 10.97) revealed that the data were approximately 11 times more likely under H\textsubscript{1} than H\textsubscript{0}. For both perceived competence and the CAMSA, robustness checks indicated that evidence for H\textsubscript{1} increased as prior widths increased. These results suggest that there is substantial support that children in the imagery group had higher perceptions of competence and performed better on the CAMSA from pre- to post-intervention. The BF\textsubscript{10} values for MG-A imagery, kinesthetic imagery, visual imagery, and controlled motivation ranged from 1.62 to 2.81, suggesting that the data were more likely under H\textsubscript{1} than H\textsubscript{0}. Furthermore, the BF\textsubscript{10} values for MG-M imagery, CS imagery, and
confidence, ranged from .41 to .74, indicating that the data were more likely under H₀ than H₁. Table 8 shows the means, standard deviations, t-tests, Bayes factors, and interpretation of the Bayes factor for the within-group results.

**Control condition.** Paired samples t-tests yielded a significant increase in perceived competence at pre-intervention to post-intervention competence, \( t(3) = -3.307, p = .045 \). All other t-tests were non-significant (\( ps < .05 \)). In contrast to this finding, the BF₁₀ value for perceived competence was 2.540, suggesting that the data were 2.540 times more likely to occur under the H₁ than H₀. However, the evidence in favor of H₁ was only anecdotal. Examination of the robustness check indicated that the data was not sensitive to different priors. Additionally, BF₁₀ values for CS imagery, kinesthetic imagery, and confidence, and the CAMSA ranged from 1.09 to 2.16, indicating that the data were more likely to occur under H₁ than H₀. The BF₁₀ values for MG-M imagery, MG-A imagery, and visual imagery ranged from .45 to .75, suggesting that the data were more likely to occur under H₀ than H₁. Table 8 shows the means, standard deviations, t-tests, Bayes factors, and interpretation of the Bayes factor for the within-group results.

**Discussion**

The overall purpose of the current study was to examine the effects of a 4-week imagery intervention on measures of physical literacy (motivation, confidence, and perceived and actual competence), imagery use, and imagery ability. Our hypotheses were generally not supported; children in the experimental condition did not score higher on autonomous motivation, confidence, perceived competence, actual competence (CAMSA), imagery use, or imagery ability at post-intervention than children in the control condition, nor did they show improvements from pre- to post-intervention on motivation, confidence, imagery use, or imagery
ability. However, perceived competence and scores of the CAMSA increased from pre- to post-intervention for children in the experimental condition, but not for children in the control condition. These preliminary results extend previous experimental research on imagery use and perceived competence (Catenacci et al., 2015) by providing evidence that imagery, coupled with physical practice, can not only increase perceptions of competence but also execution of various fundamental movement skills.

That psycho-behavioral skills (e.g., imagery, goal setting, focus and distraction control) are as equally important to psychomotor skills for promoting lifelong physical activity engagement is widely acknowledged within the physical activity literature (e.g., MacNamara, Collins, Bailey, Toms, Ford, & Pearce, 2011). However, very few physical activity programs have attempted to combine psycho-behavioral and psychomotor skills in ‘real-world’ settings. One exception to this is the Developing the Potential of Young People in Sport (DPYPS) program developed by Sport Scotland (Abbott, Collins, Sowerbt, & Martindale, 2007). The DPYPS was delivered through formal and extracurricular activity programs, and offered psychomotor and psycho-behavioral skills to students in primary school and early years of secondary school. The psychomotor component was designed to promote basic moves (e.g., catching) prior to teaching complex coordinative moves, while the psycho-behavioral component taught children strategies that facilitated learning and performance, such as goal setting and imagery. For imagery training, instructors/teachers encouraged students to image tasks prior to physically performing them and to reflect on the kinesthetic feelings associated with performing the task. Teachers/instructors were also encouraged to consider how they would promote imagery use within their lessons (e.g., allocating time to perform imagery). Quantitative and qualitative analyses revealed several positive outcomes of the program (e.g., improved perceived
competence and self-motivation; Abbott et al., 2007). Carry-over benefits of the DPYPS program were also noted; students not only used these psycho-behavioral skills within sporting contexts, but also applied them to various non-sporting contexts, including school and social settings. Together this research exemplifies that stakeholders responsible for developing and/or refining physical activity programs for children should not overlook the important role of psycho-behavioral skills in maximizing performance and development and facilitating lifelong physical activity engagement.

Perhaps the most significant limitation of our study is the small sample size, and thus the findings should be considered preliminary and be interpreted with caution. Similarly, it is possible that problems associated with small sample sizes (e.g., bias, inability to detect effects) contributed to the lack of meaningful findings in our study. For example, in some previous imagery interventions, participants who received imagery training showed greater increases in motivation, imagery use, and imagery ability following the completion of the intervention than those who did not receive imagery training (e.g., Guerrero et al., 2015; Munroe-Chandler et al., 2012). This was not the case for participants in our study, even though our design (e.g., length of intervention, amount of imagery training sessions) was similar to that of previous imagery interventions. And although Bayesian statistics are better equipped to handle small sample sizes, without informative prior distributions small sample size problems are not immediately voided (McNeish, 2017). Another limitation is that children’s perceptions of their instructors’ interpersonal styles of communication (autonomy-supportive vs. controlling) were not assessed, making it difficult to determine how (if at all) instructors’ interpersonal styles affected their perceived competence and performance. Given that significant others’ interpersonal styles can affect one’s own motivation, cognitions, and behaviors (Ryan & Deci, 2017), assessing and
controlling for perceptions of interpersonal styles in future studies should be carefully considered. Nevertheless, with the exception of a few occasions, children from both sport programs were generally led by the same instructors.

To our knowledge, our study was the first to integrate a psychological skill into the curriculum of a physical activity program. Compared to those in the control condition, children in the experimental group had higher perceptions of competence and performed better on various fundamental movement skills over the course of the intervention. We hope that our study will serve as the first of many imagery interventions focusing on children’s development of physical literacy. As strategies for improving physical literacy continue to be developed, equipping children with both physical and mental skills should be a central focus.


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JASP Team. (2016). JASP (Version 0.8.2) [Computer software].


CHAPTER 5

DISCUSSION AND CONCLUSIONS

The positive effect of imagery on performance-related outcomes has been documented in countless books (Lacey & Lawson, 2013; Morris, Spittle, & Watt, 2000), book chapters (e.g., Munroe-Chandler & Hall, 2016; Munroe-Chandler & Guerrero, 2017), journal articles (e.g., Munroe-Chandler, Hall, Fishburne, Murphy, & Hall, 2012; O, Munroe-Chandler, Hall, & Hall, 2014), and review papers (e.g., Cumming & Ramsey, 2009; Feltz & Landers, 1983). Much of the imagery research conducted with children has primarily treated imagery as a performance enhancement technique, and has neglected to consider: (a) the benefits of children’s imagery use outside of sporting contexts, and (b) imagery as strategy to facilitate necessary components of living an active life (i.e., physical literacy). Thus, the objective of this dissertation was to explore the correlates and antecedents of children’s active play imagery and the effects of children’s imagery use in sport on the components of physical literacy. This objective was accomplished through three studies (i.e., chapters). The revised applied model of deliberate imagery use (RAMDIU; Cumming & Williams, 2013) was used to guide Chapters 3 and 4.

In Chapter 2 psychosocial correlates of children’s active play imagery were explored. The purpose of this study was to determine whether children’s active play imagery was associated with their personal and social skills and self-confidence. A total of 105 male and female children ($M_{age} = 9.84, SD = 1.41$) completed inventories that assessed their active play imagery (i.e., capability, social, and fun), personal and social skills, and self-confidence. All three types of active play imagery were positively and significantly related to personal and social skills, with social imagery accounting for the most variance. That is, children who reported higher levels of all three types of active play imagery also reported better personal and social
skills. Further, capability and fun imagery were positively and significantly associated with self-confidence, with fun imagery accounting for the most variance. Interpretation of this finding is that children who reported imaging themselves being physically competent and having fun also reported greater self-confidence. The results of Chapter 2 highlight the usefulness of imagery in fostering children’s personal and social skills as well as self-confidence.

The purpose of Chapter 3 was to determine whether physical activity participation and imagery ability predicted the three types of active play imagery. Children ($N = 120; \bar{M}_{age} = 9.84, SD = 1.41$) completed questionnaires that assessed their physical activity participation, visual (internal and external) and kinesthetic imagery ability, and active play imagery. Hierarchical regression analyses revealed that age (control variable) and physical activity participation were positive predictors of capability, social, and fun imagery. That is, older children and more physically active children reported using more active play imagery than younger children and less physically active children. Additionally, external visual imagery positively predicted fun imagery, and that internal visual imagery and kinesthetic imagery were not significant predictors of capability, social, or fun imagery. This study provides evidence that active play imagery is influenced by one’s age, physical activity participation, and ability to use external visual imagery, and is the first to explore how the “who” and “imagery ability” components of the RAMDIU influence active play imagery.

The focus in Chapter 4 shifted from children’s active play imagery to sport imagery. Using the RAMDIU as a guiding framework, the general purpose was to examine the effects of a 4-week imagery intervention on components of physical literacy, namely the affective (motivation, confidence, and perceived competence) and physical (actual physical competence) components. The intervention was implemented with two sport programs that were specifically
developed using core principles of physical literacy. Children in the experimental condition \((n = 5)\) received imagery training sessions for four consecutive weeks while participating in their regular weekly practices. Children in the control group \((n = 4)\) did not receive any imagery training sessions and only participated in their regular weekly practices. Imagery training sessions targeted various aspects including motivation, confidence, competence, and various fundamental movement skills (e.g., running, kicking). Frequentist and Bayesian statistics were conducted to examine between-group differences at post-intervention and within-group differences from pre- to post-intervention. There were no significant differences between the experimental and control conditions on any outcome variables at post-intervention; however, the experimental group reported greater perceived competence and received higher scores on actual physical competence from pre- to post-intervention. Overall, the findings offer evidence that combining psychological skills with physical skills is important for motor skill development.

**Future Research Directions**

Future researchers should address the primary limitation of many imagery interventions within the field of sport and exercise psychology – the lack of tailored and personally meaningful imagery scripts. It is well-known that imagery is more effective when images are personalized and meaningful for the individual (Ahsen, 1984; Cumming & Ramsey, 2009). Imagery that is personalized and meaningful is also believed to be more enjoyable and easier to perform for the imager (Cumming & Ramsey, 2009), which in turn may enhance participant compliance and attrition in experimental research. Most of the individualized imagery interventions in sport have been conducted using single-subject multiple-baseline designs (e.g., Mellalieu, Hanton, & Thomas, 2009; O et al., 2014), making it more manageable for researchers to personalize scripts for each participant. In these scenarios, researchers generally collect relevant information from
each participant in a one-on-one meeting and then use the collected information to develop an individualized imagery script. The developed imagery script is then reviewed by the participant’s coaches and by the participant, and any changes to the script are made before the start of the imagery training sessions. Clearly this process of personalizing imagery scripts for interventions with large numbers of participants seems unrealistic, especially if the scripts change throughout the experimental phase. One way to overcome the logistical and time-demanding challenges of personalized imagery scripts is to use computer-tailoring strategies. Computer-tailoring refers to adjusting intervention materials to an individual person through a computerized process (de Vries & Brug, 1999). Computer-tailoring has recently been used to deliver behavior change interventions, and has proven to be an effective way to deliver personalized content to a wide audience at a relatively low cost (Smit, Evers, de Vries, & Hoving, 2013). In behavior change computer-tailored interventions, the information provided to participants is based on participants’ self-reported responses to various questions (e.g., demographic characteristics, intentions to change, perceived barriers to change), and is generated using if-then algorithms. The personally-relevant content is drawn from a database of potential response combinations. This process of tailoring intervention content could be undertaken in imagery interventions. For example, the setting in the imagery script could be tailored based on the participant’s preferred location to play/practice (e.g., backyard/front yard vs. park), and specific images could be emphasized based on the participant’s gender (e.g., social images for females, competence images for males), and goals (e.g., increase confidence, manage stress). In sum, the lack of personalized imagery interventions has been a persistent limitation in sport and exercise psychology, and computer-tailoring strategies is one way to overcome this limitation.
Another research area that requires more attention is the measurement of imagery. Researchers have commonly used retrospective self-report assessments to assess imagery types and frequency. However, retrospective self-report measures are highly susceptible to recall bias as they rely on people’s memory (Larson & Csikszentmihalyi, 2014). Self-report assessments also assume that the construct under investigation is relatively stable, and thus fail to consider that the construct may be dynamic and fluctuate across contexts and time (Ohly, Sonnentag, Niessen, & Zapf, 2010). Many researchers have turned to prospective self-report measures in an attempt to overcome some of the limitations of traditional self-report methods (Larson & Csikszentmihalyi, 2014). Prospective diary methods (e.g., experience-sampling, event-sampling, and daily diaries) allow researchers to examine various human experiences within everyday situations (Ohly et al., 2010). For example, participants in diary studies repeatedly use self-report instruments to record ongoing experiences over a specific period of time (e.g., daily for seven consecutive days; Bolger, Davis, & Rafaeli, 2003). Advantages of diary methods include reduced likelihood of recall inaccuracies, and enhanced ecological validity by capturing experiences in the natural setting in which they occur. However, prospective diary methods are not without their limitations; they are often time consuming, require significant participant involvement, and can lead to reactivity (Reis, Gable, & Maniaci, 2014). Nevertheless, exploring alternative ways to measure imagery warrants attention.

Identifying strategies that can enhance an individual’s imagery ability is another future research direction that warrants investigation. For example, researchers have argued that mindfulness, a subjective state involving non-judgmental awareness focused on the present moment (Kabat-Zinn, 2003, 2005), is an individual characteristic that can influence imagery ability (Bedford, 2012). There is some evidence showing that people who engage in mindful
observing (i.e., notices or attends to internal and experiences) report greater imagery vividness (Kharlas & Frewen, 2016). However, little is known on whether mindfulness meditation training can improve an individual’s ability to create vivid, controllable images. Researchers might consider moving beyond this line of inquiry by exploring the benefits of using mindfulness meditation and imagery together in experimental research – an approach commonly used in the field of psychology (e.g., Elomaa, de Williams, & Kalso, 2009; Fernros, Furhoff, & Wändell, 2008). In fact, integrative body-mind training (Tang et al., 2007) includes various body and mind techniques including body relaxation, breathing, mindfulness training, and imagery, and has been shown to improve emotional and cognitive performance, attention, self-regulation, and reduce stress (Tang, 2011).

Another potential mechanism for enhancing imagery ability is through video games. Action video game is a genre of video game, and refers to games that are often played from first-person perspective, require simultaneous processing of multiple targets and attentive monitoring of the visual periphery, and are fast paced (Green & Bavelier, 2006). Action video game training has been shown to have several positive effects on cognition functions including visuospatial processing, processing speed, multiple object tracking ability, mental rotation, and spatial visualization (e.g., Basak, Boot, Voss, & Kramer, 2008; Green & Bavelier, 2003; Oei & Patterson, 2013) – all of which play an important role in one’s ability to image. Clear gender differences in spatial ability and mental rotation (a sub-dimension of spatial ability) are well-documented, with males performing better on spatial ability tests than females (Halpern, 2000; McGee, 1979). Thus, video game training may be particularly useful for enhancing spatial abilities among females. It is, however, important to note that some research studies have found null effects of video game training on cognitive abilities (Peters, Laeng, Latham, Jackson,
Zaiyouna, & Richardson, 1995), and some researchers have highlighted the negative consequences of excessive video game use (e.g., increased sedentary time, lower grades in school; Gentile, Lynch, Linder, & Walsh, 2004; Strauss & Knight, 1999). Nevertheless, exploring whether video game use can improve imagery ability is an avenue worth investigating.

Conclusion

Decades of sport and exercise research have been dedicated to the psychological skill of imagery. Within this body of research, imagery has been generally examined as a means to enhance performance-related outcomes within sport and exercise settings. The general findings of this dissertation contribute to the existing body of imagery research by illustrating that imagery can play an important role in the holistic development of children. Additional strengths of this dissertation include the application of the RAMDIU in the context of active play and the use of a web-based intervention with children. It is hoped that the work of this dissertation serves as a foundation for future research on the usefulness of imagery in promoting children’s overall well-being, and encourages practitioners physical activity stakeholders to consider ways in which they can incorporate imagery into their physical activity programs.
References


TABLES
Table 1

Descriptive Statistics for Imagery Types, Personal and Social Skills, and Self-Confidence

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Note. *\( p < .05 \). **\( p < .01 \).
### Table 2

*Hierarchical Regression Analyses for Imagery Types Predicting Personal and Social Skills and Self-Confidence*

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*Note.* Control variables.

*p < .05.

**p < .01.
Table 3

*Means, Standard Deviations, and Bivariate Correlations for Study Variables*

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*p < .05. **p < .01.

Note. Capability imagery, social imagery, and fun imagery are rated on a 5-point Likert scale. Internal visual imagery, external visual imagery, and kinesthetic imagery are rated on a 7-point Likert scale.
## Table 4

### Hierarchical Regression Analyses for Physical Activity and Imagery Ability Predicting Active Play Imagery

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*Note. *p < .05, **p < .01.*
Table 5

Means, Standard Deviations, and Omega Coefficients for all Variables at Pre- and Post-Intervention

| Variable                        | Range | Imagery Use and Ability | Control Condition | Imagery Use and Ability | Control Condition | | | |
|---------------------------------|-------|-------------------------|-------------------|-------------------------|-------------------| | | |
| Imagery use and ability         |       |                         |                   |                         |                   | | | |
| MG-M imagery                    | 1-5   | 3.85 (.58)              | 3.88 (.92)        | .76                     | 3.87 (1.04)       | 3.08 (.42) | .80 |
| MG-A imagery                    | 1-5   | 3.67 (.78)              | 3.83 (1.04)       | .70                     | 4.30 (.45)        | 3.56 (.75) | .71 |
| CS imagery                      | 1-5   | 3.40 (.98)              | 3.75 (.87)        | .84                     | 3.67 (.85)        | 2.92 (.88) | .71 |
| Kinesthetic imagery             | 1-7   | 6.50 (.47)              | 5.88 (1.05)       | .81                     | 6.70 (.41)        | 6.44 (.83) | .86 |
| Visual imagery                  | 1-7   | 6.30 (.67)              | 6.00 (.91)        | .85                     | 6.68 (.30)        | 5.75 (1.48) | | |
| Motivation and confidence domain|       |                         |                   |                         |                   | | | |
| Autonomous motivation           | 1-5   | 4.55 (.37)              | 4.81 (.24)        |                         | 4.68 (.39)        | 3.48 (.70) | .83 |
| Controlled motivation           | 1-5   | 2.88 (.46)              | 4.15 (1.05)       | .80                     | 4.80 (.28)        | 3.85 (1.14) | .80 |
| Confidence                      | 1-4   | 3.64 (.50)              | 3.50 (.60)        | .73                     | 3.72 (.30)        | 3.35 (.57) | .81 |
| Physical competence domain      |       |                         |                   |                         |                   | | | |
| Perceived competence            | 1-5   | 4.00 (.35)              | 3.75 (1.04)       | .84                     | 4.93 (.22)        | 4.54 (.75) | .83 |
| CAMSA                           | 1-42  | 28.80 (5.85)            | 32.63 (2.56)      | 33.90 (3.77)            | 35.25 (1.50)      | | | |
| Demographics                    |       |                         |                   |                         |                   | | | |
| BMI                             |       | 17.12 (3.25)            | 18.84 (1.47)      |                         |                   | | | |

Note. Autonomous motivation at pre-intervention could not be calculated because two of the three items had zero variances. CAMSA = Canadian agility and movement skill assessment.
Table 6

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<td>(.51)</td>
<td>(.59)</td>
<td>(.65)</td>
<td>(.51)</td>
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<tr>
<td>5. Visual imagery</td>
<td>.30</td>
<td>.42</td>
<td>.81</td>
<td>.85</td>
<td>-.</td>
<td>.28</td>
<td>-.04</td>
<td>.12</td>
<td>-.13</td>
<td>-.09</td>
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<tr>
<td></td>
<td>(.53)</td>
<td>(.70)</td>
<td>(8.01)</td>
<td>(15.59)</td>
<td></td>
<td>(.52)</td>
<td>(.41)</td>
<td>(.42)</td>
<td>(.43)</td>
<td>(.42)</td>
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<tr>
<td>6. Confidence</td>
<td>.60</td>
<td>.85</td>
<td>.77</td>
<td>.84</td>
<td>.79</td>
<td>-.</td>
<td>.66</td>
<td>.47</td>
<td>-.10</td>
<td>-.20</td>
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<tr>
<td></td>
<td>(1.47)</td>
<td>(14.01)</td>
<td>(5.10)</td>
<td>(12.41)</td>
<td>(6.16)</td>
<td></td>
<td>(2.09)</td>
<td>(.85)</td>
<td>(.42)</td>
<td>(.46)</td>
</tr>
<tr>
<td>7. Perceived competence</td>
<td>.48</td>
<td>.53</td>
<td>.28</td>
<td>.53</td>
<td>.22</td>
<td>.47</td>
<td>-.10</td>
<td>-.35</td>
<td>-.14</td>
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<tr>
<td></td>
<td>(.86)</td>
<td>(1.01)</td>
<td>(.52)</td>
<td>(1.05)</td>
<td>(.47)</td>
<td>(8.3)</td>
<td></td>
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<td>8. Autonomous motivation</td>
<td>.28</td>
<td>.55</td>
<td>.71</td>
<td>.32</td>
<td>.55</td>
<td>.58</td>
<td>-.29</td>
<td>-</td>
<td>.48</td>
<td>-.16</td>
</tr>
<tr>
<td></td>
<td>(.52)</td>
<td>(1.13)</td>
<td>(2.94)</td>
<td>(.55)</td>
<td>(1.17)</td>
<td>(1.29)</td>
<td>(.53)</td>
<td></td>
<td>(.85)</td>
<td>(.44)</td>
</tr>
<tr>
<td>9. Controlled motivation</td>
<td>.27</td>
<td>.24</td>
<td>.60</td>
<td>.21</td>
<td>.43</td>
<td>.37</td>
<td>-.12</td>
<td>.67</td>
<td>-.15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(.50)</td>
<td>(.48)</td>
<td>(1.46)</td>
<td>(.46)</td>
<td>(.74)</td>
<td>(.62)</td>
<td>(.42)</td>
<td>(2.17)</td>
<td></td>
<td>(.44)</td>
</tr>
<tr>
<td>10. CAMSA</td>
<td>.01</td>
<td>.51</td>
<td>.32</td>
<td>.03</td>
<td>.03</td>
<td>.38</td>
<td>.21</td>
<td>.26</td>
<td>.30</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(.41)</td>
<td>(.96)</td>
<td>(.56)</td>
<td>(.41)</td>
<td>(.41)</td>
<td>(.64)</td>
<td>(.46)</td>
<td>(.50)</td>
<td>(.54)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Correlations between the study variables at pre-intervention are presented below the diagonal. Correlations between the study variables post inter-intervention are presented above the diagonal. BF\textsubscript{10} values are displayed in brackets. BF\textsubscript{10} values greater than 3 are bolded and considered substantial evidence in favor of H\textsubscript{1} (Jeffreys, 1961). CAMSA = Canadian agility and movement skill assessment.
Table 7

*Independent samples T-Tests, Bayes Factors, and Interpretation of Bayes Factors*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>Interpretation of BF</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>$t$</td>
<td>$p$</td>
<td>BF 10</td>
</tr>
<tr>
<td>Imagery use and ability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG-M imagery</td>
<td>-.05</td>
<td>.962</td>
<td>.51</td>
</tr>
<tr>
<td>MG-A imagery</td>
<td>-.28</td>
<td>.790</td>
<td>.52</td>
</tr>
<tr>
<td>CS imagery</td>
<td>-.72</td>
<td>.494</td>
<td>.60</td>
</tr>
<tr>
<td>CG imagery</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesthetic imagery</td>
<td>1.21</td>
<td>.267</td>
<td>.77</td>
</tr>
<tr>
<td>Visual imagery</td>
<td>.58</td>
<td>.583</td>
<td>.56</td>
</tr>
<tr>
<td>Motivation and confidence domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomous motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlled motivation</td>
<td>-2.46</td>
<td>.044</td>
<td>2.04</td>
</tr>
<tr>
<td>Confidence</td>
<td>.38</td>
<td>.713</td>
<td>.53</td>
</tr>
<tr>
<td>Physical competence domain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived competence</td>
<td>.51</td>
<td>.626</td>
<td>.55</td>
</tr>
<tr>
<td>CAMSA</td>
<td>-1.21</td>
<td>.267</td>
<td>.77</td>
</tr>
</tbody>
</table>

*Note.* Degrees of freedom = 7. Bayes factor BF 10 compares the alternative hypothesis against the null hypothesis. Bayes factor BF 10 were interpreted according to Jeffreys’ (1961) labels. CAMSA = Canadian agility and movement skill assessment.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Imagery Condition</th>
<th>Control Condition</th>
<th>Interpretation of BF&lt;sub&gt;10&lt;/sub&gt;</th>
<th>Interpretation of BF&lt;sub&gt;10&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imagery use and ability</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MG-M imagery</td>
<td>-.06</td>
<td>.955</td>
<td>.41 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>1.32 .280 .68 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>MG-A imagery</td>
<td>-2.25</td>
<td>.087</td>
<td>2.81 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>.35 .752 .45 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>CS imagery</td>
<td>-.77</td>
<td>.484</td>
<td>.74 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>1.87 .159 1.09 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>Kinesthetic imagery</td>
<td>-2.74</td>
<td>.099</td>
<td>2.55 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>-2.03 .135 1.21 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>Visual imagery</td>
<td>-1.63</td>
<td>.179</td>
<td>1.62 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>.52 .639 .48 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>Motivation and confidence domain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controlled motivation</td>
<td>-2.74</td>
<td>.052</td>
<td>2.16 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>.47 .671 .47 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>Confidence</td>
<td>-.28</td>
<td>.794</td>
<td>.49 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
<td>3.00 .058 2.16 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>Physical competence domain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived competence</td>
<td>-4.99</td>
<td>.008</td>
<td>17.11 Substantial evidence for H&lt;sub&gt;1&lt;/sub&gt;</td>
<td>-3.31 .045 2.54 Anecdotal evidence for H&lt;sub&gt;0&lt;/sub&gt;</td>
</tr>
<tr>
<td>CAMSA</td>
<td>-4.53</td>
<td>.010</td>
<td>10.97 Substantial evidence for H&lt;sub&gt;1&lt;/sub&gt;</td>
<td>-2.05 .133 1.23 Anecdotal evidence for H&lt;sub&gt;1&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

*Note.* Degrees of freedom for imagery group = 4. Degrees of freedom for control group = 3. Bayes factor BF<sub>10</sub> compares the alternative hypothesis against the null hypothesis. Bayes factor BF<sub>10</sub> were interpreted according to Jeffreys’ (1961) labels. CAMSA = Canadian agility and movement skill assessment.
Figure 1. 
APPENDIX A

LETTER OF PERMISSION FOR CONDUCTING RESEARCH
(Chapter 2)

Title of study: Examining the Relationships Among Active Play Imagery and Positive Youth Development and Self-Confidence

PURPOSE OF THE STUDY
The purpose of the present study is to: a) examine the relationship between active play imagery and positive youth development and, b) investigate the association between active play imagery and self-confidence with children 8-12 years old.

POTENTIAL RISKS AND DISCOMFORTS
There are no perceived risks associated with participation in this study.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY
The information gained from this study may be used in further research studies exploring children’s imagery of active play. Further, the researchers may gain valuable insight regarding how children’s active play imagery positively influences important life skills and confidence.

RIGHTS OF RESEARCH SUBJECTS
The parent and/or child may withdraw their consent at any time and discontinue participation without penalty. If you, the child and/or parent(s) or guardian(s) have any questions regarding the rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF VENUE CONTACT/LOCATION REPRESENTATIVE
I understand the information provided and purpose for the study, to a) examine the relationship between active play imagery and positive youth development and, b) investigate the association between active play imagery and self-confidence with children 8-12 years old, as described herein. I permit the use of my facility for the recruitment of participants and agree to support my consent to potential subjects. I understand if I have the right to discontinue involvement in the study, and the researcher will no longer utilize my venue. I have been given a copy of this form.

____________________________  ______________________
Name of Venue Contact                         Telephone Number

____________________________  ______________________
Signature of Venue Contact                            Date

SIGNATURE OF INVESTIGATOR
These are the terms under which I will conduct research.

____________________________  ______________________
Signature of Investigator                         Date
Title of Study: Examining the Relationships Among Active Play Imagery and Positive Youth Development and Self-Confidence

Your child is being asked to participate in a research study conducted by Michelle Guerrero, a first year PhD student, from the Faculty of Human Kinetics at the University of Windsor. Imagery use in leisure time physical activity (active play) will be investigated. If you have any questions or concerns about the research, please feel free to contact Michelle Guerrero (519) 253-3000 ext. 4997, guerrerm@uwindsor.ca or Dr. Krista Munroe-Chandler (519) 253-3000 X 2446, chandler@uwindsor.ca.

PURPOSE OF THE STUDY
The purpose of the present study will be to: a) examine the relationship between active play imagery and positive youth development and, b) investigate the association between active play imagery and self-confidence with children 8-12 years old.

PROCEDURES
If you volunteer your child to participate in this study, we would ask he/she complete three questionnaires. The first questionnaire is the Children’s Active Play Imagery Questionnaire (11 questions), which assesses how frequently children image their active play (unstructured leisure-time physical activity). The second questionnaire is the Youth Experience Survey for Sport (27 questions), which assesses positive developmental experiences occurring in the youth physical activity domain. The third questionnaire is the Sport Confidence Questionnaire for Children (5 questions), which measures children’s confidence levels in a physical activity domain. The completion of the questionnaires will take approximately 15 minutes. The questionnaires will be completed during pick-up and drop-off times at the St. Denis Center at the University of Windsor.

POTENTIAL RISKS AND DISCOMFORTS
There are no known risks associated with taking part in this study. The questionnaires that will be administered have been employed in the past and we have received no indication of any reported discomfort.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY
The information gained from this study may be used in further research studies exploring children’s imagery of active play. Further, the researchers may gain valuable insight regarding how children’s active play imagery positively influences important life skills and confidence.

COMPENSATION FOR PARTICIPATION
Subjects will have their names entered into a draw to have the chance to win one of four $25 gift certificates to Sport Chek.
CONFIDENTIALITY
Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission. All responses from the questionnaires will be kept in strict confidentiality. The questionnaires will be kept in a locked cabinet in the investigator’s office. There is no access to this cabinet by anyone other than the investigator. The information obtained from the study will not be used for any purpose other than the research and the communication of the results.

PARTICIPATION AND WITHDRAWAL
Participation in this study is voluntary. Your child can choose whether to be in this study or not. If your child volunteers to be in this study, he/she may withdraw at any time. You may remove your child and your child’s data from the study at any point. Your child may also refuse to answer any questions he/she doesn’t want to answer and still remain in the study.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS
The investigator will provide a written summary of the study’s findings to you upon request. If you have any additional concerns or questions you can email or call the investigator(s) at the address or number provided above. Please keep this Letter of Information.

SUBSEQUENT USE OF DATA
These data may be used in subsequent studies in publications and in presentations.

RIGHTS OF RESEARCH PARTICIPANTS
If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF INVESTIGATOR
These are the terms under which I will conduct research.

____________________________________  __________________
Signature of Investigator                  Date
Title of Study: Examining the Relationships Among Active Play Imagery and Positive Youth Development and Self-Confidence

I have read the Letter of Information, have had the nature of the study explained to me and I agree to allow my child to participate. All questions have been answered to my satisfaction.

I consent to my child participating in the study: Yes No

____________________________
Name of Child

____________________________
Name of Parent/Guardian

____________________________________
Signature of Parent/Guardian Date

____________________________________
Signature of Person Obtaining Consent Date

____________________________________
Name (in print) of Person Obtaining Consent
APPENDIX D

CHILD ASSENT FORM
(Chapter 2)

I am a student researcher, and I am doing a study on the pictures you create in your mind about active play. Active play can be riding your bike, dancing, playing tag, kicking a ball, going swimming with friends, or ice-skating. It makes you sweat, makes your legs feel tired, or makes you breathe harder. I would first ask you to meet with me to fill out three (3) short questionnaires. The first questionnaire will ask you about the pictures you create in your mind about active play. The second questionnaire will ask you about the experiences you may have had during your active play. The third questionnaire will ask you about how confident you feel during your active play. I will ask that you meet with me once to fill out the questionnaires.

I want you to know that I will not be telling your camp instructors or parents or any other kids what you answer. The only exception is if you tell me that someone has been hurting you. If I think that you are being hurt or abused I will need to tell your parents or someone else who can help you. Otherwise, I promise to keep everything that you tell me private.

Your mom and/or dad have said it is okay for you to answer my questions on the pictures you create in your mind about active play. Do you think that you would like to answer them? You won’t get into any trouble if you say “no”. If you decide to answer the questions you can stop answering them at any time, and you don’t have to answer any question you do not want to answer. It is entirely up to you. Would you like to participate in my study?

I understand what I am being asked to do to be in this study, and I agree to be in this study.

_________________________________  ______________________
Signature                      Date

Witness
APPENDIX E

DEMOGRAPHICS
(Chapters 2, 3, & 4)

Age: ____________

Please circle one:  Boy   Girl
**APPENDIX F**

**CHILDREN’S ACTIVE PLAY IMAGERY QUESTIONNAIRE**
(Chapters 2 and 3; Cooke, Munroe-Chandler, Hall, Tobin, & Guerrero, 2014)

Active play is something you do during your free time. For example, *active play* can be riding your bike, ice skating, dancing, playing tag, tobogganing, kicking a ball, or going swimming.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at All</th>
<th>A Little Bit</th>
<th>Sometimes</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) When thinking about active play, I imagine the moves that are needed</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2) When thinking about active play, I imagine joining in with others</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3) When thinking about active play, I picture myself having fun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4) When thinking about active play, I imagine the positions of my body.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5) When thinking about active play, I see myself with my friends.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6) When thinking about active play, I imagine the fun I have.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7) When thinking about active play, I picture myself doing it in a group.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8) When thinking about active play, I imagine enjoying myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9) When thinking about active play, I imagine the movements that my body makes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10) When thinking about active play, I imagine my friends with me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11) When thinking about active play, I imagine how my body moves.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
## APPENDIX G

### YOUTH EXPERIENCE SURVEY FOR ACTIVE PLAY

(Chapter 2; MacDonald, Côté, Eys, & Deakin, 2012)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at All</th>
<th>A Little</th>
<th>Quite a Bit</th>
<th>Yes Definitely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) When thinking about my experiences in active play, I am good at giving feedback.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2) When thinking about my experiences in active play, I am good at taking feedback.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3) When thinking about my experiences in active play, I am good at sharing responsibility.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4) When thinking about my experiences in active play, I learn that working together requires some compromising.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5) When thinking about my experiences in active play, I learn to be patient with other group members.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6) When thinking about my experiences in active play, others count on me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7) When thinking about my experiences in active play, I learn about the challenges of being a leader.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>8) When thinking about my experiences in active play, I learn about helping others.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>9) When thinking about my experiences in active play, I learn that it is not necessary to like people in order to work with them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>10) When thinking about my experiences in active play, I make new friends.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>11) When thinking about my experiences in active play, I get to know people in the community.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>12) When thinking about my experiences in active play, I learn I had a lot in common with people from different backgrounds.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>13) When thinking about my experiences in active play, I have good conversations with my parents/guardians because of active play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>14) When thinking about my experiences in active play, I learn how my emotions and attitude affect others in the group.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15) When thinking about my experiences in active play, I improve skills for finding information.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>When thinking about my experiences in active play, I improved academic skills (reading, writing, math, etc.).</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>16</td>
<td>When thinking about my experiences in active play, I improved computer/internet skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17</td>
<td>When thinking about my experiences in active play, I improved creative skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18</td>
<td>When thinking about my experiences in active play, it increased my desire to stay in school.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>19</td>
<td>When thinking about my experiences in active play, I learned to find ways to reach my goals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20</td>
<td>When thinking about my experiences in active play, I set goals for myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>When thinking about my experiences in active play, I learned to consider challenges when making future plans.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>22</td>
<td>When thinking about my experiences in active play, I observed how others solved problems and learned from them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>When thinking about my experiences in active play, I learned to push myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>24</td>
<td>When thinking about my experiences in active play, I learned to focus my attention.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>25</td>
<td>When thinking about my experiences in active play, I put all my energy into active play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>26</td>
<td>When thinking about my experiences in active play, I improved athletic or physical skills.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
SPORT CONFIDENCE QUESTIONNAIRE FOR CHILDREN
(Chapters 2 and 4; Stadulis, MacCracken, Eidson, & Severance, 2002)

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Quite a Bit</th>
<th>Very Much So</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I usually feel self-confident in active play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I usually feel secure in active play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I’m usually confident I can meet the challenge of active play well.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I’m usually confident that I will participate in active play well.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I’m usually confident because, in my mind, I picture myself reaching my goal in active play.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
APPENDIX I

LETTER OF PERMISSION FOR CONDUCTING RESEARCH
(Chapter 3)

PURPOSE OF THE STUDY
The purpose of this research project is to examine children’s (9-12 years) imagery use in their leisure time physical activity.

POTENTIAL RISKS AND DISCOMFORTS
There are no perceived risks associated with participation in this study.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY
This study is part of a larger study examining imagery use in leisure time physical activity. The information gained from this study may be used in further research studies exploring imagery use and psychological needs among children. The researchers may gain valuable insight regarding imagery use during leisure time physical activity among children. A written summary of the study’s findings will be posted at the University of Windsor’s Ethics Board website by December 2013 (www.uwindsor.ca/reb). The study’s findings will also be posted in the school’s newsletter.

RIGHTS OF RESEARCH SUBJECTS
The parent and/or child may withdraw their consent at any time and discontinue participation without penalty. If you, the child and/or parent(s) or guardian(s) have any questions regarding the rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF VENUE CONTACT/LOCATION REPRESENTATIVE
I understand the information provided and purpose for the study, to examine imagery use in children’s leisure time physical activity, as described herein. I permit the use of my facility for the recruitment of participants and agree to support my consent to potential subjects. I understand if I have the right to discontinue involvement in the study, and the researcher will no longer utilize my venue. I have been given a copy of this form.

____________________  ______________________
Name of Venue Contact                          Telephone Number

____________________  ______________________
Signature of Venue Contact                      Date

SIGNATURE OF INVESTIGATOR
These are the terms under which I will conduct research.

____________________  ______________________
Signature of Investigator                          Date
Title of Study: Children’s Imagery Use in Leisure Time Physical Activity

Your child is being asked to participate in a research study conducted by Dr. Krista Munroe-Chandler from the Faculty of Human Kinetics at the University of Windsor. Working with Dr. Craig Hall from the School of Kinesiology at the University of Western Ontario, imagery use in leisure time physical activity (active play) will be investigated. If you have any questions or concerns about the research, please feel free to contact Dr. Krista Munroe-Chandler (519) 253-3000 X 2446, chandler@uwindsor.ca or Dr. Craig Hall (519) 661-2111 ext. 8388, chall@uwo.ca.

PURPOSE OF THE STUDY
The purpose of the present study is to see if a 4-week imagery intervention can help increase physical activity in children in grades 4-6 (9-12 years old). The study will attempt to understand if using imagery will influence children’s motivation to participate in leisure-time physical activity.

PROCEDURES
If you volunteer your child to participate in this study, we would ask he/she do the following:

- **Week 1:** Your child will be asked to meet the researcher during their lunch time period to fill out several questionnaires (approx. 12-15 minutes). The first questionnaire will assess how frequently children employ imagery during their leisure time physical activity (11 items). The second questionnaire will assess how one feels when they engage in physical activity (16 items). The third questionnaire, comprised of one item, will assess the child’s intention to engage in physical activity over a specific amount of time. The fourth questionnaire will assess reasons for participation of leisure time physical activity (16 items). The final questionnaire assesses physical activity during free time (9 items). Your child will be given a pedometer (approximately the size of a child’s palm), which will measure physical activity patterns and instructed on how to use the device (i.e., placement on the hip). Your child will be asked to wear the pedometer for the duration of the study (i.e., during all waking hours except when in water, during organized sports or physical education classes, or sleeping). The pedometer is small and non-obtrusive. During this meeting your child will be provided with a 1-800 number in which they call and enter their identification number provided by the researcher. The researcher will assist your child, as they will be expected to repeat this procedure over the next week from home. After your child has entered their identification number they will proceed to listen to an audiotape on imagery in physical activity or a children’s short story (age appropriate and neutral in nature). The audiotape will last no longer than 5 minutes. Your child will be asked to listen to this audiotape two times before the next meeting with the
researcher following the same procedure (i.e., dial 1-800 number, enter ID number, and listen to audiotape). Your child will be asked to meet with the researcher once a week for the next 5 weeks.

- **Week 2-4:** Your child will meet with the researcher at school during lunch hour (5 minutes) to collect the physical activity data from the pedometer and complete the questionnaire assesses physical activity during free time (9 items) and the one item intention to engage in active play question. They will be reminded to call in to the 1-800 number three times over the next seven days (before the next meeting with the researcher).

- **Week 5:** Your child will be asked to meet with the researcher to collect the physical activity data from the pedometer and to complete the same questionnaires as those given in Week 1.

**POTENTIAL RISKS AND DISCOMFORTS**
There are no known risks associated with taking part in this study. The questionnaires that will be administered have been employed in the past and we have received no indication of any reported discomfort. Also, pedometers are an accurate, reliable, and safe measure of children’s physical activity. The imagery and short story audiotape will pose no risk.

**POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY**
This study is part of a larger study examining imagery use in active play. The information gained from this study may be used in further research studies exploring imagery use and psychological needs among children. The researchers may gain valuable insight regarding imagery use during active play among children and imagery as a motivator for children to be physically active.

**COMPENSATION FOR PARTICIPATION**
Children who successfully complete the 5-week study will receive a $50 gift certificate to Sport Chek as an incentive. Successful completion of the intervention involves (1) the participant and researcher meet once a week for 5 weeks and (2) the participant makes 3 phone calls per week for 4 weeks (Weeks 1 through 4 for a total of 12 phone calls; $2.50 per phone call) in order to listen to the designated audiotape imagery or short story. Children who call in 12 times (3 phone calls per week for 4 weeks) and meet with the researcher to return their pedometer and fill out the questionnaire package (Week 5) will receive the $50 gift certificate at the end of week 5 ($30 for the 12 phone calls and $20 dollars for completion of Week 5). Children will receive the remaining $25 gift certificate to Sport Chek if they participate in the 3-month follow up. If the participant decides to withdraw from the study at any point prior to completion, they will be compensated for the time invested in the study up to that point. For example, if the participant decides to withdraw from the study at Week 3 and has called in 3 times per week, the participant will receive $22.50 (9 phone calls at $2.50 per phone call).

**CONFIDENTIALITY**
Any information that is obtained in connection with this study and that can be identified with your child will remain confidential and will be disclosed only with your permission. All responses from the questionnaires will be kept in strict confidentiality. The information collected
from the pedometer will be kept confidential. The information obtained from the study will not be used for any purpose other than the research and the communication of the results.

**PARTICIPATION AND WITHDRAWAL**
Participation in this study is voluntary. Your child can choose whether to be in this study or not. If your child volunteers to be in this study, he/she may withdraw at any time. You may remove your child’s data from the study. Your child may also refuse to answer any questions he/she doesn’t want to answer and still remain in the study. Each time the researcher and your child meet, your child will be provided with a re-assent form in order to confirm they want to continue to participate in the study. However, you or your child may withdraw at any time throughout the study.

If your child becomes injured or ill during the intervention (preventing them from being physically active during their free time) they will be excluded from the study and compensated for the amount of time they have invested in the study up to the time of injury or illness. Also, if your child does not attend school for an extended period of time (be it planned or unplanned) and as such the researcher is unable to collect your child’s pedometer data, they will be excluded from the study and compensated for the amount the amount of time they have invested in the study up to that point.

**FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS**
A written summary of the study’s findings will be posted at the University of Windsor’s Ethics Board website by December 2013 (www.uwindsor.ca/reb). The study’s findings will also be posted in the school’s monthly newsletter. If you have any additional concerns or questions you can email or call the investigator at the address or number provided above. Please keep this Letter of Information.

**SUBSEQUENT USE OF DATA**
These data may be used in subsequent studies in publications and in presentations.

**RIGHTS OF RESEARCH PARTICIPANTS**
If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

**SIGNATURE OF INVESTIGATOR**

These are the terms under which I will conduct research.

____________________________________  __________________
Signature of Investigator                Date
APPENDIX K

PARENT/GUARDIAN CONSENT FORM
(Chapter 3)

Title of Study: Children’s Imagery Use in Leisure Time Physical Activity

I have read the Letter of Information, have had the nature of the study explained to me and I agree to allow my child to participate. All questions have been answered to my satisfaction.

I consent to my child participating in the study: Yes No

______________________________________
Name of Child

______________________________________
Name of Parent/Guardian

______________________________________
Signature of Parent/Guardian Date

______________________________________
Signature of Person Obtaining Consent Date

______________________________________
Name (in print) of Person Obtaining Consent
APPENDIX L

Children’s Assent Form
(Chapter 3)

I am a student researcher, and I would like to learn about the pictures you create in your mind about active play. Active play can be riding your bike, dancing, playing tag, kicking a ball, or going swimming. It makes you sweat, makes your legs feel tired, or makes you breathe harder. When we meet, I will give you a piece of paper with some questions I would like you to answer. These questions will help me learn more about the pictures you create in your mind when you are playing. You will then be given a small electronic device. This will let me see how much you are moving when you play each day. You will be asked to wear it (on your waistband) all day except when in water, during sports or gym class, or sleeping. You will be asked to make a phone call from your home where you will listen to a 5-minute story I’ve made for you. I will come to your school to meet you once a week for the next few weeks for about 5 minutes during your lunch. I’ll give you a piece of paper with some questions I would like you to answer. The final week I will ask you to answer some questions on the pictures you create in your mind about active play.

I want you to know that I will not be telling your teachers or parents or any other kids what you answer. The only time I would tell someone else is if you tell me that someone has been hurting you. If I think that you are being hurt I will need to tell someone else who can help you. Otherwise, I promise to keep everything that you tell me to myself.

Your mom and/or dad have said it is okay for you to answer my questions on the pictures you create in your mind about active play. Do you think that you would like to answer them? You won’t get into any trouble if you say “no”. If you don’t want to be in the study, just say so. Even if you say yes now, you can still change your mind later. If there is a question you don’t want to answer you don’t have to. You will still stay in the study. Would you like to do this?

I understand what I am being asked to do to be in this study, and I agree to be in this study.

_______________________                ______________________
Signature                        Date

________________________________
Witness
APPENDIX M

PHYSICAL ACTIVITY QUESTIONNAIRE FOR CHILDREN
(Chapter 3; Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997)

1. Physical activity in your spare time: Have you done any of the following activities in the past 7 days (last week)? If yes, how many times? (Check mark only one box per row)

<table>
<thead>
<tr>
<th>Activity</th>
<th>No</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>7 times or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skipping</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rowing/canoeing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-line skating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tag</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking for exercise</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bicycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jogging or running</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Aerobics</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Swimming</td>
<td></td>
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<td></td>
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<tr>
<td>Baseball, softball</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Dance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Football</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Badminton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skateboarding</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Soccer</td>
<td></td>
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</tr>
<tr>
<td>Street hockey</td>
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<tr>
<td>Volleyball</td>
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<tr>
<td>Floor hockey</td>
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<tr>
<td>Basketball</td>
<td></td>
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<tr>
<td>Ice skating</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cross-country skiing</td>
<td></td>
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</tr>
</tbody>
</table>
2. In the last 7 days, what did you do most of the time at recess? (Circle one only)
   A. Sat down (talking, reading, doing schoolwork)
   B. Stood around or walked around
   C. Ran or played a little bit
   D. Ran around and played quite a bit
   E. Ran and played hard most of the time

3. In the last 7 days, what did you normally do at lunch (besides eating lunch)? (Circle one only)
   A. Sat around (talking, reading, doing schoolwork)
   B. Stood around or walked around
   C. Ran or played a little bit
   D. Ran or played a quite bit
   E. Ran and played hard most of the time

4. In the last 7 days, on how many days right after school, did you do active play in which you were very active? (Circle one only)
   A. None
   B. 1 time last week
   C. 2 or 3 times last week
   D. 4 times last week
   E. 5 times last week

5. In the last 7 days, on how many evenings did you do active play in which you were very active? (Circle one only)
   A. None
   B. 1 time last week
   C. 2 or 3 times last week
   D. 4 or 5 times last week
   E. 6 or 7 times last week

6. On the last weekend, how many times did you do active play in which you were very active? (Circle one only)
   A. None
   B. 1 time
   C. 2-3 times
   D. 4-5 times
   E. 6 or more times

7. Which one of the following describes you best for the last 7 days? Read all five statements before deciding on one answer that describes you. (Circle one only)
   1. All or most of my free time was spent doing things that involve little physical effort
2. I sometimes (1-2 times last week) did physical things in my free time (e.g., played sports, went running, swimming bike riding, did aerobics)
3. I often (3-4 times last week) did physical things in my free time
4. I quite often (5-6 times last week) did physical things in my free time
5. I very often (7 or more times last week) did physical things in my free time
8. Mark how often you did active play for each day last week.

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>Little bit</th>
<th>Medium</th>
<th>Often</th>
<th>Very often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuesday</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Wednesday</td>
<td></td>
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<tr>
<td>Thursday</td>
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<tr>
<td>Friday</td>
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<tr>
<td>Saturday</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Sunday</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

9. Were you sick last week, or did anything prevent you from doing active play? (Circle one)
   A. Yes
   B. No

If yes, what prevented you?
_________________________________________________________________
Instructions: We want to know about the ways that movements can happen in your head. We want to know how hard or easy it is for you to see or feel different movements in your head.

First, we will ask you to do a movement. Then, we will ask you to do one of three things in your head, without moving any part of your body.

The three things we will ask you to do are:

1. See yourself doing the movement through your own eyes
2. See yourself doing the movement as if you are watching it on video
3. Feel yourself doing the movement in your head

<table>
<thead>
<tr>
<th></th>
<th>Very Hard</th>
<th>Hard</th>
<th>Kind of Hard</th>
<th>Not Easy nor Hard</th>
<th>Kind of Easy</th>
<th>Easy</th>
<th>Very Easy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Glass of Mud (Very hard to... see or feel)</td>
<td>Glass of cloudy water (Not easy nor hard... to see or feel)</td>
<td>Empty Glass (Very easy to... see or feel)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**ITEMS:** We will ask you to do 4 different movements and imagine them 3 times each. For each item, rate how easy it is to do or see the movement by circling the number that best represents your experience.

1. **Starting position for this action is:**
   Stand with your feet and legs close together and your arms at your sides.

   **The movement to do is:**
   Lift your right knee as high as you can. Bring it back down slowly until your two feet are on the ground. Make sure you do it slowly.

   Get into the starting position.

   **In your head:**
   Try *feeling* the knee lifting movement you just did, as if you were actually doing it, but without moving any part of your body.

   Rate how easy or hard it was to *feel* this:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>

2. **The starting position for this action is:**
   Stand with your feet and legs close together and your arms at your sides

   **The movement to do is:**
   Bend down low and then jump in the air as high as you can, with your arms up over your head. Land with your feet apart and bring your arms back down.

   Get into the starting position.

   **In your head:**
   Try to *see* the jumping movement you just did *through your own eyes*, like what you would see if you were actually doing it.

   Rate how easy or hard it was to *see* this *through your own eyes*:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>

3. **The starting position for this action is:**
   Which arm do you write with? Now take the other arm and stretch it out to your side so the palm of your hand is facing the floor.
The movement to do is:
Keep your arm stretched out, and move it from your side to in front of you. Do this slowly.

Get into the starting position.

In your head:
Try to see the movement you just did of your arm moving to the front, as if you were watching yourself on video.

Rate how easy or hard it was to see this as if you were watching yourself on video:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
<td></td>
</tr>
</tbody>
</table>

4. The starting position for this action is:
Stand with your feet apart and your arms stretched out all the way above your head.

The movement to do is:
Slowly bend your body forward and try to touch your toes with your fingertips.
Now, stand back up with your arms above your head.

Get into starting position.

In your head:
Try feeling the bending movement you just did, as if you were actually doing it, but without moving any part of your body.

Rate how easy or hard it was for you to feel this:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
<td></td>
</tr>
</tbody>
</table>

5. The starting position for this action is:
Stand with your feet and legs close together and your arms at your sides

The movement to do is:
Lift your right knee as high as you can. Bring it back down slowly until your two feet are on the ground. Make sure you do it slowly.

Get into the starting position.
In your head:
Try to see the knee lifting movement you just did **through your own eyes**, like what you would see if you were actually doing it.

Rate how easy or hard it was to see this **through your own eyes**:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>

6. The starting position for this movement is:
   Stand with your feet and legs close together and your arms at your sides

   The movement to do is:
   Bend down low and then jump in the air as high as you can, with your arms up over your head. Land with your feet apart and bring your arms back down.

   Get into the starting position.

   In your head:
   Try to see the jumping movement you just did as if you were **watching yourself on video**.

   Rate how easy or hard it was to see this as if you were **watching yourself on video**:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>

7. The starting position for this action is:
   Take the arm that you do not write with, and stretch it out to your side so the palm of your hand is facing the floor.

   The movement to do is:
   Keep your arm stretched out, and move it from your side to in front of you. Do this slowly.

   Get into the starting position.

   In your head:
   Try to **feel** the movement you just did of your arm moving to the front, as if you were actually doing it, but without moving any part of your body.
Rate how easy or hard it was to feel this:

<table>
<thead>
<tr>
<th></th>
<th>1 Very hard</th>
<th>2 Hard</th>
<th>3 Kind of Hard</th>
<th>4 Not Easy nor Hard</th>
<th>5 Kind of Easy</th>
<th>6 Easy</th>
<th>7 Very Easy</th>
</tr>
</thead>
</table>

8. The starting position for this action is:
Stand with your feet apart and your arms stretched out all the way above your head.

The movement to do is:
Slowly bend your body forward and try to touch your toes with your fingertips.
Now, stand back up with your arms above your head.

Get into the starting position.

In your head:
Try to see the bending movement you just did through your own eyes, like what you would see if you were actually doing it.

Rate how easy or hard it was to see this through your own eyes:

<table>
<thead>
<tr>
<th></th>
<th>1 Very hard</th>
<th>2 Hard</th>
<th>3 Kind of Hard</th>
<th>4 Not Easy nor Hard</th>
<th>5 Kind of Easy</th>
<th>6 Easy</th>
<th>7 Very Easy</th>
</tr>
</thead>
</table>

9. The starting position for this action is:
Stand with your feet and legs close together and your arms at your sides.

The movement to do is:
Lift your right knee as high as you can. Bring it back down slowly until your two feet are on the ground. Make sure you do it slowly.

Get into the starting position.

In your head:
Try to see the knee lifting movement you just did as if you were watching yourself on video.

Rate how easy or hard it was to see this as if you were watching yourself on video:

<table>
<thead>
<tr>
<th></th>
<th>1 Very hard</th>
<th>2 Hard</th>
<th>3 Kind of Hard</th>
<th>4 Not Easy nor Hard</th>
<th>5 Kind of Easy</th>
<th>6 Easy</th>
<th>7 Very Easy</th>
</tr>
</thead>
</table>
10. The starting position for this action is:
   Stand with your feet and legs close together and your arms at your sides

   The movement to do is:
   Bend down low and then jump in the air as high as you can, with your arms up over
   your head. Land with your feet apart and bring your arms back down.

   Get into the starting position.

   In your head:
   Try feeling the jumping movement you just did, as if you were actually doing it,
   but without moving any part of your body.

   Rate how easy or hard it was to feel this:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
<td>Hard</td>
<td>Kind</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>

11. The starting position for this action is:
   Take the arm that you do not write with, and stretch it out to your side so the palm
   of your hand is facing the floor.

   The movement to do is:
   Keep your arm stretched out, and move it from your side to in front of you. Do this
   slowly.

   Get into the starting position.

   In your head:
   Try to see the movement you just did of your arm moving toward the front through your own eyes, like what you would see if you were actually doing it.

   Rate how easy or hard it was to see this through your own eyes:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
<td>Hard</td>
<td>Kind</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>
12. **The starting position for this action is:**
   Stand with your feet apart and your arms stretched out all the way above your head.

   **The movement to do is:**
   Slowly bend your body forward and try to touch your toes with your fingertips.
   Now, stand back up with your arms above your head.

   Get into the starting position.

   **In your head:**
   Try to *see* the bending movement you just did as if you were **watching yourself on video**.

   Rate how easy or hard it was to *see* this as if you were **watching yourself on video**:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very hard</td>
<td>Hard</td>
<td>Kind of Hard</td>
<td>Not Easy nor Hard</td>
<td>Kind of Easy</td>
<td>Easy</td>
<td>Very Easy</td>
</tr>
</tbody>
</table>
APPENDIX O

LETTER OF PERMISSION FOR CONDUCTING RESEARCH
(Chapter 4)

PURPOSE OF THE STUDY
The purpose of this research project is to determine whether imagery use can facilitate children’s (8-12 years) physical literacy development. Children will participate in a 6-week intervention.

POTENTIAL RISKS AND DISCOMFORTS
We expect minimal risks to the children who participate in this study. There are no needles or invasive procedures involved in the study whatsoever. However, as with all types of physical activity there is a small risk of falling. However, all of the equipment used in the program is similar to what the children use in their physical education classes. Safety is our top priority and all study personnel are trained. In the event of an injury and/or emergency standard organizational policies will be followed.

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY
The information gained from this study may be used in further research studies exploring imagery use and psychological needs among children. The researchers may gain valuable insight regarding imagery use and its impact on physical literacy. A written summary of the study’s findings will be posted at the University of Windsor’s Ethics Board website by December 2017 (www.uwindsor.ca/reb).

RIGHTS OF RESEARCH SUBJECTS
The parent and/or child may decide to withdraw their consent at any time and discontinue participation without penalty. If you, the child and/or parent(s) or guardian(s) have any questions regarding the rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF VENUE CONTACT/LOCATION REPRESENTATIVE
I understand the information provided and purpose for the study, to examine imagery use and its effect on physical literacy, as described herein. I permit the use of my facility for the recruitment of participants and agree to support my consent to potential subjects. I understand if I have the right to discontinue involvement in the study, and the researcher will no longer utilize my venue. I have been given a copy of this form.

_________________________________________  ______________________
Name of Venue Contact                           Telephone Number

_________________________________________  ______________________
Signature of Venue Contact                       Date
SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

Signature of Investigator                                      Date
Hello Parents/Guardians!

The Windsor YMCA is excited to announce the development of a new program, *Train your Brain*!

*Train your Brain* was developed and designed by Michelle Guerrero, a PhD student at the University of Windsor. The program aims to encourage children to use visualization (also known as mental imagery) in sport. While physical training can help young athletes improve their sport skills, technical knowledge, agility, and endurance, mental practice also plays an important role in improving sport performance and obtaining sport success. Visualization is a mental skill that is used by athletes from all competitive levels, including elite soccer players like Wayne Rooney!

*Train your Brain* will be implemented into the YMCA Spring Soccer Program. Below you will find a brief outline of the *Train your Brain* program.

**Week 1 (Week of May 1st):** Getting started (distributing handouts).

**Week 2 (Week of May 8th):** Children will complete a series of physical activities that will assess their physical literacy (for more information on physical literacy please see the second handout). These activities include: (1) an obstacle course (which includes jumping, running, hopping, catching, throwing, and kicking balls while running), the shuttle run (formerly known as the beep test), and (3) a plank (holding a push up position while resting only on the toes and forearms). Children’s height and weight will also be assessed. Finally, children will be given a pedometer (step counter) and will be asked to wear the pedometer every day until the next YMCA soccer practice (7 consecutive days).

**Week 3 (Week of May 15th):** Children will hand-in their pedometer to their YMCA instructor. Next, children will complete questionnaires that assess their motivation, confidence, competence, and mental imagery use. Children will also complete an audio-recorded guided visualization session (4 mins. maximum) at the beginning of the practice. Children will be asked to listen to the audio-recorded guided visualization session two more times at home before their next soccer practice at the YMCA. The guided visualization session will be accessible through a website (link will be provided to child and parent).

**Week 4 (Week of May 22nd):** Children will complete an audio-recorded guided visualization session (4 mins. maximum) at the beginning of the practice, and will be asked to listen to this audio recording two more times at home before their next soccer practice at the YMCA (through the same website link provided in Week 3).
**Week 5 (Week of May 29th):** Children will complete an audio-recorded guided visualization session (4 mins. maximum) at the beginning of the practice, and will be asked to listen to this audio recording two more times at home before their next soccer practice at the YMCA (through the same website link provided in Week 3).

**Week 6 (Week of June 5th):** Children will complete an audio-recorded guided visualization session (4 mins. maximum) at the beginning of the practice, and will be asked to listen to this audio recording two more times at home before their next soccer practice at the YMCA (through the same website link provided in Week 3).

**Week 7 (Week of June 12th):** Children will complete the same physical activities completed that were completed in Week 2 (e.g., obstacle course, shuttle run, and plank).

**Week 8 (Week of June 19th):** Children will complete the same questionnaires that were completed in Week 3. Program is complete!

**Why are we implementing Train your Brain into the YMCA program?**

The information we will gain from *Train your Brain* will be beneficial for two reasons.

First, the information we gain from this program will be used as a program evaluation and quality improvement tool for the Managers and Program Developers at the Windsor YMCA. This is extremely important because we believe that the YMCA of Western Ontario has a huge role in impacting the health and wellness of our community members, which is why we are so passionate about providing quality sport programs to your child(ren).

Second, we (Michelle, Sarah, and Terra) hope that the data we collect from this program can be used for research purposes such as conference presentations and publications. This data can be used to inform other organizations of the benefits of the *Train your Brain* program. Additionally, allowing Michelle to use your child’s data for research purposes will contribute to the completion of her PhD at the University of Windsor. If you allow us to use your child’s data, their data would be **completely confidential and anonymous**.

Sincerely,
Michelle Guerrero and Terra Armstrong
Can we use the data we obtain from your child for research purposes? Please circle your answer. If you circle “Yes”, please complete the following information in the box below.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Parent/Guardian</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signature of Parent/Guardian</th>
<th>Name of Child</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

143
Hello Parents/Guardians!

The YMCA of Western Ontario is committed to developing and implementing sport programs that help children develop physical literacy. Physical literacy is having the confidence, competence, and motivation to be physically active. For more information on physical literacy and why it is important, please see the second handout.

Michelle Guerrero (a PhD student at the University of Windsor) and Dr. Sarah Woodruff (a faculty member in the Department of Kinesiology at the University of Windsor) are passionate about understanding and promoting children’s physical literacy. Michelle and Sarah will conduct physical literacy assessments with all children enrolled in the Spring Basketball Program.

Below you will find a brief outline of what the physical literacy assessments will look like:

**Week 1 (Week of May 1st):** Getting started (distributing handouts).

**Week 2 (Week of May 8th):** Children will complete a series of physical activities. These activities include: (1) an obstacle course (which includes jumping, running, hopping, catching, throwing, and kicking balls while running), (2) the shuttle run (formerly known as the beep test), and (3) a plank (holding a push up position while resting only on the toes and forearms). Children’s height and weight will also be measured. Finally, children will be given a pedometer (step counter) and will be asked to wear the pedometer every day until the next YMCA Basketball practice (7 consecutive days).

**Week 3 (Week of May 15th):** Children will hand-in their pedometer to their YMCA instructor. Next, children will complete questionnaires that assess their motivation, confidence, competence, and mental imagery use.

**Week 7 (Week of June 12th):** Children will complete the same physical activities that were completed in Week 2 (i.e., obstacle course, shuttle run, and plank).

**Week 8 (Week of June 19th):** Children will complete the same questionnaires that were completed in Week 3. Program is complete!

Why are we implementing physical literacy into the YMCA basketball program?

Learning about children’s physical literacy will be beneficial for two reasons.

First, the information obtained from these assessments will be used as a program evaluation and quality improvement tool for the Managers and Program Developers at the Windsor YMCA.
This is extremely important because the YMCA of Western Ontario has a huge role in impacting the health and wellness of our community members, which is why Windsor YMCA is so passionate about providing quality sport programs to your child(ren).

Second, we (Michelle, Sarah, and Terra) hope that the data we collect from these assessments can be used for research purposes such as conference presentations and publications. The information we gather can help improve the development of different sport programs offered at the Windsor YMCA as well as sport programs offered at other YMCA locations in Western Ontario. Additionally, allowing Michelle to use your child’s data for research purposes will contribute to the completion of her PhD at the University of Windsor. If you allow us to use your child’s data, their data would be completely confidential and anonymous.

Can we use the data we obtain from your child for research purposes? Please circle your answer. If you circle “Yes”, please complete the following information in the box below.

Yes        No
APPENDIX R

MOTIVATION QUESTIONNAIRE
(Chapter 4; Sebire, Jago, Fox, Edwards, & Thompson, 2013)

I am active because...

<table>
<thead>
<tr>
<th></th>
<th>Not true for me</th>
<th>Not really true for me</th>
<th>Sometimes true for me</th>
<th>Often true for me</th>
<th>Very true for me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Being active is fun</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>It is important to me to do active things</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>When I’m not active I feel bad</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Other people say I should be active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I enjoy being active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>I value the benefits of being active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>When I don’t do activity I feel bad about myself</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>If I’m not active, other people will not be pleased with me</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>I like being active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>In life it is important to be active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>I want to show other people how good I am at being active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Other people pressure me to be active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX S

PERCEIVED COMPETENCE QUESTIONNAIRE
(Chapter 4; Sebire, Jago, Fox, Edwards, & Thompson, 2013)

<table>
<thead>
<tr>
<th></th>
<th>Not like me at all</th>
<th>Not really like me</th>
<th>Sometimes like me</th>
<th>Quite a lot like me</th>
<th>Really like me</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>When it comes to playing active games, I think I am pretty good.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I think I do well at activities compared to other children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>After working at a new activity for a while, I feel that I can do it pretty well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>I am happy with how good I am at doing active games.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>When it comes to being active, I have good skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>I can’t do physical activities very well.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX T

CAMSA LAYOUT

(Chapter 4; CAPL-2 Manual)
APPENDIX U

CAMSA SCORE SHEET

(Chapter 4; CAPL-2 Manual)

<table>
<thead>
<tr>
<th>Test Location:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Date:</td>
</tr>
<tr>
<td>Appraiser #1:</td>
</tr>
<tr>
<td>Appraiser #2:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ID Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time(s)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Two foot jumping</th>
<th>3 two-foot jumps in and out of the yellow/purple/blue hoops</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No extra jumps and no touching of hoops</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sliding</th>
<th>Body and feet are aligned sideways when sliding in one direction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Body and feet are aligned sideways when sliding in opposite direction</td>
</tr>
<tr>
<td></td>
<td>Touch cone with low centre of gravity and athletic position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Catching</th>
<th>Catches ball (no dropping or trapping)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throwing</td>
<td>Uses overhand throw to hit target</td>
</tr>
<tr>
<td></td>
<td>Transfers weight and rotates body</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skipping</th>
<th>Correct hop-step pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Uses arms appropriately (alternates arms and legs, arm swinging for balance)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>One foot hopping</th>
<th>Land on one foot in each hoop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hops once in each hoop (no touching of hoops)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kicking</th>
<th>Smooth approach to kick ball and hit target</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Elongated stride on last stride before impact</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
</tr>
</thead>
</table>

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I make up new game plans or routines in my head</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
</tr>
<tr>
<td>2.</td>
<td>I see myself doing my very best</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
</tr>
<tr>
<td>3.</td>
<td>I imagine myself being confident in competition</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
</tr>
<tr>
<td>4.</td>
<td>In my head, I imagine how calm I feel before I compete</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<td>5.</td>
<td>I see what I would do if my game plans or routines do not work out</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<td>6.</td>
<td>I imagine myself staying calm in competitions</td>
<td>Not at all</td>
<td>A little bit</td>
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<td>7.</td>
<td>I imagine other people telling me that I did a good job</td>
<td>Not at all</td>
<td>A little bit</td>
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<tr>
<td>8.</td>
<td>I can usually control how a skill looks in my head</td>
<td>Not at all</td>
<td>A little bit</td>
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<tr>
<td>9.</td>
<td>I see the audience cheering for me</td>
<td>Not at all</td>
<td>A little bit</td>
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<td>10.</td>
<td>When I think of doing my skill, I always see myself doing it perfectly</td>
<td>Not at all</td>
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<tr>
<td>11.</td>
<td>I imagine continuing with my game plan or routine even if it is not going well</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<tr>
<td>12.</td>
<td>When I think of a competition, I imagine myself getting excited</td>
<td>Not at all</td>
<td>A little bit</td>
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<tr>
<td>13.</td>
<td>Before trying a skill, I imagine myself doing it perfectly</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<tr>
<td>14.</td>
<td>I see myself being mentally strong</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<td>15.</td>
<td>I imagine how exciting it is to be in a competition</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<tr>
<td>16.</td>
<td>I see myself as a champion</td>
<td>Not at all</td>
<td>A little bit</td>
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<td>17.</td>
<td>I see myself being focused in a tough situation</td>
<td>Not at all</td>
<td>A little bit</td>
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<td>18.</td>
<td>When learning something new, I see myself doing it perfectly</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
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<td>19.</td>
<td>I see myself being in control in tricky situations</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Statement</td>
<td>Not at all</td>
<td>A little bit</td>
<td>Sometimes</td>
<td>Often</td>
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<tr>
<td>20. I see myself following the game plan or routine at competitions</td>
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<tr>
<td>21. I see myself getting through tough situations with good results</td>
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APPENDIX W

SAMPLE IMAGERY SCRIPT
(Chapter 4)

Welcome to your second visualization training session.

Take a moment to make sure you are in a quiet and comfortable place, a place that is free of distractions. When you are ready, take some deep, full breathes. Breath in through your nose, and out through your mouth. Try to inhale to a count of 3 and breath out to a count of 6. Let’s try this now. Take a deep breath through your nose for 3 seconds (1, 2, 3) now slowly release that breathe for 6 seconds (1, 2, 3, 4, 5, 6).

Now, close your eyes. Keep them closed for the rest of this training session, and keep breathing slowly and deeply. This will help you focus. I’d like you now to count from 5 to 1 slowly in your head. Still eyes closed. Still breathing slowly and deeply.

Let’s begin to visualize by creating a detailed picture of you at your YMCA soccer program. First, picture yourself in the YMCA gym. What are you wearing? A sweater, t-shirt, or long sleeve? Shorts, jeans, or track pants? What do your shoes look like? What colour are they? How do the feel? Are they snug or lose?

Now look up and around you. Picture your teammates and coaches. Imagine everyone standing in a circle in the middle of the gym – practice is just about to start. Picture Coach Jodi standing in the middle of the circle. Hear the sound of her voice as she gives you and your teammates instructions. Imagine how excited and motivated you are to play soccer.

Now, let’s set the scene. Picture you and your teammates running from one end of the gym to the other. You head is up and your looking forward. Your torso is straight and shoulders are pulled back. With each stride, you lift your front knee high and straighten your back leg completely as you push off the ground. You land on the balls of your feet. Your elbows are bent at 90 degrees. Your arms swing from your shoulders, they are close to your side and they drive forward and back as you run. Your right arm is forward when your left knee is lifted, and your left arm is forward when your right knee is lifted. Picture yourself taking long strides. Your upper body is slightly leaned forward. Imagine how confident you feel at running. Your technique is perfect. As you continue to run, focus on your how your body feelings. Your breathing faster, your beginning to sweat, and your legs are starting to feel heavy. Imagine using these physical feelings as fuel to keep going. You feel powerful and confident in your ability to run well.

Now picture yourself completing a kicking drill. You and your teammates are spread out around the gym. Everyone has a soccer ball and is facing the wall. Imagine that the space between you and the wall is the same length as your parents’ car. Coach Jodi instructs you to kick the ball at the wall 10 times. You are excited to begin this drill because you believe you are good at kicking. Picture yourself taking a few steps towards the ball. Both knees are bend as you plant your non-kicking foot beside the ball and swing your other leg toward the ball. The inside of your foot or the shoelace area of your foot makes contact with the ball. Picture yourself
following through with your kick, your leg continuing to swing forward and across your body. Watch the ball soar through the air, slightly hovering above the ground. Your technique was perfect. Now I want you to picture you’re your arms look like as you kick the ball. They are slightly raised like “airplane wings” to help you balance. Picture yourself doing this drill again. You take a few steps towards the ball, plant your non-kicking foot beside the ball, swing your kicking leg toward the ball, make contact with the ball using the inside of your foot or the shoelace area of your foot, and follow-through with your kick. Keep picturing yourself completing this drill…Now I want you to focus on the sound. What does it sound like you’re your kicking leg makes contact with the ball or when the ball smashes into the wall? You are motivated to keep practicing this drill because you know you will continue to get better and better at kicking.

This is the end of your training session. Take one more deep breath in, and release. When you are ready, go ahead and open your eyes.
VITA AUCTORIS

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<thead>
<tr>
<th>NAME</th>
<th>Michelle D. Guerrero</th>
</tr>
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<tr>
<td>PLACE OF BIRTH</td>
<td>Toronto, ON</td>
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<td>EDUCATION</td>
<td>Banting Memorial High School, Alliston, ON, 2007</td>
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<td>Laurentian University, H.B.A., Sudbury, ON, 2011</td>
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<td>University of Windsor, M.H.K., Windsor, ON, 2013</td>
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