Better Understanding the Adoption of the Long-Term Athlete Development Model: Case Analyses of Cross-Country Ski Coaches

by.
Mark Thomas Frankish
B.Ed. Intermediate Senior, University of Ottawa, 2009
B.Sc. Human Kinetics, University of Ottawa, 2008

Supervisor: Dr. Charlotte Beaudoin
Committee Members: Dr. Diane Culver and Dr. Pierre Trudel

THESIS

Submitted to the Faculty of Graduate and Postdoctoral Studies in partial fulfillment of the requirements for the degree of Master's of Arts in Human Kinetics

School of Human Kinetics
University of Ottawa
September 2011

For Oma, Grandma, Nanny,

Grandpa Jimmy, & Grandpa Paul

"Look at a stone cutter hammering away at his rock, perhaps a hundred times without as much as a crack showing in it. Yet at the hundred-and-first blow it will split in two, and I know it was not the last blow that did it, but all that had come before."

~Jacob A. Riis

"If we are facing in the right direction, all we have to do is keep on [skiing]".

~Modified Buddhist Saying

Table of Contents

List of Tables

List of Figures

List of Abbreviations

CAC- Coaching Association of Canada

CCC- Cross-Country Canada

CFLRI- Canadian Fitness and Lifestyle Research Institute

CSC- Canadian Sport Centres

ICC- Introduction to Community Coaching

LTAD- Long-Term Athlete Development

L2S- Learn to Ski

NCCP- National Coaching Certification Program

NSO- National Sport Organization

PA- Physical Activity

PC- Paid-Competitive

VP- Volunteer-Participatory

VC- Volunteer-Competitive

VR- Volunteer-Recreational

XCS- Cross-Country Skiing

Abstract

This thesis is composed of a multiple case study and a descriptive qualitative analysis of cross-country skiing (XCS) coaches (N = 13). Both studies look at the attributes of Canada's Long-term Athlete Development model as perceived by coaches. The LTAD is an "athlete centered, coach driven, and administration, sport science, and sponsor supported" (Canadian Sport Centres [CSC], 2006, p. 33) athlete-development model. It incorporates seven unique stages of development that identify appropriate practice, competition, and recovery periods for athletes in sport (CSC, 2006). The adoption of LTAD by XCS coaches is understood using Rogers' (2003) *Diffusion of Innovations*, specifically the persuasion and decision stages proposed in his *innovation-decision process*.

The first article outlines a multiple case analysis of three club's coaches. This analysis led to the emergence of case-specific and cross-case attributes of the LTAD model that influenced the adoption of the LTAD by XCS coaches. The second article presents a descriptive qualitative analysis showcases the similarities and differences between individual XCS coaches' perceived attributes of the LTAD model. This produced a classification system for coaches based on their role within a XCS club, the values they placed on sport, and their personal sport experiences. This classification system allowed a unique look at the attributes experienced by specific types of coaches.

All XCS coaches had adopted the LTAD model, but the perceived attributes of the model differed from coach-to-coach. In Article 1, it was found that many attributes of the LTAD were linked to a club's size and focus. In Article 2 the same types of coaches experienced similar attributes of the LTAD. Research on Canada's LTAD is relatively sparse, thus this exploratory study provides one of the first steps in understanding the LTAD's adoption by sport coaches.

Acknowledgements

This thesis was completed with the love and support of my family; first and foremost my Mom and Dad. Thank you for giving me the skills, motivation, and confidence to succeed in whatever I put my mind to. Secondly, to my brother Paul who has been a role model and friend for the past 25 years. Thirdly, I would like to acknowledge my Grandma who taught me the true value of perseverance, and my Nanny who always made me feel special. A sincere thank you must also go to Teal, Sasha, Kris, and Heather whose unwavering friendship has made them family. I would also like to thank John, who kept me on track during the hardest months of writing and whose love and friendship I cherish.

An acknowledgement must also be made to the research team I was a member of. This thesis would not have been possible without their support and financial contribution. Thank you also to the clubs and coaches who participated in this study. A study such as this could not happen without their commitment to the great sport of cross-country skiing. Lastly, I would like to acknowledge the invaluable support and wisdom of my supervisor Dr. Charlotte Beaudoin, and committee members Dr. Diane Culver and Dr. Pierre Trudel. Thank you for providing the direction and guidance to complete this thesis.

CHAPTER 1: INTRODUCTION

Today's youth spend more time in front of the television, playing video games and surfing the Internet than ever before. These activities have caused alarming sedentary trends that have been linked to rising levels of obesity (Ifedi, 2005; Tremblay, Katzmarzyk, & Willms, 2002). Not surprisingly, it is has been shown that children who regularly participate in sport and physical activity (*PA*) are at a lower risk of obesity than children who are sedentary (Atlantis, Barnes, & Singh, 2006).

The importance of sport and PA on the healthy development of children became a focal point for the Canadian government who responded by creating a plan to increase youth participation (Canadian Heritage, 2007). The Canadian government's plan began with the *Canadian sport policy*, which informed the creation of the Long-Term Athlete Development (*LTAD*) model by Sport Canada. This athlete-centered, coach-delivered model was developed to provide the opportunity for Canadians to engage in sport and PA with the final goal of creating a population of confident, healthy and active adults who would be life-long participants in sport and PA (Canadian Sport Centres [*CSC*], 2006). The latest version of the LTAD (Appendix A) is a seven-stage continuum that recognizes the varying paths with which Canadians experience sport. Each stage identifies optimal windows of trainability, competition to practice ratios, recovery, and developmental characteristics (CSC, 2006).

Canada has experienced decreasing winning sport performances on the world stage at the same time as declining activity levels of youth (CSC, 2006). This added issue influenced the secondary goal of the LTAD model; that is, to increase the number of Canadian athletes who reached their fullest potential in sport in order to increase consistent performers on the world stage. The LTAD model's objectives (participation and performance) make coaches an essential part of an athlete's physical and cognitive development. This research project aims to better

understand how determinants of adoption affect a cross-country ski (*XCS*) coach's decision to adopt or reject the LTAD model. The following research questions guided the direction of the study and were formulated for both articles using Rogers' (2003) *Diffusion of Innovation* theoretical framework:

Article 1:

1. What are the perceived attributes of the LTAD model as experienced by XCS coaches?
2. How do these attributes influence a XCS coach's decision to adopt or reject the LTAD model?
3. How do coaches from different XCS clubs perceive the attributes of the LTAD model?

Article 2:

1. What are the perceived attributes of the LTAD model as experienced by XCS coaches?
2. How do personal characteristics affect a coach's perceived attributes of LTAD?

There is very little research on Canada's LTAD model; in fact, only one peer-reviewed article regarding Canada's LTAD model has been published (Black & Holt, 2009). Other forms of research exist (e.g., papers, reports, unpublished research, and research on old versions of Bayli's Model), but none examine how attributes affect a club coach's decision to adopt the LTAD model. Since there is not sufficient research on Canada's LTAD model, a conceptual grounding of this project reviews four complimentary themes to provide a broader understanding of the research context.

Research Context

Given the novel nature of this research project, a multiplicity of literature will provide its conceptual grounding. This review of literature will concentrate on four areas of research: (1)

Sport participation in Canada, (2) Coach education in Canada, (3) Sport development models, and (4) Canada's LTAD model.

Sport Participation in Canada

The World Health Organization (1998) has shown that the prevalence of overweight and obesity is reaching critical levels in both developing and developed countries. The incidence of overweight and obese Canadian children, in particular, is rising and has been linked to increasing inactivity levels (Li et al., 2006; Tremblay & Willms, 2003; Tremblay, Katzmarzyk, & Willms, 2002). Ifedi (2005) showed that these growing sedentary trends were representative of most of the Canadian population. The *Canadian Sport Policy,* created to support a healthy and active population, has the initiative to enhance participation, excellence, capacity, and interaction in all aspects of Canadian sport and PA (Canadian Heritage, 2007). Canada's model for LTAD is one of the cornerstone projects developed in response to this policy. The LTAD model seeks to increase participation in sport and PA to benefit health, and to increase the number of Canadians participating successfully at the highest levels of competition (CSC, 2006). In an effort to fully understand why the LTAD model was created, it is important to understand how its goal of sport participation will benefit the Canadian population.

There are three proposed benefits to youth participation in sport: (1) physical health, (2) psychosocial development, and (3) motor skill acquisition (Côté & Fraser-Thomas, 2007; Fraser-Thomas & Côté, 2006). It has been well documented that there is a positive impact from sport and PA on cardiovascular fitness (e.g., Li et al., 2006), weight control (e.g., Fox & Hillsdon, 2007), and flexibility (e.g., Warburton, Nicol, & Bredin, 2006). It has also been shown that regular participation in PA and sport can decrease the risk of developing certain cancers, diabetes, cardiovascular disease, and osteoporosis (Warburton, Nicol, & Bredin, 2006).

Psychosocial benefits have been linked to a person's participation in PA and sport (Wankel & Berger, 1990). Involvement in sport and PA provides Canadian youth with opportunities to participate and interact with others, where they "learn important life skills such as cooperation, discipline, leadership, and self-control" (Fraser-Thomas & Côté, 2006, p. 12). Lastly, the development of motor skills increases with regular participation in sport and PA as a youth. Motor skills, such as strength and flexibility, "serve as a foundation for future national sport stars and recreational adult sport participants" (Fraser-Thomas & Côté, 2006, p. 12).

It has been suggested that there is a positive association between the PA habits in youth and the subsequent PA trends as adults (Perkins, Jacobs, Barber, & Eccles, 2004; Robertson-Wilson, Baker, Derbyshire, & Côté, 2003; Thompson, Humbert, & Mirwald, 2003). This association is important since the LTAD model has the ultimate goal of life-long participation in sport and PA by engaging youth in meaningful activities at a young age (CSC, 2006). However, for youth to experience *meaningful* participation in sport and PA, coaches must have sufficient training and knowledge to properly engage and develop their athletes. Coach education becomes an important concept in understanding how Canadian coaches learn about LTAD.

Coach Education in Canada

The National Coaching Certification Program (*NCCP*) is the "recognized national standard for coach training and certification in Canada" (Coaching Association of Canada [*CAC*], 2008, n.p.). The NCCP is a large-scale coach education program that has been widely accepted as the model for other coach education and certification programs around the world (Gowan, 1992). It was developed to distribute a standardized curriculum including coaching skills, training techniques and coaching knowledge to as many coaches as possible (Gilbert & Trudel, 1999; Trudel, & Gilbert, 2006).

The NCCP, first created in the 1970s, has continued to evolve as research on coaching advances (CAC, 2008; Misener & Danylchuk, 2009). Coach education was traditionally presented "on a continuum from novice to expert" (Werthner & Trudel, 2006, p. 208); however, the NCCP has been updated to recognize "the specificity of the different coaching contexts whether those contexts are recreational, developmental, or elite" (p. 208). The new NCCP is divided into three competency-based coaching streams, which address the needs of the numerous types of coaches who contribute to the Canadian sport system (CAC, 2008). The three streams of the NCCP are community sport coaches, competition sport coaches, and instructional sport coaches (CAC, 2008).

Support for the NCCP's innovative methods to effectively train coaches has grown in many sport communities. Research has shown that the reason for this support is the perceived notion that the NCCP increases a coach's "self-efficacy, motivation, strategy, and technique" (Misener & Danylchuk, 2009, p. 234). These outcomes are accomplished through interactive and problem-based modules with contextual relevance to specific coaching situations (CAC, 2008). Continued support has made the NCCP "the standard for coach training and certification for 65 sports in Canada" (Misener & Danylchuk, 2009, p. 234).

Trudel and Gilbert (2006) examined coach training and coach education research through three coaching contexts similar to the NCCP: recreational sport, developmental sport, and elite sport. They determined that fewer recreational sport coaches (< 50%) participated in formal coach education courses than developmental coaches (> 75%) and elite sport coaches (100%) (Trudel & Gilbert, 2006). Coaches who have attended NCCP courses find them to be positive and have shown the intention to participate in future CE (Misener & Danylchuk, 2009). Nonetheless, research has shown that youth sport coaches (i.e., recreational and developmental)

would more likely attend coach education programs if they became an association requirement, if they were able to choose topics that interested them, or if courses were offered online and less formally (Misener & Danylchuk, 2009; Vargas-Tonsing, 2007; Wiersma & Sherman, 2005).

Sport Development Models

Canada's model for LTAD is a development model, which incorporates physical, mental, emotional, and cognitive development to determine an athlete's developmental age (CSC, 2006). It is important to understand that the LTAD model is one of numerous models of sport development that exist within coaching science. Sport development models take on several forms each presenting a unique set of outcomes and goals. Bruner and colleagues (2009, 2010) completed two citation network analyses on models of sport development and their existence within peer-reviewed English literature. They found two factions of literature that emerged from this analysis: *talent development models* and *transitional models* in sport.

Talent development models.

Research on talent development focuses on the identification of talented youth athletes and their development into competitive, world-class athletes (e.g., Durand-Bush, & Salmela, 2001; Martindale, Collins, & Daubney, 2005). Models that focus on the development of talent (e.g., Bailey & Morley, 2006; Bloom, 1985; Côté, 1999) are "influenced by the field of cognitive psychology, skill acquisition, and expertise in domains such as music, art, and chess" (Bruner, Erickson, McFadden, & Côté, 2009, p. 24). The most notable talent development model, Bloom's *Developing Talent in Young People* (as cited in Bruner et al., 2009), was produced after a longitudinal study of 120 athletes. Bloom identified three distinct stages of development: early years or stage of initiation, middle years or stage of development, and late years or stage of perfection. Most subsequent talent development models used Bloom's stages as a base structure

(Bruner et al., 2009) but provided "more information on the evolution of outstanding performance" (Durand-Bush & Salmela, 2001, p. 275).

Côté and colleagues studied the athletic development of elite athletes in Canada and Australia in multiple sports (Abernethy, Côté, & Baker, 1999; Côté, 1999; Côté, Baker, & Abernethy, 2003; Côté & Hay, 2002a). Côté suggested that athlete development should be broken into four stages: sampling years, investment years, specialization years, and recreation years. Côté indicated that an athlete could move forward, drop out, or enter into recreational sport at any point in his or her development. This recreational component is similar to the Canadian LTAD's final stage of development, *Active for Life*, which demonstrates that an athlete can begin a recreational level of participation at any point in time.

Bloom (1985) as well as Côté and colleagues explained that talent development is heavily influenced by social factors in an athlete's life. The influence of parents, family, and coaches on athlete development has been of particular interest within coaching science (e.g., Côté, 1999, 2002; Côté & Hay, 2002b). Côté interviewed members of four families who had children involved in elite rowing and tennis. He found that children provided with opportunities for development from their social support networks were more likely to reach an expert level of performance (Côté, 1999). Ericsson, Krampe, and Tesch-Römer's (1993) general framework postulated that these opportunities could be provided through *deliberate practice*.

Deliberate practice in sport is characterized by activities that involve "well defined tasks with appropriate difficulty levels, informative feedback, and opportunities for repetition and corrections for errors" (Durand-Bush & Salmela, 2001, p. 277). The concept of deliberate practice is linked to effective talent development (Baker, Horton, Robertson-Wilson, & Wall,

2003; Côté et al., 2003), and has been extensively researched in relation to expert performance (e.g., Deakin & Cobley, 2003).

It has been suggested that it requires ten years or 10 000 hours of deliberate practice to achieve an expert level of performance in sport, and in life's pursuits (Bloom, 1985; Ericsson et al., 1993). The LTAD emphasizes that athletes must engage in at least three hours of competition or practice every day for ten years to attain a level of expert performance (CSC, 2006). The LTAD also recognizes that during these years athletes will transition through different roles and responsibilities (CSC, 2006).

Transitional models in sport.

The second key type of sport-development model, that literature centered around, was based on role and career transitions of athletes (Bruner et al., 2010). This type of model examines an athlete in terms of lifespan development and the transitions experienced while moving from one role to another (Bruner et al., 2009; McPherson, 1980). Examples of research on career transitions can be seen in research by Stambulova (1994), and Wylleman, Alfermann, & Lavalee (2004). Many transitional models examined how an athlete's changing roles (e.g., transitions out of elite sport) influence his or her athletic performance and psychological wellbeing (e.g., Baillie & Danish, 1992; Werthner & Orlick, 1986).

There has been a shift away from examining single-event transitions (i.e., recovery from an injury) to the examination of an athlete's lifelong transition through sport (Wylleman et al., 2004); nonetheless, some research on an athlete's life span was carried out before this shift (e.g., McPherson, 1980). Examples of this new research focus can be seen in the work of Wylleman, Lavallee, and Alfermann, (1999), Weiss and Raedeke (2004), and in the Canadian LTAD model (CSC, 2006). Lifelong-transitional research focuses on the changing roles of athletes over the

course of their careers; that is, from their initiation into sport until their eventual removal from the sport environment or into recreational sport (Bruner et al., 2009).

Transitional model research has experienced a growing interest on social and societal factors that influence an athlete's transition and development through sport (Bruner et al., 2009). An example of this type of research is that of Bruner, Munroe-Chandler, and Spink (2008) who looked at an athlete's transition into elite sport. Specifically they showed the developmental transitions of athletes at psychological, psychosocial, athletic, and academic-vocational levels using Wylleman & Lavalee's (2004) transitional model.

The principles of the Canadian LTAD are based on coaching science and organized into seven unique stages of development. Concepts were borrowed from both talent development models (e.g., deliberate practice & social influences) and career transition models (e.g., life-long participation, and role transition) to create a hybrid model with two objectives: elite performance and life-long participation in sport and PA.

Canada's LTAD Model

The LTAD is an "athlete centered, coach driven, and administration, sport science, and sponsor supported" (CSC, 2006, p. 33) athlete-development model. Canada's LTAD stipulates that athletic and recreational involvement should be based on an athlete's developmental stage rather than his or her chronological age (CSC, 2006). Canada's LTAD model includes seven stages of development with unique objectives to properly develop athletes.

1. *Active Start*: males and females aged 0 – 6
    - "Learn fundamental movements and link them together into play" (CSC, 2006, p. 37).
2. *FUNdamentals*: males aged 6 – 9 and females aged 6 – 8

- "Learn all fundamental movement skills and build overall motor skills" (CSC, 2006, p. 38).

3. *Learning to Train*: males aged 9 – 12 and females aged 8 – 11
    - "Learn overall sport skills" (CSC, 2006, p. 40).
4. *Training to Train*: males aged 12 – 16 and females aged 11 – 15
    - "Build an aerobic base, develop speed and strength towards the end of the stage, and further develop and consolidate sport specific skills" (CSC, 2006, p. 41).
5. *Training to Compete*: males aged 16 – 23 +/- and females aged 15 – 21 +/-
    - "Optimize the engine and learn to compete. *Optimize* fitness preparation and sport-, individual-, and position-specific skills as well as performance" (CSC, 2006, p. 42).
6. *Training to Win*: males aged 19 +/- and females aged 18 +/-
    - "Podium performances. *Maximize* fitness preparation and sport-, individual-, and position-specific skills as well as performance." (CSC, 2006, p. 43).
7. *Active for Life*: males and females enter at any age
    - "A smooth transition from an athlete's competitive career to lifelong PA and participation in sport" (CSC, 2006, p. 44).

Each stage identifies key points where optimal development can take place; for instance, the Training to Train stage identifies that aerobic exercise is an important activity after the onset of peak height velocity (CSC, 2006). Peak height velocity is one of the ten factors identified in Canada's model for LTAD. These ten factors listed below are the "research, principles, and tools upon which LTAD is built" (CSC, 2006, p. 19).

1. *Ten-year rule*

2. *FUNdamentals*
3. *Specialization*
4. *Developmental age*
5. *Trainability*
6. *Physical, mental, cognitive, and emotional development*
7. *Periodization*
8. *Calendar planning for competition*
9. *System alignment and integration*
10. *Continuous improvement of the LTAD model*

These factors support the LTAD model's goals, and helped in the creation of sport specific models by Canadian sport organizations.

Since its development and adoption by Sport Canada, most Canadian sport organizations have adapted the model to their own sport-specific requirements; in fact, "federally funded Canadian sports are required to have a LTAD plan" (Black & Holt, 2009, p. 1). Sport Organizations like Cross-Country Canada (*CCC*) have produced their own LTAD documents and distributed them to associations, clubs, coaches, and members (CCC, 2007). *Cross-Country Skiing- A Sport for Life* (CCC, 2007) provides step-by-step resources for coaches and parents on LTAD. XCS is a late specialization sport; therefore, in the first stages of CCC's model "children grow and improve within the sport through programs permitting a broad exposure to activities that develop overall motor and sport skills" (CCC, 2007, p. 22).

Each stage of development outlined in CCC's (2007) document includes a list of goals and objectives specific to the sport and the motor capacities of athletes at that stage of development. For instance, the Learning to Train stage identifies an introduction to "dryland

training techniques- ski walking and ski striding" (p. 31) while the training-to-compete stage recognizes the need to "evaluate race specialization options (sprint versus distance) for training and performance" (p. 37). Each stage also provides a list of suggested resource material where more information and assistance in applying the principles of LTAD can be found. For example, suggested materials for coaches of children in the active start stage of development include CCC's Bunny-rabbit booklet and the NCCP ICC reference material (CCC, 2007); reference materials for parents are regularly published by CSC (e.g., CSC, n.d.).

CCC has adjusted its coach education programs (Appendix D) and introductory ski programs to compliment the goals and objectives outlined in the early stages of the LTAD model. This adjustment has been seen in the Bunny-rabbit, Jackrabbit, and Track-Attack programs in Canadian XCS clubs (CCC, 2008). CCC adapted the LTAD to better address its sport-specific needs. However, have XCS coaches, involved in the development and training of athletes, adopted the model? This study used Rogers' (2003) theoretical framework to help us understand how attributes of adoption influence a coach's decision to adopt or reject the LTAD model.

As previously mentioned, the LTAD was developed in response to several key changes in Canada: (1) a growing sedentary population, (2) declining international sport performances, and (3) the creation of the Canadian sport policy. Canada's Sport policy envisioned having a dynamic and world-class sport system that "enables all Canadians to experience and enjoy involvement in sport to the extent of their abilities and interests" (Canadian Heritage, 2007, n.p.). This policy enabled the creation of the LTAD and its commitment to the aforementioned goals of the policy (Canadian Heritage, 2007). The Canadian Sport policy also stipulates a need to increase Canada's research and knowledge base, specifically in "policy development and applied

and basic sport science for athlete/participant development" (Canadian Heritage, p.11). Nonetheless, to date there is very little scientific research published on Canada's LTAD model.

Research on Canada's LTAD.

The Canadian LTAD model has not been studied in depth; in fact, we found that only Black and Holt (2009) have published a refereed journal article on Canada's LTAD. However, there are a number of un-published articles (e.g., Parry & Kavanagh, 2009), reports (e.g., Banack & Bloom, 2009), and non-refereed research (e.g., Bayli & Way, 1995) that discuss the Canadian LTAD model. These types of material are difficult to obtain, and the data within them is not necessarily reliable. Interestingly, as mentioned above, other sport development models have been researched, and Canadian sport scientists have published peer-reviewed articles based on this research. Moreover, extensive research exists on European LTAD models that are implemented in countries like the UK (e.g., Ford, et al. 2011; Lang & Light, 2010). This research project is the first step in understanding how attributes of the LTAD model influenced the LTAD model's adoption or rejection by Canadian XCS coaches. The following section will introduce the only refereed article found on Canada's LTAD, one report, and one unpublished article.

Black and Holt (2009) evaluated the perceptions of coaches and parents on the implementation of an LTAD-based alpine ski program in Alberta. However, they did not use Rogers' (2003) innovation-decision process or the five attributes outlined within his theory. Black and Holt found that the LTAD-based program had the ability to make language consistent, update coaches' knowledge, and help coaches plan training sessions. However, there were few positive attitudes from coaches and parents were shown to have little knowledge of the LTAD or its principles. Despite Rogers' (2003) theoretical framework not being used, Black and Holt's

work provides interesting insights on the persuasive attributes of the LTAD and the decisions made by alpine ski coaches.

Banack and Bloom (2009) found that XCS coaches had a basic understanding of the LTAD model and its principles after completing the ICC course. These NCCP modules are one avenue for coaches to learn about the LTAD model and to develop an understanding of its principles. But are these learning situations sufficient to provide coaches an opportunity to form a decision about the LTAD model based on its attributes? Furthermore, will a coach take these principles and adopt them into his or her daily practices? Sufficient research does not exist to answer these questions; however, Banack and Bloom (2009) found that XCS "coaches attempted to integrate the principles of LTAD into their coaching practices" (p. 12). This project makes the first connection between a coach's experience with the LTAD model and his or her decision to adopt or reject its principles.

In an unpublished historical content analysis, Parry and Kavanagh (2009) linked the LTAD model to methods of athletic development used in Ancient Greece. They argued that "rather than being a new innovative approach to sports coaching, LTAD is a reflection of ideas and theories which were first introduced almost 3000 years ago" (Parry, & Kavanagh, 2009, p. 2). However, as discussed by Rogers' (2003), an innovation can be an old idea that has only just been introduced to a new social group. In this case, the LTAD has been re-introduced to a new generation of athletes and coaches. Canada's LTAD model is an innovation in the Canadian sport community; the adoption of which will be studied using Rogers' (2003) theoretical framework.

Theoretical Framework

As previously mentioned, the project uses Rogers' (2003) *Diffusion of Innovations* to understand how attributes of Canada's LTAD model affect a XCS coach's decision to adopt or reject the model. Rogers (2003) defines an innovation as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12). The LTAD model shows us that sport and PA were delivered inconsistently to Canadian athletes and change was necessary. The new model "differs from other athlete development models because it acknowledges that physical education, school sports, competitive sports, and recreational activities are mutually interdependent" (CSC, 2006, p. 15). The LTAD model approaches the training of athletes from a developmental perspective using stages of development instead of placing athletes into specific age groups as has been commonly done in the past (CSC, 2006). This way of coaching was new and innovative in the Canadian sport community and the XCS community when the model was first introduced.

Rogers' (2003) proposed that the decision to adopt and implement an innovation follows a predictable process. This process, known as the *innovation-decision process*, is divided into five stages that provide a holistic way to understand how an

> individual (or other decision-making unit[1]) passes from gaining initial knowledge of an innovation, to forming an attitude toward the innovation [persuasion stage], to making a decision to adopt or reject, to implementation of the new idea, to confirmation of this decision. (Rogers, 2003, p. 168)

This thesis focuses solely on the persuasion and decision stages of the innovation decision process; however, it is important to introduce the entire process.

[1] In this thesis, the decision-making units are XCS coaches and skiing communities; however, in this section the terms 'individual' and 'social system' are used to simplify the text.

Innovation-Decision Process

Rogers (2003) proposed that the five stages of the innovation-decision process are knowledge, persuasion, decision, implementation, and confirmation. These five stages are depicted in Figure 1 and definitions of each stage are listed below.

Stage 1: *Knowledge*- "occurs when an individual is exposed to an innovation's existence and gains an understanding of how it functions" (Rogers, 2003, p. 169).

Stage 2: *Persuasion*- "occurs when an individual forms a favo[u]rable or unfavo[u]rable attitude toward the innovation" (Rogers, 2003, p. 169).

Stage 3: *Decision*- "takes place when an individual engages in activities that lead to a choice to adopt or reject the innovation" (Rogers, 2003, p. 169).

Stage 4: *Implementation*- "occurs when an individual puts a new idea into use" (Rogers, 2003, p. 169).

Stage 5: *Confirmation*- "takes place when an individual seeks reinforcement of an innovation-decision already made, but he or she may reverse this previous decision if exposed to conflicting messages about the innovation" (Rogers, 2003, p. 169).

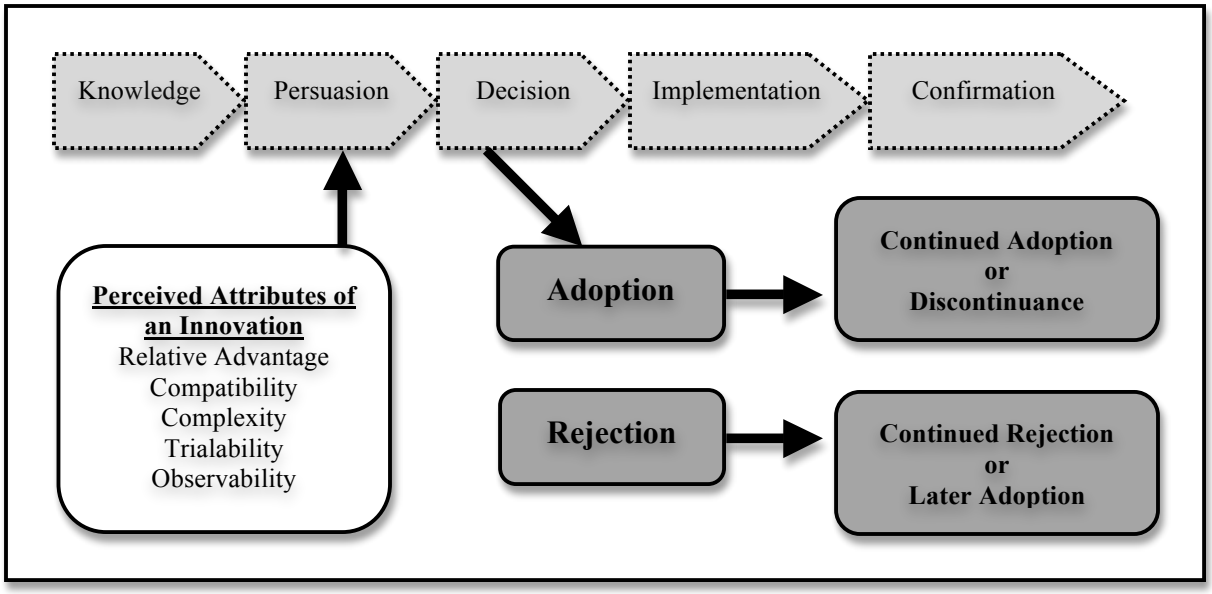


Figure 1: Rogers' (2003) Innovation-Decision Process

Attributes of adoption.

Attributes of an innovation, perceived at the persuasion stage, influence an adopter's decision to adopt or reject the innovation during the decision stage. As seen in Figure 1, five attributes persuade an individual's decision to adopt or reject an innovation. These five attributes are *relative advantage, compatibility, complexity, trialability,* and *observability*. Relative advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229). Research has identified that relative advantage is one of the strongest and most prevalent predictors of an innovation's rate of adoption[2] (Rogers, 2003). If an innovation is perceived to be highly advantageous to an individual, the innovation will have more acceptance and a quicker rate of adoption. Relative advantage can be experienced in different ways depending on the type of innovation; for example, an innovation could have economic, social, or technological advantages.

The second persuasive attribute of an innovation is its compatibility. Compatibility is the "degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 240). Compatibility is also a strong predictor of both an innovation's likelihood of being adopted and its rate of adoption within a social system. An innovation can be compatible or incompatible in terms of socio-cultural values or beliefs, previous ways of thinking, or the need for change in a social system.

The third attribute of adoption, complexity, is the "degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257). The amount of knowledge an individual learns about an innovation can increase or decrease an innovation's

[2] "Rate of adoption is the relative speed with which an innovation is adopted by members of a social system" (Rogers, 2003, p. 221)

perceived complexity. Attributes that are seen as complex (i.e., difficult to use, difficult to understand, and/or difficult to access) are less likely to be adopted by a social system.

The fourth attribute that can persuade an individual's decision to adopt or reject an innovation is trialability; that is, the "degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 258). Rogers explained that if an innovation can be broken down and adopted piece-by-piece, the innovation could be more easily adopted. The expense, time and resources required to adopt all or part of an innovation can influence its perceived trialability by an individual.

The final attribute that Rogers (2003) identifies, as influential to forming an adoption decision, is the observability of an innovation. Observability is the "degree to which the results of an innovation are visible to others" (Rogers, p. 258). These results can be seen in features of an innovation such as production values, profitability, and/or membership.

Attributes of adoption can act positively or negatively in relation to rate of adoption. Each positive attribute, with the exception of complexity, increases an innovation's rate of adoption. Positive complexity (e.g., something that is difficult to understand) is associated with a decreased rate of adoption. Positive attributes will persuade adopters to adopt an innovation, however negative attributes can persuade a potential adopted to reject the innovation.

Research Using the Diffusion of Innovations

Rogers' (2003) theoretical framework has been used in health and physical education research since the late 1970s (e.g., Jackson, Heron, & McLachlin, 1978). More recent research focuses on various innovations and their diffusion into different communities. For example, Rogers' theory has been used in health promotion research (e.g., Hopman-Rock, 2000), drug prevention (e.g., Simons-Morton, Donohew, & Crump, 1997), sport management (e.g., Newell &

Swan, 1995), and sports products (e.g., Schreiger, Oberhauser, and Prügl, 2007). Rogers' theory has also been used within case study methods and provides a valuable way to understand data.

Research Design

This Master's thesis is presented in two articles; the first article is presented as a case study analysis and the second as a descriptive qualitative analysis. Each article uses the data obtained from in-depth interviews with XCS coaches (n = 13). Interviews underwent thematic analysis using NVivo8 software and thematic conceptual matrices (Miles & Huberman, 1994) to organize cases (i.e., three club's coaches) and to identify themes within and across these cases as well as individual coaches.

Methods

The first article organizes 13 interviews with XCS coaches into a multiple case study of three distinctly different club's coaches. This multiple case study allowed for the coding of case-specific and cross-case themes within the data. A case study method was chosen to distinguish between coaches from each club and to show the differences in perceived attributes of coaches from each club.

Yin (2003) defined a case study as an inquiry that "investigates a contemporary phenomenon within a real-life context" (p. 13), where "there will be many more variables of interest than data points" (p. 13), will rely "on multiple sources of evidence" (p. 14), and benefit "from theoretical propositions to guide data collection and analysis" (p. 14). This study investigated the contemporary phenomenon of the adoption of LTAD, satisfying the first of four features of Yin's definition. Secondly, the study gained more than just one-word answers to the

questions posed. The study used a narrative interview guide[3] (Appendix B) allowing coaches an opportunity to explain in detail their perceptions of the LTAD model's attributes. By gathering narrative data from a case study of XCS coaches we obtained invaluable information that could not have been obtained through other venues such as surveys or archival analysis (Yin, 2003).

Thirdly, multiple XCS coaches from three different clubs were interviewed providing multiple sources of data, and allowed for variation in their personal characteristics (e.g., amount of experience, level of CE, and coaching roles), and a differentiation in the type of club each coach was a member of. This variation enabled the gathering of the unique lived experiences of each coach, as well as the common themes experienced by all XCS coaches.

Yin's (2003) last feature of a case study (i.e., theoretical guiding) was satisfied by the study's use of Rogers' (2003) *Diffusion of Innovations* theoretical framework. Rogers' theory guided the creation of the interview guide as well as to generate an initial coding structure for both analyses.

In addition, the study was exploratory in nature, given the paucity of research on LTAD, and was best suited to a case study methodology (Stake, 2006; Yin, 2003). Exploratory studies often use case studies to better understand a phenomenon of interest (Yin, 2003). Furthermore, diffusion researchers have used case studies to understand a wide variety of innovation adoptions, as seen in the work of Fitzgerald, Ferlie, Wood, & Hawkins (2002).

Case studies allow for the replication of themes within a single case study or across multiple cases. This replication leads to better-informed conclusions that are trustworthy (Stake, 2006; Yin, 2003). In a pilot study conducted by the researcher, XCS coaches understood certain attributes of adoption differently than other respondents; however, they also shared some

[3] The University of Ottawa gave ethics approval (certificate # 09-148-06.19) for this interview guide, and participants gave informed consent.

perceptions. Similarities and differences were partly dependent on their own set of personal characteristics and their club or interscholastic membership. Yin explained that "if under these varied circumstances you [the researcher] still can arrive at common conclusions" (p. 53), the research project will have some amount of generalizability. It is however understood that the generalizability of this thesis cannot extend past a population similar to that of the sample population (i.e., Canadian XCS club coaches).

In the second article data was presented as a descriptive qualitative analysis. This study analyzed data from each coach individually to gain an understanding of the personal lived experiences of each coach. Analysis of coaches as unique individuals allowed for the identification of similarities and differences between the perceived attributes of specific coaches.

Overview of the pilot study.

The aforementioned pilot study was completed to examine the validity of the interview guide in answering the research questions identified above. Three pilot interviews were conducted, transcribed, and analyzed using thematic analysis grids. The pilot sample group was made up of female (n=1) and male (n=2) XCS coaches, who volunteered at either a XCS school or club within the Ottawa-Gatineau region. A summary of the coaches' backgrounds and key results is found in Appendix C. Several changes were made to the interview guide after pilot study interviews were completed:

1. An additional question about trialability was added (i.e., how can the LTAD be used on a trial basis?).
2. Several questions were re-worded to evoke better narrative responses from participants.
3. One question was removed because it was decided that a majority of coaches would not have the appropriate knowledge to answer it (i.e., How could the LTAD be improved as

a working sport development model for XCS?).

Data collection.

Data for this project was collected using semi-structured narrative interviews. The main researcher completed 45 - 75 minute interviews with thirteen XCS coaches using the interview guide. Interviews were recorded, and then transcribed verbatim by the researcher. Transcriptions were then member checked, increasing the credibility and overall trustworthiness of the research study (Lincoln and Guba, 1985). Member checking provided participants an opportunity to address the intentionality of their responses. A complete discussion of trustworthiness is found later in this thesis.

Participants.

Participants were made up of male (n = 9) and female (n = 4) XCS coaches whose individual characteristics can be found in Table 1. Participants were required to meet a number of criteria to be involved in this study. Participants must have had one year of XCS coaching experience before and after the 2007 season, completed at least one new coach education module (competency based framework), and been a coaching member at a XCS club.

The first criterion was established to ensure that coaches had experience coaching before and after CCC's adoption of the LTAD took place. CCC's LTAD document was created and distributed to its clubs and coaches in 2007. This criterion ensured that: (1) participants had coached before the model was distributed, (2) participants had the opportunity to learn about the model, and (3) that participants had made a decision adopt or reject the LTAD model.

Table 1

Coach Characteristics Organized by Age & Coaching Experience

Coach	Gender	Age (years)	XCS Coaching Experience (years)	Type of Coach	New NCCP Courses (# Attended)	Old NCCP Courses (level completed)	Club Association (A, B, or C)
1	M	25 - 29	5 – 9	P	> 5	3	A
2	M	25 – 29	5 – 9	P	3 - 4	2	C [b]
3	F	25 – 29	10 – 14	P	> 5	3	A
4	F	30 – 34	5 – 9	V	1 – 2	1	A
5	M	30 -34	10 -14	P	3 – 4	3	C
6	M	30 – 34	10 – 14	V	3 – 4	2	B
7	F	40 – 44	5 – 9	V	1 – 2	0	B
8	F	40 – 44	5 – 9	V	1 - 2	1	B
9	M	45 – 49	10 – 14	V	3 – 4	2	A
10	M	50 – 54	10 - 14	V	1 – 2	2	C
11	M	50 – 54	20 – 24	V	3 – 4	2	A
12	M	55 – 59	15 – 19	V	3 – 4	3	B
13	M	60 – 64	30 +	V	3 – 4	3	C

Note: Abbreviations: F = female, M = male, V = volunteer, P = paid; coach education was an approximation by most coaches as they did not know how many courses they had taken that were under the new NCCP vs. another venue

Secondly, participants completed at least one NCCP module within the new competency-based framework, such as the ICC course. These modules could include both XCS specific (i.e.

through CCC) and a general NCCP courses. Most coaches were unclear as to the specific courses they participated in; however, many coaches remembered being in an Introduction to Community Coaching (ICC) course, as part of a pilot program and/or through a research study completed at one club. The ICC course provides a basic understanding of many of the principles included within the LTAD model (Banack & Bloom, 2009). The ICC course is included with the structure of CCC's coach education program and reflects the NCCP's community coaching ideals. A summary of these courses can be found in Appendix D. Both CCC and NCCP coach education modules include concepts and principles included within the LTAD model (e.g., specialization, and multiple sport). With the exception of two coaches (Coaches 4 & 10), all coaches within this study had attended the ICC course. Banack and Bloom (2009) found that XCS coaches who completed the ICC course had a basic understanding of the principles of LTAD, and attempted to adopt them into their daily practices. This criterion ensured that participants would have a basic knowledge of the LTAD model and could provide rich, meaningful narratives.

The last criterion was that participants must have been active[4] coaching members at a XCS club. During the pilot study conducted as part of this research project, both club coaches and interscholastic coaches were interviewed. It was found that the experiences of interscholastic coaches differed greatly from those of club coaches because the organizational structures, coaching experience, and coach criteria differ considerably. Many interscholastic coaches are not trained, and are in more of a supervisory role than a coaching role. Due to these differences, and to maintain a representative sample, only XCS club coaches were interviewed.

[4] Coach 2 and 5 were head coaches (paid) at Club C; however, Coach 2 left as coach 5 took over his role. This happened during the course of the study, and both coaches were interviewed.

Recruitment.

Seven XCS clubs were contacted using the information available on their websites and an initial list of coaches from three clubs was produced. These three clubs were chosen based on response rate and also using purposeful selection in order to represent the variation in structure and focus of Canadian XCS clubs. Six coaches responded to the first wave of emails and interviews were conducted with these participants. Subsequent participants were found through snowball sampling (Brewer & Miller, 2003) using contact information provided during the interview process. Participants were asked if they had suggestions for further participants at the conclusion of the interview; however, in most cases coaches offered information regarding potential future participants before being asked. This was a relative strength of using a narrative interview structure since participants naturally included other XCS coaches in their dialogues.

Interview Method

Narrative interviews encouraged a participant to tell a story about a significant experience in his or her life and within a specific social context (Jovchelovitch & Bauer, 2000). Elliott (2005) explained that narrative interviews help to organize a "sequence of events into a whole so that each event can be understood through its relation to that whole" (p. 3). Narratives were used to study a coach's decision to adopt or reject the LTAD model in relation to Rogers' (2003) innovation-decision process. Rogers' (2003) theory, in association with a narrative interview format, created a unique understanding of the adoption process experienced by XCS coaches.

Elliott (2005) identified three key features that must be present to classify an interview as a narrative: (1) a chronologic series of events, (2) a story that is meaningfully described, and (3) a story that is rooted in a specific social context. Narrative interviews illicit meaningful data because informants can reconstruct social events from their own perspective and as truthfully as

they recall (Jovchelovitch & Bauer, 2000). In this study it was important to allow coaches to express themselves freely. Mishler (1995) explained that the way a participant remembers and conveys a story could reflect the factors that influenced his or her behaviour. How a coach acted and verbalized his or her experiences with the LTAD model helped us understand how the coach perceived specific attributes of the model.

Elliott (2005) identified five common themes, or social contexts, where narratives have been used to collect data; this study falls within two of these themes. Narratives have been used when there has been "an interest in people's lived experiences and an appreciation of the temporal nature of that experience" (Elliott, 2005, p. 6). The lived experience, in this case study, is a coach's interaction with the LTAD model since its creation. Moreover, the adoption of LTAD is a process that requires time for coaches to learn, be persuaded, and decide to adopt the model.

Secondly, narratives have been used when there is "an interest in process and change over time" (Elliott, 2005, p. 6). One process of interest is a coach's practice, specifically how the LTAD has influenced change in his or her way of coaching. These changes allowed us to see how a XCS coach perceived certain attributes of the LTAD model, and what aspects of the model he or she adopted into his or her coaching practice.

Participants were asked to respond to three narrative questions representing the beginning, middle and end of a story (Bell, 2004; Elliot, 2005; Jovchelovitch & Bauer, 2000) as well as the three pillars of interest in this study: (1) coach history, (2) attributes of adoption, and (3) barriers to adoption. Each section was structured by a main question supported by a series of probe questions that deepened our understanding of each main question's purpose. These probes took the form of checklists that were disregarded as coaches naturally responded to them. As

identified above, a complete version of the interview guide can be found in Appendix B.

Data Analysis

Transcriptions were analyzed using NVivo8, computer software that helped to organize the data so that it was more easily understood (QSR International, 2007). NVivo8 helped to "manage, shape and make sense" (QSR International, 2007, n.p.) of the information obtained in each of the interviews. Côté, Salmela, Baria, and Russell (1993) explained that computer programs aid in organizing unstructured data and provide helpful ways to code and organize themes. NVivo8 does not physically analyze the data; instead, it helps to organize unstructured data to ease in the analysis of its content. This research study thematically analyzed data using thematic conceptual matrices (Miles & Huberman, 1994) to identify common themes. Miles and Huberman showed that these types of matrices allow researchers to organize data using conceptual or theoretical themes. The matrices used here were organized using Rogers' (2003) five attributes and through either club association (e.g., Article 1) or coach classification (e.g., Article 2[5]).

Thematic analysis is a "method for identifying, analyzing and reporting patterns [or themes] within data" (Braun & Clarke, 2006). Initial coding structures were designed with Rogers' (2003) five attributes as a foundation, and informed by the pilot interviews, which gave insight into what types of themes to look for. This analysis also looked at each part of the narrative in regards to the whole story (Elliot, 2005). By analyzing from a part/whole perspective a more holistic understanding of the attributes affecting a coach's adoption as part of the innovation-decision process was gained. Although each article used the same data, the analysis differed because of the different focus each article took.

[5] Article 2's analysis was initially organized into individual coaches; however, when the existence of four types of coaches arose, a reorganization of the matrix was prompted.

Analysis: Article 1.

For Article 1, XCS coaches from the three clubs were organized into three cases. Analysis began with case-by-case coding to identify attributes of the model perceived by each of the club's coaches. This phase allowed for the emergence of case-specific (*CS*) themes. Secondary analysis was conducted across cases to acknowledge the similarities and differences experienced by each club. This phase allowed for the coding of cross-case (C*C*) themes. The third and final phase of analysis involved the construction of thematic conceptual matrices (Miles and Huberman, 1994) that organized themes using Rogers' (2003) attributes of adoption.

Analysis: Article 2.

Article 2's objective prompted a slightly different analysis structure made up of 3 phases:

First Phase: Coaches' individual interviews were analyzed using Rogers' (2003) attributes as a pre-established coding structure. This phase allowed for the emergence of attributes as perceived individually by each coach.

Second Phase: The interviews were contrasted with one another and perceived attributes shared by all coaches emerged. These common attributes represented parts of the model that were perceived by a majority of coaches and could be generalized to a larger population of XCS coaches. These attributes are presented as 'cross-case themes' in Article 1 and were not presented in Article 2. Nonetheless, this stage provided a confirmation of the cross-case themes that emerged in Article 1.

Third Phase: Coach's personal characteristics were coded and highlighted and were then used to create a template for understanding the adoption of the LTAD model by classifying coaches into four types. Types of coaches within the classification allowed a further comparison of coaches' perceived attributes with their common characteristics.

Trustworthiness

An argument against qualitative research is the lack of validity that is enforced by qualitative methodologies. Lincoln and Guba (1985) identified several ways for qualitative researchers to increase trustworthiness within a study. They defined trustworthiness as the degree to which information obtained in a study is "worth paying attention to, [or] worth taking account of" (p. 290). Trustworthiness is influenced by how credible, transferable, dependable, and confirmable the data obtained is in regards to how data was obtained, analyzed and presented. By following techniques identified by Lincoln and Guba (1985) this research project obtained data that is trustworthy; triangulation, member checking, thick description, and a reflexive journal were employed to increase the data's trustworthiness.

Triangulation was used to address the credibility, dependability and confirmability of the data obtained (Lincoln & Guba, 1985). Triangulation is a technique where questions are addressed using multiple sources of data, theories, or researchers (Lincoln, & Guba, 1985). This study used multiple cases and coaches to understand how attributes of the LTAD influence coaches' decisions to adopt or reject the LTAD model. Multiple case triangulations (Article 1) ensure that the findings represent the experiences of a larger sample, and not of an individual coach. This study was also interested in an individual's unique experience with the LTAD model; however, these experiences cannot be generalized to the larger population of XCS coaches.

Member checking is "the most crucial technique for establishing credibility" (Lincoln & Guba, 1985, p. 314) within a qualitative research study. This technique verifies that, "data, analytical categories, interpretations, and conclusions are tested with members of those stake-holding groups from whom the data were originally collected" (p. 314) to ensure its authenticity.

Member checking provides participants a chance to (1) confirm the intentionality of their responses, (2) correct misinterpretation that occurred during analysis, and (3) offer further insight into the topic. This technique made certain that researchers understood the data accurately, and did not speculate about results. Participants were emailed their transcripts and a summary of results.

Thick description is a technique that increases the transferability of the data presented; that is, the degree to which results are transferable to other contexts of inquiry. Thick description in itself does not ensure transferability; however, it provides the information "necessary to enable someone interested in making a transfer to reach a conclusion about whether transfer can be contemplated as a possibility" (Lincoln & Guba, 1985, p. 316). Thick description was used in Article 1 and 2 to present the results and discussion of each case analysis.

Lastly, the reflexive journal identified by Lincoln and Guba (1985) addresses all aspects of trustworthiness, and provides a holistic account of a study's credibility, transferability, dependability, and confirmability. A reflexive journal is "a kind of diary in which the investigator on a daily basis, or as needed, records a variety of information about *self* (hence the term 'reflexive') and *method"* (Lincoln & Guba, 1985, p. 327). A properly constructed reflexive journal should include a daily schedule, a personal diary, a methodological log, and participant interaction log. The reflexive journal provided a useful guide to the evolution and theoretical grounding of this study. The reflexive journal of this researcher took the form of notes and electronic entries on analysis progression, decision rationales, and member-checking notes.

References

Abernethy, B., Côté, J., & Baker, J. (1999). *Expert decision-making in sport*. Canberra: Australian institute of sport publication. (Report)

Atlantis, E., Barnes, E. H., & Singh, M. A. F. (2006). Efficacy of exercise for treating overweight in children and adolescents: A systematic review. *International Journal of Obesity, 30*(7), 1027-1040. doi:10.1038/sj.ijo.0803286

Bailey, R., & Morley, D. (2006). Towards a model of talent development in physical education. *Sport, Education & Society, 11*(3), 211-230.

Baillie, P. H. F., & Danish, S. J. (1992). Understanding the career transition of athletes. *Sport Psychologist, 6*(1), 77-98.

Baker, J., Horton, S., Robertson-Wilson, J., & Wall, M. (2003). Nurturing sport expertise: Factors influencing the development of elite athlete. *Journal of Sports Science & Medicine, 2*(1), 1-9. Retrieved from http://www20.uludag.edu.tr.proxy.bib.uottawa.ca/%7Ehakan/sbtd/vol2/n1/1/v2n1-1.h

Banack, H., & Bloom, G. (2009). Promoting long-term athlete development (LTAD): Does the introduction to community coaching course promote the principles of LTAD? (Report)

Bayli, I., & Way, R. (1995) Long-term planning of athlete development: The training to train phase. *BC Coach, (no volume),* 2 – 10.

Black, D. E., & Holt, L. H. (2009). Athlete development in ski racing: Perceptions of coaches and parents. *International Journal of Sports Science & Coaching, 4*(2), 245 – 260.

Bloom, B. (1985). In Bloom B. (Ed.), *Developing talent in young people*. New York: Ballantine Books.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*, 77-101.

Brewer, D., D. & Miller, R., L. (2003). The A – Z of social research: a dictionary of key social science research concepts. London: SAGE Publications.

Bruner, M. W., Erickson, K., McFadden, K., & Côté, J. (2009). Tracing the origins of athlete development models in sport: A citation path analysis. *International Review of Sport & Exercise Psychology, 2*(1), 23-37.

Bruner, M. W., Erickson, K., Wilson, B., & Côté, J. (2010). An appraisal of athlete development models through citation network analysis. *Psychology of Sport & Exercise, 11*(2), 133-139.

Bruner, M. W., Munroe-Chandler, K. J., & Spink, K. S. (2008). Entry into elite sport: A preliminary investigation into the transition experiences of rookie athletes. *Journal of Applied Sport Psychology, 20,* 236 – 252. Doi: 10.1080/10413200701867745

Canadian Sport Centres. (n.d.). Canadian sport for life: A sport parent's guide. Ottawa, ON: Canadian Sport Centre. Retrieved May 4, 2011, from http://www.canadiansportforlife.ca/upload/docs/LTAD%20Downloads%20Eng/A%20Sport%20Parent's%20Guide.pdf.

Canadian Sport Centres. (2006). Canadian sport for life. Ottawa, ON: Canadian Sport Centre. Retrieved August 14, 2010, from http://www.ltad.ca/groups/LTAD%20Downloads/English?LTAD_Resource_Paper.pdf

Canadian Sport Centres. (2011). The Canadian sport for life rectangle. Ottawa, ON: Canadian Sport Centre. Retrieved May 4, 2011, from http://www.canadiansportforlife.ca/resources/cs4l-rectangle

Canadian Heritage. (2007). The Canadian Sport Policy. Author.

CCC. (2008). *Cross Country Canada- Athlete development.* Retrieved March, 3, 2010, from http://www.cccski.com/

Coaching Association of Canada (CAC). (2008). *Coaching association of Canada.* Retrieved April, 2010, from http://www.coach.ca/eng/

Côté, J. (1999). The influence of the family in the development of talent in sport. *Sport Psychologist, 13*(4), 395-417.

Côté, J. (2002). Coach and peer influence on children's development through sport. In J. Silva, & D. Stevens (Eds.), *Psychological foundations of sport* (pp. 520-540). Boston: Allyn and Bacon.

Côté, J., Baker, J., & Abernethy, B. (2007). Practice and play in the development of sport performance. In R. Eklund (Ed.), *Handbook of sport psychology* (3rd ed.) John Wiley & Sons.

Côté́, J., Baker, J. & Abernethy, B. (2003) From play to practice: a developmental framework for the acquisition of expertise in team sport. In J. Starkes & K. A. Ericsson (Eds*.), Recent advances in research on sport expertise* (pp. 89–114). Champaign, IL: Human Kinetics.

Côté, J., & Fraser-Thomas, J. (2007). Youth involvement in sport. In P. Crocker (Ed.), *Introduction to sport psychology: A Canadian perspective* (pp. 266-294). Toronto: Pearson Prentice Hall.

Côté, J., & Hay, J. (2002a). Children's involvement in sport: A developmental perspective. In J. Silva, & D. Stevens (Eds.), *Psychological foundations in sport* (pp. 484-499). Boston: Allyn and Bacon.

Côté, J., & Hay, J. (2002b). Family influences on youth sport performance and participation. In J. Silva, & D. Stevens (Eds.), *Psychological foundations of sport* (pp. 503-517). Boston: Allyn and Bacon.

Côté, J., Salmela, J. H., Baria, A., & Russell, S. J. (1993). Organizing and interpreting unstructured qualitative data. *The Sport Psychologist, 7,* 127-137.

Deakin, J. M., & Cobley, S. (2003). A search for deliberate practice: An examination of the practice environments in figure skating and volleyball. In Starkes, J.L. and Ericsson, K.A. (Eds.)*, Expert performance in sports: Advances in research on sport expertise* (pp.85-87, 115-135, 416). Human Kinetics: Champaign, Ill.

Durand-Bush, N., & Salmela, J. (2001). The development of talent in sport. In R. Singer, H. Hausenblas, & C. Janelle (Ed.), *Handbook of sport psychology* (pp. 269- 289). New York: John Wiley & Sons.

Durand-Bush, N., & Salmela, J. H. (2002). The development and maintenance of expert athletic performance: Perceptions of world and Olympic champions. *Journal of Applied Sport Psychology, 14*(3), 154-171.

Elliot, B. (2005). *Using narrative in social research: Qualitative and quantitative approaches*. London: SAGE.

Ericsson, K. A., Krampe, R. T., & Tesch-Roemer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review, 100*(3), 363-406.

Fitzgerald, L., Ferlie, E., Wood, W., & Hawkins, C. (2002). Interlocking interactions: The diffusion of innovations in health care. *Human Relations, 55*(12), 1429 -1449.

Ford, P., De Ste Croix, M., Lloyd, R., Myers, R., Moosavi, M., Oliver, J., Till, K., & Williams, C. (2011). The long-term athlete development model: Physiological evidence and application. *Journal of Sports Sciences, 29*, 389 – 402. doi: 10.1080/02640414.2010.536849

Fox, K., & Hillsdon, M. (2007). Physical activity and obesity. *Obesity Reviews, 8*(Supp. 1), 115-121.

Fraser-Thomas, J., & Côté, J. (2006). Youth sports: Implementing findings and moving forward with research. *Athletic Insight, 8*(3), 8-8.

Gilbert, W., & Trudel, P. (1999). An evaluation strategy for coach education programs. *Journal of Sport Behavior, 22*(2), 234-250.

Gowan, G. R. (1992). Canada's national coaching certification program (NCCP) - past, present, and future. *Journal of Physical Education, Recreation & Dance, 63*(7), 50-54.

Hopman-Rock, M. (2000). International congress on physical education, aging, and health. *Science and Sports, 15*(4), 180-186.

Ifedi, F. (2005). *Sport participation in Canada*. Ottawa, Canada: Statistics Canada.

Jackson, J. J., Heron, P. R., & McLachlin, H. J. (1978) Examing the diffusion of innovations in physical education, recreation, and sports settings: Methodology. *Review of Sport and Leisure, 3*(2), 93 – 111.

Jovechelovitch, S., & Bauer, M. (2000). Narrative interviewing. In M. Bauer, & G. Gaskell (Eds.), *Qualitative researching with text, image and sound: A practical handbook* (pp. 57-74). London: SAGE.

Lang, M., & Light, R. (2010). Interpreting and implementing the long term athlete development model: English swimming coaches' views on the (swimming) LTAD in practice.

International Journal of Sports Science & Coaching, 5(3), 389 – 419. Retrieved from http://www.multi-science.co.uk/sports-science&coaching.htm

Li, T., Rana, J., Manson, J., Willett, W., Stampfer, M., Colditz, G., Rexrode, K., & Hu, F. (2006). Obesity as compared with physical activity in predicting risk of coronary heart disease in women. *Circulation, 113*(4), 499-506.

Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: SAGE publications.

Martindale, R. J. J., Collins, D., & Daubney, J. (2005). Talent development: A guide for practice and research within sport. *Quest, 57*(4), 353.

McPherson, B. (1980). Retirement from professional sport: The process and problems of occupational and psychological adjustment. *Sociological Symposium, 30*, 126-143.

Miles, B. M., & Huberman, A. M. (1994). Qualitative Data Analysis. Thousand Oaks: SAGE Publications.

Misener, K. E., & Danylchuk, K. E. (2009). Coaches' perceptions of Canada's national coaching certification program (NCCP): Awareness and value. *International Journal of Sports Science & Coaching, 4*(2), 233-243.

Mishler, E. G. (1995). Models of narrative analysis: A typology. *Journal of Narrative and Life History, 5*(2), 87 – 123.

Newell, S., & Swan, J. (1995). The diffusion of innovations in sport organizations: An evaluative framework. *Journal of Sport Management, 9*, 317 – 337.

Parry, K., & Kavanagh, E. (2009). *Learn to walk before you run: Locating the origins of long-term athlete development in ancient Greece.* Manuscript submitted for publication.

Perkins, D., Jacobs, J., Barber, B., & Eccles, J. (2004). Childhood and adolescent sports participation as predictors of participation in sports and physical fitness activities during young adulthood. *Youth Society, 35*, 495-520.

QSR. (2007). *NVivo8.* Retrieved April, 14, 2010, from http://www.qsrinternational.com/

Robertson-Wilson, J., Baker, J., Derbyshire, E., & Cote, J. (2003). Childhood physical activity involvement in active and inactive female adults. *AVANTE, 9*(1), 1-8.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Schreier, M., Oberhauser, S., & Prugl, R. (2007). Lead users and the adoption and diffusion of new products: Insights from two extreme sports communities. *Marketing Letters, 18*, 15–30.

Simons-Morton, B. G., Donohew, L., & Crump, A. D. (1997). Health communication in the prevention of alcohol, tobacco, and drug use. *Health Behavior, 24*(5), 544-554.

Stake, R. (2006). *Multiple case study analysis*. New York: The Guilford Press.

Stambulova, N. B. (1994). Developmental sports career investigations in Russia: A post-perestroika analysis. *Sport Psychologist, 8*(3), 221-237.

Thompson, A., Humbert, M., & Mirwald, R. (2003). A longitudinal study of the impact of childhood and adolescent physical activity experiences on adult physical activity perceptions and behaviors. *Qualitative Health Research, 13*, 358-377.

Tremblay, M. S., Katzmarzyk, P. T., & Willms, J. D. (2002). Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity & Related Metabolic Disorders, 26*(4), 538.

Tremblay, M. S., & Willms, J. D. (2003). Is the Canadian obesity epidemic related to physical inactivity? *International Journal of Obesity, 27*, 1100-1105.

Trudel, P., & Gilbert, W. (2006). Coaching and coach education. In D. Kirk, D. Macdonald & M. O'Sullivan (Eds.), *The handbook of physical education* (pp. 516-539). London: SAGE.

Vargas-Tonsing, T. (2007). Coaches' preferences for continuing coaching education. *International Journal of Sports Science & Coaching, 2*(1), 25-35.

Wankel, L. M., & Berger, B. G. (1990). The psychological and social benefits of sport and physical activity. *Journal of Leisure Research, 22*(2), 167-182.

Warburton, D. E. R., Nicol, C. W., & Bredin, S., S.D. (2006). Health benefits of physical activity: The evidence. *CMAJ: Canadian Medical Association Journal, 174*(6), 801-809.

Weiss, M. R., & Raedeke, T. D. (2004). Developmental sport and exercise psychology: Research status on youth and directions toward a lifespan perspective. *In Weiss, Maureen R. |a university of Virginia (ed.), developmental sport and exercise psychology: A lifespan perspective,* Morgantown: Fitness Information Technology, p. 1-26.

Werthner, P., & Orlick, T. (1986). Retirement experiences of successful Olympic athletes. *International Journal of Sport Psychology, 17*(5), 337-363.

Werthner, P., & Trudel, P. (2006). A new theoretical perspective for understanding how coaches learn to coach. *Sport Psychologist, 20*(2), 198-212.

Wiersma, L. D., & Sherman, C. P. (2005). Volunteer youth sport coaches' perspectives of coaching Education/Certification and parental codes of conduct. *Research Quarterly for Exercise & Sport, 76*(3), 324-338.

World Health Organization. (1998). *Obesity: Preventing and managing the global epidemic: Report of a WHO consultation on obesity*. Geneva: World Health Organization.

Wylleman, P., Alfermann, D., & Lavalee, D. (2004). Career transitions in sport: European perspective. *Psychology of Sport & Exercise, 5*, 7-20. Doi: 10.1016/S1469-0292(02)00049-3

Wylleman, P., & Lavallee, D. (2004). A developmental perspective on transitions faced by athletes. In M. Weiss (Ed.), Developmental sport and exercise psychology: A lifespan perspective (pp. 507–527). Morgantown, WV: Fitness Information Technology.

Wylleman, P., Lavallee, D., & Alfermann, D. (Eds.). (1999). *Career transitions in competitive sports*. Retrieved from www.fepsac.com/index.php/download_file/-/view/31

Yin, R. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks: SAGE.

CHAPTER 2: ARTICLE 1
CROSS-COUNTRY SKI COACHES AND THE LTAD MODEL: EXPLORING ATTRIBUTES OF ADOPTION

Canadians have seen a rising incidence of sedentary behavior and obesity in youth (Tremblay & Willms, 2003), which has been linked to a decrease in physical activity (*PA*) and health (Warburton, Nicol, & Bredin, 2006). These trends led to the creation of the *Canadian sport policy* (Canadian Heritage, 2007) in an effort to increase sport and PA by the population and to address the positive impact it has on the healthy development of Canadian children (CFLRI, 2006). By following the policy's goals of enhanced participation, excellence, capacity, and interaction in all aspects of Canadian sport (Canadian Heritage, 2007), the Long-Term Athlete Development (LTAD) model became the backbone of a Canadian sport movement. It was thought that early involvement in sport and "support for a healthy, physically literate nation whose citizens participate in lifelong physical activity" (Canadian Sport Centres [*CSC*], 2006, p. 7) would gradually increase health in Canada (Ifedi, 2005).

Sport Canada's model for LTAD is a development model "based on the physical, mental, emotional, and cognitive development of children and adolescents" (CSC, 2006, p. 7). The model is made up of seven unique stages of development (1- Active Start, 2- FUNdamental, 3- Learn to Train, 4- Train to Train, 5- Train to Compete, 6- Train to Win, and 7- Active for Life) that identify and support the healthy development and growth of Canadians in both recreational and competitive sport (CSC, 2006). Two of the main principles of the LTAD, regardless of athletic focus, are that sport should be enjoyable and impact a person's entire lifespan. Over the past ten years, most Canadian sport organizations have recognized and modified the LTAD model to their sport specific needs. In fact, "federally funded Canadian sports are required to have a LTAD plan" (Black & Holt, 2009, p. 1). However, it is important to understand that the LTAD model is one among many models of athlete development that exists within the coaching literature. Other models of athletic and sport development take on different forms each with their

own unique set of outcomes and goals. Examples of this are seen in the work of Alfermann and Stambulova (2007) and Durand-Bush and Salmela (2001). Bruner, Côté, Erickson, and Wilson (2010) completed citation network analyses that examined types of athlete development models and their abundance within the literature. They found that most research focused on *talent-development* and *transitional models* in sport.

While creating the LTAD model, concepts were borrowed from talent development models (e.g., deliberate practice, social influences, environmental factors) and transitional sport models (e.g., life-long participation, role transition, recreational sport). This created a hybrid model with two main objectives: elite performance and life-long participation in sport and/or PA. The LTAD model represented a unique and innovative model within the body of coaching science by encouraging both early participation in sport, elite performance, and lifelong PA. Côté & colleagues (2002, 2007) proposed four possible benefits to meaningful participation in youth sport; (1) physical health, (2) psychosocial development, (3) motor skill acquisition, and (4) increased PA as an adult. However, for youth to experience meaningful participation in sport and PA, coaches must have sufficient training and knowledge to properly engage and develop their athletes. The LTAD is not only "coach driven" (CSC, 2006, p. 33), but also designed to educate coaches about principles of LTAD. In Canada, coach education is accomplished through sports clubs (e.g., local clinics), national sport organizations (e.g., CCC courses), and sport specific training (i.e., Canadian Association of Nordic Ski Instructors), however the most notable venue is the National Coaching Certification Program (*NCCP*).

Although National Sport Organizations, sport clubs, and sport associations distribute sport specific LTAD models and resources, the NCCP is the largest contributor to coaches' knowledge of the model. The NCCP is a large-scale coach education program that has become

the "recognized national standard for coach training and certification in Canada" (Coaching Association of Canada [*CAC*], 2008, n.p.). It was developed to distribute a standardized coaching curriculum, including coaching skills, training techniques and coaching knowledge, to as many coaches as possible (Gowan, 1992; Trudel, & Gilbert, 2006). Currently the NCCP is a competency-based program that embodies many of the principles of the LTAD model. Recently Banack and Bloom (2009) found that introductory modules of the NCCP and CCC, such as the Introduction to Community Coaching (*ICC*) course, provide coaches (XCS club coaches) with a basic understanding of the LTAD model.

This research project is unique and provides an important link within Canadian coaching science on the LTAD model, sport clubs, and sport coaches. A review of literature found that a large amount of peer-reviewed research exists on Canadian health, development models, and coach education, but a scarcity of refereed research on Canada's LTAD model (viz., Black & Holt, 2009). There is however an abundance of unpublished research (e.g., Parry & Kavanagh, 2009), non-refereed research (e.g., Bayli & Way, 1995), and reports (e.g., Banack & Bloom, 2009) as well as some research on early versions of Bayli's model (e.g., Ford et al., 2011).

Black and Holt (2009) evaluated the perceptions of coaches and parents on the implementation of an LTAD-based alpine ski program in Alberta. They found that the LTAD-based program could allow coaches to: (1) have consistent language, (2) update their knowledge, and (3) more easily plan training sessions. Nonetheless, there were few positive comments from coaches, and parents had little knowledge of the LTAD or its general principles. Black and Holt's research is valuable, but does not provide information on the perceived attributes of the LTAD model as experienced by a sport community (i.e. coaches, clubs, and/or NSO's). This

project is the first step in understanding the adoption of LTAD as Canada's national model and how coaches perceive it within their sport context.

Therefore, the purpose of this study was to better understand the adoption of Sport Canada's LTAD by Canadian sport coaches. Even though most Canadian sports have recognized this model, it is unclear whether sport clubs or their coaches have adopted the model. This project was interested in establishing whether cross-country ski (*XCS*) club coaches adopted or rejected the model and secondly how attributes of the model influenced their decision to adopt or reject it. The following research questions, developed using Rogers (2003) theory on the *Diffusion of Innovations*, guided the project.

1. What are the perceived attributes of the LTAD model as experienced by XCS coaches?
2. How do these attributes influence a XCS coach's decision to adopt or reject the LTAD model?
3. How do coaches from different XCS clubs perceive the attributes of the LTAD model?

Theoretical Framework

Rogers' (2003) *Diffusion of Innovations* is a theoretical framework that provides a way of understanding the lifecycle of an innovation within a social context. An innovation can include, but is not limited to, tools, processes, technologies, and in this case ways of thinking or models of behaviour. Although the theory itself is not geared specifically to sport research, it has been previously used in this discourse; for example, Rogers' theory has been used in health promotion research (e.g., Hopman-Rock, 2000), drug prevention studies (e.g., Simons-Morton, Donohew, & Crump, 1997), sport management (e.g., Newell & Swan, 1995), and sport equipment use (e.g., Schreiger, Oberhauser, and Prügl, 2007). Rogers' theory has also been used within case study methods and provides a valuable way to understand data.

This study uses the innovation decision process (Figure 1) of the theory to understand how XCS coaches move from their initial knowledge about the LTAD model until their eventual implementation or rejection of the model (Rogers, 2003). The focus of this project will be on the persuasion and decision stages of the process. These two stages enabled us to understand how

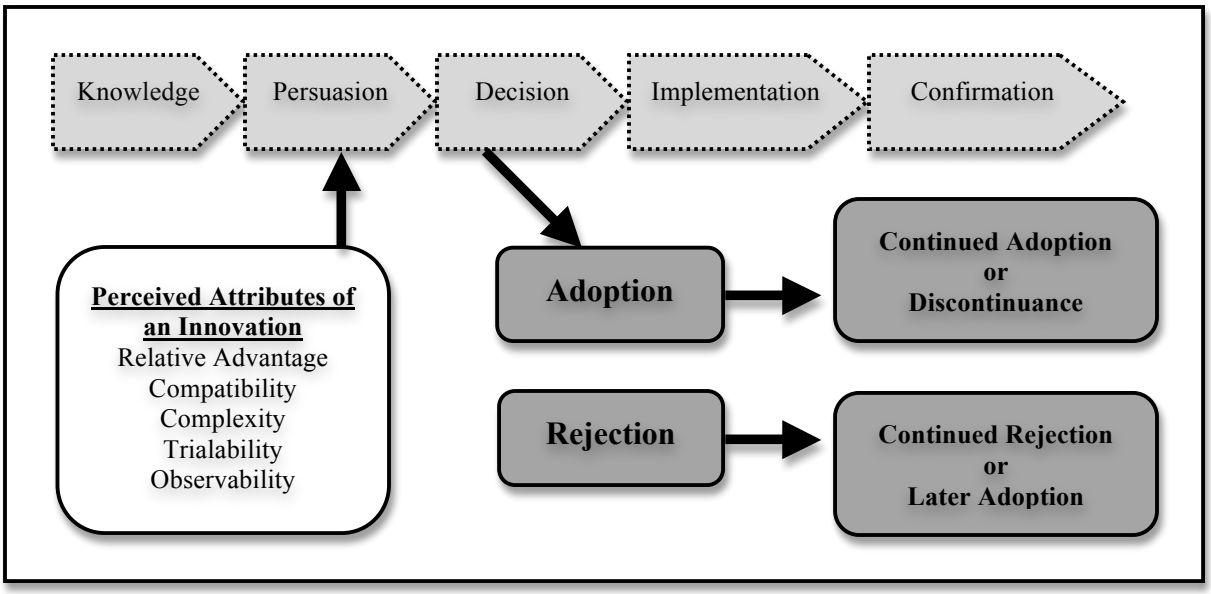


Figure 1: Rogers' (2003) Innovation-Decision Process

five key attributes of the innovation (i.e., the LTAD model) persuaded XCS coaches' decisions to adopt or reject the LTAD model into their coaching practice.

The five attributes affecting the decision to adopt or reject an innovation are as follows:

1- *Relative Advantage*- "degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229).

2- *Compatibility*- "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 240).

3- *Complexity*- "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257).

4- *Trialability*- "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 258).

5- *Observability*- "the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258

Methods

This article is the first step to better understanding the adoption of the LTAD model by sport coaches. XCS coaches were interviewed in order to gain an understanding of club coaches' adoption of the model. Rogers' (2003) suggests that the structure of a social system can influence factors at multiple stages of the adoption process. But, no research has been found connecting a sports club's unique structure or the characteristics of its coaches' to the perceived attributes of an innovation. This project provides new information on how a club's size, focus, and structure can influence their coaches to adopt the LTAD model.

A multiple case study design was used to structure the data and answer the research questions outlined above. According to Stake (2006) and Yin (2003), the use of multiple cases allows for the replication of themes within and across cases and leads to better-informed conclusions.

Recruitment

Seven XCS club's coaches were contacted using the information available on websites. From this initial contact, a list of coaches from three clubs was produced. These three clubs were chosen based on response rate and to represent the different sized XCS clubs within Canada. Six coaches responded to the first wave of emails and interviews were conducted with these participants. Subsequent participants were found through snowball-sampling methods (Haber & Singh, 2009) using contact information gathered during the interview.

Several selection criteria were put in place for participants to be included within the sample group. These criteria ensured that coaches would have the knowledge and experience to answer most questions included in the interview guide. Coaches had to have coached at least one year before the 2007 XCS season and at least one year after this season. This date was chosen to ensure that participants had experience coaching before and after the creation and dispersal of the LTAD model by Cross-Country Canada (*CCC*), which occurred in the 2007 season. Additionally, coaches must have attended at least one NCCP module under the new competency-based framework. A majority of XCS coaches (n = 11) interviewed had completed the ICC course, which provides a "basic understanding of the LTAD" (Banack & Bloom, 2009, p. 12). The final criterion was for coaches to be an active coaching member of a XCS club; this was ensured by the recruitment strategy identified above. Coaches not meeting the above criteria were not included within this case study; alternatively, they were encouraged to partake in a larger study of Canadian coaches presently being done.

Participants & Case Profiles

As presented in table 1, XCS coaches (N = 13) were interviewed from three different XCS clubs located in Ontario and Quebec. Each case was made up of 4-5 coaches from a single club, thus creating up a multiple-case study of three XCS club's coaches. Coaches were male (n = 9) and female (n = 4) with various amounts of experience, coach education, and athletic background[6]. Coaches were identified by their club membership to acknowledge the differences in club focus, size, and structure (Table 1) within XCS communities in Canada. Moreover, XCS clubs are responsible for educating their coaches on the LTAD, but do not share a standardized

[6] A second article is also submitted for publication; it presents an analysis and comparison of an individual coach's characteristics with his or her perceived attributes of an innovation.

method for the dispersal of this knowledge. The differences between case participants produced a rich amount of data that could be compared to the characteristics of each participant's club.

Table 1

Summary of Club Characteristics

Characteristic	Club A	Club B	Club C
# of interviewees	n = 5	n = 4	n = 4
# of paid coaches	2	0	2[a]
Membership	>1000	<400	400-1000
Type of club	Co-op	Volunteer	Community
Coach education	Facilitated, on-site	Supported, off-site	Info provided, off-site
Club focus	Competition	Learn to ski	Community centered

Note. Information has been gathered from interviews and from content analysis of club websites. a) Two coaches from club C were paid coaches; however, one coach left the role as another took over. This happened during the course of the study, and both coaches were interviewed.

Data Collection

A narrative interview guide was developed to interview participants. Thus, during data collection participants were encouraged to tell a story rather than answer a standardized set of questions about their experience with the LTAD model. Elliott (2005) explained that narrative interviews help participants to organize a "sequence of events into a whole so that each event can be understood through its relation to that whole" (p. 3). The interview guide was divided into three sections representing the beginning, middle and end of a story (Elliot, 2005):

1- *Coach History*- Tell me about you as an athlete, and as a coach; what your background is in sport, and how you got started.

2- *Determinants of Adoption*- Tell me about your experience with Sport Canada's model for long-term athlete development and how you first perceived the LTAD model in your ski club

3- *Perceived Barriers of Adoption*- What would be the ideal situation if you were to adopt LTAD in its entirety?

Each section was structured using a main question and then supported by a series of probe questions that deepened our understanding of a coach's experience. Probe questions (e.g., What do you enjoy most about coaching?) took the form of checklists that were disregarded when the participant responded to them naturally. The University of Ottawa gave ethics approval for this interview guide, and participants gave informed consent. Interviews lasted between 45 and 75 minutes, were digitally recorded, and were transcribed verbatim by the lead researcher. Participants were given an opportunity to member check their transcripts and confirm the responses they provided, according to the protocols of Lincoln and Guba (1985).

Trustworthiness

Lincoln and Guba (1985) explained that trustworthiness is influenced by how credible, transferable, dependable, and confirmable the data obtained is with regard to how the data was obtained, analyzed and presented within a study. Trustworthy data in this study was obtained through triangulation of cases, member checking, a reflexive journal, and thick description of results and discussion (Lincoln & Guba, 1985).

Data Analysis

Transcriptions were analyzed using QSR NVivo8 software that helped to organize, structure and understand the data. Interviews were grouped in cases and coded using a thematic structure derived from Rogers' (2003) five attributes. The coding structure was flexible enough

to allow for the emergence of new themes; however, these emergent themes were then categorized as sub-themes under Rogers' original five attributes. For instance, the retention of athletes was initially viewed as a separate theme; but upon further thought and discussion it was agreed that it fit under relative advantage, compatibility, and observability depending on the context, club association, or individual coach.

Analysis began with case-by-case coding to identify attributes of the model experienced by each club's coaches. This first phase allowed for the emergence of case-specific themes. Secondary analysis was conducted across cases to acknowledge the similarities and differences experienced by each club's coaches. This phase allowed for the coding of cross-case themes. The third and final phase of analysis involved the construction of thematic conceptual matrices (Miles and Huberman, 1994) that organized themes using Rogers' (2003) attributes.

Results & Discussion

LTAD was designed as a life-long model for athletic development based on several key principles from coaching science. Each principle of the model was included to work hand in hand, as a holistic model, and "acknowledges that physical education, school sports, competitive sports, and recreational activities are mutually interdependent" (CSC, 2006, p. 15).

Parry & Kavanagh (2009), and most XCS coaches in this study, agreed that the LTAD model is not a new innovation. Instead, they identify that it is the first time all these ideas and principles have been put together to create a holistic developmental model. One coach explained:

> There are some fundamental principles about learning; how people learn, how people are motivated, the benefits of sport etc. that are incorporated into this model…But they are really a lot of basic truths about human nature [and] learning, and reflect more on common sense practices. It is great that they are now in one place, and provide structure and

function to the sport aspect of learning, but it is not the be all and end all of Canadian sport. It is just a framework, not a new thing. (Coach 7, Club B)

Results of this study indicate that coaches adopt certain aspects of the model more favourably, and that the unique characteristics of their club can influence that adoption. Rogers' (2003) attributes provide a template to understand how characteristics of the model influence its adoption into a coach's overall coaching practice.

Case-Specific Themes

Each club's coaches had unique experiences with the LTAD model and these experiences were categorized as case-specific themes. These themes were experienced by a majority (3-5) of coaches in a single club, or two separate clubs. Themes experienced by coaches in two clubs were linked to a characteristic shared by those clubs (e.g., size, focus, or coaching staff). Case-specific themes are shown in Table 2 and will be compared with the unique characteristics of each club (Table 1).

Themes were further categorized as positive (+) or negative (-). In most instances a positive attribute will increase the adoption of an innovation, while a negative will increase its rejection by a community. One exception to this rule is complexity; in that, a community will less favourably adopt elements of an innovation that are more positively complex.

Club A.

Club A was classified as a large club with a competitive focus. Coaches in club A regularly updated their coaching knowledge through on-site coach education facilitated by NCCP certified coach. This high level of participation in coach education likely led to most coaches from this club finding that the LTAD was generally not difficult to understand. One coach said, "as I get into further coaching education, there is a lot of information out there, and there is a lot

of information that coaches need to plan and consider, but it makes it [LTAD] easier to understand" (Coach 4, Club A). There was, however, a level of difficulty associated with certain concepts such as the windows of trainability. Specifically, how accurate or scientifically proven these concepts are.

Table 2

Case Specific Themes Identified Through Thematic Analysis

Attribute	Case Specific Themes	Club A	Club B	Club C
Relative Advantage	(+) Facilitated (on-site) coach education, consistency in programming, communication tool, retention, flexibility of the model	■		
	(+) Increase participation bottom-up			■
	(-) Time commitment	■	■	
Compatibility	(-) Optimal windows of trainability	■		
	(-) Does not address special populations		■	■
	(-) Connotations of the name 'LTAD'		■	
Complexity	(-) Coach education makes LTAD easier to understand	■	■	
	(-) Easy to understand	■		
	(-) Optimal windows of trainability	■		
Observability	(+) Word of mouth through coaches	■	■	
	(+) Measurable improvements, Istvan Bayli	■		
	(+) Results from other clubs		■	■
	(-) Early adopter	■		

One coach offered that there was a "little bit of contention over how accurate that is [the windows of trainability]; the argument is that Balyi only sourced his own studies when he wrote

that" (Coach 3, Club A). There is some agreement from other clubs, but more research is needed to determine whether this belief is common among XCS coaches and other sport coaches.

Club A's coaches expressed that even though it is difficult to initially get parents to understand, the LTAD model acts as a valuable tool for communication with parents and athletes. Coaches expressed a variety of ways that the model was used for communication including goal setting, developmental stage selection, and athletic burnout. One coach solidified this by explaining that

> you are able to sit down…and explain [to athletes/parents] what the LTAD model is, [and] what the goal of us working together is; not necessarily that it is having you peak at 15, [and] not to make you the fastest skier at nationals, but to have you get as far as you want to go or can go in sport with this long-term vision in mind. (Coach 9, Club A)

Club A's coaches perceived that their program provided a level of quality and consistency unlike any other in the area; a belief shared by many coaches in Club B and C. Club A standardized the language they used from one training group to another and coaches agreed that it was a major asset to a child's understanding and progression. This consistency in language, corroborates Black and Holt (2009) who found it to be a perceived strength of LTAD-based programs. Black and Holt also saw the consistency of skill progression from one group to another as strength of these programs.

The consistency of training may have influenced the visible retention rate of athletes, coaches, and parent volunteers that coaches from Club A experienced. One coach expressed that "they cannot get rid of athletes" (Coach 3, Club A) because of how successful their programs are, and responded by hiring a second full-time coach. This retention rate was coded as a relative advantage; however, it was also noted that it could act as either a compatible or observable

attribute in XCS clubs. Retention or growth is one of the goals of Club A in order to expand the club as a business, and thus clearly compatible with the club's values and goals. In the same line of thinking, other club's coaches view the increasing numbers at Club A as observability, and are more likely to adopt the model to experience the same success. Club B and C's coaches expressed an awareness of Club A's growth in relation to the LTAD model; in fact, one coach said that "other clubs were asking us about it [the LTAD] because it was clear that there was a movement [here], or a change in our club's structure" (Coach 9, Club A).

Coaches in Club A experienced self-observability of the model, in terms of their athletes own results. Coaches from Club B nor Club C saw the same self-observability. One reason for this self-observable awareness was that the Club A was an early adopter of the model. Coaches had many conversations about the LTAD with other coaches, clubs, and course facilitators. However, the most observable change-agent[7] of the model was perceived to be Dr. Istvan Balyi who motivated coaches to adopt the LTAD at conferences and seminars. Coaches in Club A also observed and measured steady improvements in their athletes over a season. One coach said, "seeing that progression is really nice for athletes, coaches, parents, and pretty much anyone involved" (Coach 1, Club A). This steady improvement seemed to have an impact on the continued adoption of the LTAD by coaches at the club and the strong support they received from parent volunteers.

Club B.

Club B had a Learn-to-Ski (L2S) philosophy, and encouraged life-long recreational outcomes rather than competitive goals. One coach solidified that

[7] Change agents are individuals who act as motivators within a community for the adoption of an innovation (Rogers, 2003).

> the bread and butter [at our club] is the learning how to ski part; we don't focus on competition at all. I don't think a lot of parents care about it; they are just there to have their kids learn how to ski, and learn to love skiing so they can go on family ski trips on the weekends. (Coach 8, Club B)

Secondly, Club B coaches were encouraged to update their knowledge, but did not offer the same on-site opportunities as Club A. This lack of access seemed to be because of a lack of facilities available to Club B, and by no means reflects the importance placed upon coach education.

Coaches from this club had a negative impression of some attributes of the LTAD model that were consistently related to the recreational nature of the club, and the importance placed on special populations of skiers (e.g., L2S, late-comers to sport, and Para-Nordic skiers). This club created a program to address latecomers to XCS who did not fit into one single developmental stage. A coach from Club B explained that:

> because there is this logical progression [in the model] that starts when kids are quite young, it can be that the older kids are not as actively recruited or brought into the stream. And when they are recruited and brought in they don't quite fit anywhere." (Coach 7, Club B)

Coaches from Club C shared the view that certain populations are not included in the model. They explained that skiers who do not want to compete but wish to continue training at the same level are sometimes lost in the mix.

A strong view from coaches in Club B was the dislike of the model's name in relation to one of its main goals. Canada has since changed the name from LTAD to "Canadian Sport for life"; however, the front cover of the resource paper still displays "Long-term Athlete Development" at the top. One coach shared that she

> felt a little bit intimidated [by the name]...both the 'long-term' aspect, which suggests progression from very young until old which might sound and feel a bit exclusive to those joining last minute, or later in life; I mean that isn't long-term if you start at my age. And the word 'athlete' because clearly I am not an athlete, and have never considered myself an athlete, so to be coaching in a program that follows a model based on athlete development makes me feel under qualified. It also raises some concerns with parents over whether their child is in too much of a competitive atmosphere. (Coach 7, Club B)

Club B's coaches expressed the need for all coaches in the XCS community to "stop referring to it as LTAD, and start referring to it as Sport for Life, as the newest title suggests. It would gain much more acceptance" (Coach 12, Club B)

Club B saw the change in Club A's performance and its retention in numbers since the adoption of the LTAD model. Club B's coaches linked the visible success of Club A's adoption with its competitive focus as a XCS club. One coach explained that "it is so different to see the focus of other clubs as far as racing vs. recreational vs. adventure skiing. We are all very different in what we focus on, and how this model can be used" (Coach 8, Club B).

Club C.

The third club had an entirely different focus as a XCS club. Club C's coaches described themselves as a community-centered club based on inclusion through learn to ski programs, adventure skiing, and biathlon. There is a new competitive program under development but as one coach describes "it is still in its infancy" (Coach 5, Club C). The main relative advantage seen by Club C's coaches was the potential to increase the number of skiers at the introductory levels thus "maintaining a recreational base that can support the upper tiers of the sport" (Coach

5, Club C). This idea encouraged a life-long vision of the Canadian sport system by supporting increased lower-level sport programs.

Club C's coaches, along with coaches from Club B, hold the opinion that special populations fall between the cracks of the LTAD model. Coaches from Club C added that adventure programs fill a void within the model for those skiers who do not want to compete in a traditional environment, but want to continue to train. Adventure programs allow this compromise and encourage athletes, who might normally quit, to stay in the sport. Similar to Club B, this club's coaches saw the growth and results from Club A and believed that this growth was, in part, resulting from the new training groups modeled on LTAD's stages of development.

Cross-Case Themes

The other types of themes that emerged during analysis were cross-case themes. These themes were experienced by a majority of coaches in all cases and could possibly be generalized to other XCS clubs. Table 3 displays the cross-case themes that emerged within each of Rogers' (2003) attributes. There were no cross-case themes attributable to trialability or observability; and so, they were not included within the table. Rogers explains that trialability and observability have the least affect on a community's decision to adopt an innovation and adopters often have difficulty perceiving these attributes.

Relative advantage.

Coaches in XCS clubs identified that the LTAD is an organized set of existing ideas, but that the amalgamation of FUNdamentals, life long sport, cross training[8], and developmental stages are advantageous to the XCS environment. These elements had a common link to the belief that sport should be fun and enjoyable for all. Interestingly, this concept also emerged as compatible with a XCS coach's existing values (identified by coaches). This may be the reason

[8] Through multiple sport participation

that coaches perceive these elements of the model as relative advantages. A solidification of this compatibility can be seen in the quotation from Coach 3 (Club A) who said, "it jived with my own personal belief[s] enough that my fundamental value system didn't have to change at all."

Table 3

Cross Case Themes Identified Through Thematic Analysis

Attribute	Cross-Case Themes
Relative advantage	(+) FUNdamentals, multiple sport participation, lifelong vision, and developmental stages
	(-) Resources not accessible
Compatibility	(+) Sport should be fun, life long vision, and large club size
	(-) Expensive to implement, time commitment and CCC's current competition model
Complexity	(+) Parental understanding minimal
	(-) Coach education increases understanding of LTAD

One coach explained that "the main goal [of the LTAD model] is to be active for life, and really that is a great message" (Coach 4, Club A). Another coach linked being active for life to the encouragement of multiple sport participation. This coach stated:

> You don't necessarily want to encourage them [athletes and/or parents] to participate in one sport to the detriment or decline of others…What I came around to realizing is that if a child decides to follow another sport path in the end, that is still a success, in as much as they are continuing to follow an active lifestyle. (Coach 12, Club B)

Coaches also agreed that FUNdamentals helped to encourage this life-long perspective by making early experiences with sport fun and enjoyable. Research has shown that these early experiences impact a person's involvement in sport and PA later in life; therefore, those who enjoy sport as a young child are more likely to engage in it as an adult (Perkins, Jacobs, Barber, & Eccles, 2004; Thompson, Humbert, & Mirwald, 2003). Many coaches saw an immediate impact of playing fun games instead of structured drills on the overall skill development experienced by children. One coach provided the following example of a FUNdamental strategy for improving XCS technique.

> In order to teach a lengthening of stride, and how different it is when you really hold that glide, I do a monkey soldier vs. wooden soldier on skis. So in one instance you are stiff and rigid, in the other your legs are sort of swaying on skis. They really like that because it's a fun way to get them to feel how much better, and more effective it is when their knees aren't locked and stiff. (Coach 8, Club B)

Developmental stage was also linked to making sport enjoyable. Clubs identified that fitting athletes into proper stages of development allowed them to progress at the appropriate rate each season, and they were more engaged in each training session as a result. Coaches clarified that this type of grouping decreased athletic burnout and helped parents understand where their child fit within the model and why. One coach said:

> We have a huge range [of athletes], and we have got fairly big groups, so we have the ability to group them A) age appropriate[ly], B) skill appropriate[ly], and C) once that all fits, size appropriate[ly]. So you take all of those pieces and you put groups together, and when you lump them like that, the groups make sense and you have backing for why the groups happen. (Coach 4, Club A)

Another coach explained that using the development stages to group athletes "helps the parents understand where their child is in terms of moving through the program" (Coach 3, Club A).

Parental understanding has an interesting role in the decision to adopt the LTAD model. Coaches appreciated the information the model provides to parents in terms of where their child is developmentally. However, they indicated that it is difficult to have the majority of parents fully understand the more technical aspects of the model and often explaining it leads to more work for the coaches. One coach told us:

> Because parents are not well versed in LTAD, I need to reword the aspects of LTAD to something they are familiar with, but it really is difficult for them to understand especially for those parents who can't get their heads around the unique development of their child. (Coach 2, Club C)

Compatibility.

Some of the attributes of the LTAD model that were found to be compatible overlapped what was also coded as relatively advantageous to coaches. Cross-case examples of this overlap include FUNdamentals and life-long vision. Both these concepts are connected to a coach's belief that sport should be fun and enjoyable. One of the main goals and objectives of FUNdamentals is that sport should be about "FUN and participation" (CSC, 2006, p. 9), and that basic skills should be "introduced through fun and games" (p. 20). These objectives impact an athlete's initial love of sport, and influence their participation over a lifetime (Côté & Fraser-Thomas, 2007).

Club size played a role in the adoption of the LTAD as well. It was found that coaches in larger clubs would more easily adopt the model because of increased access to resources such as other coaches, athletes, parents, funding, and facilities. However, one coach explained that it is

not necessarily the size of the club, but rather the ratio of athletes to coaches in each training group. He held that "it also works in a smaller environment, or rather one with a better coach-to-athlete ratio in terms of having the ability to individualize athlete programs" (Coach 5, Club C). Another coach added that "the need for coaches dedicated to athlete development is crucial, and it really helps to have a full-time coach that can spend the time on developing individual plans for athletes that are developing either more quickly or slower than others" (Coach 2, Club C).

A negatively compatible attribute that paralleled this theme was the shift towards a paid coaching staff. Coaches identified the need for a full-time paid staff member in order to address individualized developmental programs; however, they explained that this requires monetary resources that simply do not exist in smaller clubs. Along with a lack of funds, the time commitment required to adopt the LTAD model was coded as a negatively compatible attribute. One coach explained that coaches "have to be willing, and have the time to commit to learning about the model" (Coach 7, Club B).

Coaches also saw the current competition model developed by CCC as incompatible with how the LTAD is shaping cross-country skiing in Canada. One coach clarified that

> LTAD is great, but one of the big hiccups right now is that our competitive models don't line up with LTAD. Right now I can be as sensitive to LTAD principles, stages, and theory, but in the end our competitive model doesn't mimic those directives. (Coach 5, Club C)

There is a sense that the competition model is changing to align with the LTAD model; however, one coach called it "an ongoing struggle" (Coach 3, Club A) with CCC.

Complexity.

Another ongoing struggle for clubs is the knowledge and understanding that coaches and parents have about the LTAD model. Many coaches, specifically in Clubs B and C, found concepts of the LTAD difficult to understand, and inferred that parents have even more difficulty with them. The difficulty in coach understanding was linked to the amount of coach education they had taken. One coach explained that "initially it was a tad difficult; however, after taking more coach education, it became clearer as to what they were saying, and how the [LTAD] model was designed to work" (Coach 2, Club C). As coaches updated their knowledge and participated in NCCP courses, their understanding of the LTAD and comfort level during adoption improved, similar to Banack and Bloom's (2009) findings.

Parental understanding was coded as a complex attribute of the LTAD model; that is, parents had the most difficulty understanding its concepts. Black and Holt (2009) corroborated this result and explained how 'parents' knowledge of the program appeared to depend on the extent to which their child's coach communicated with them" (p. 253). Results from the current study show that parental understanding was addressed at clubs through annual meetings where parents were provided with information regarding the LTAD model. However, coaches did play a role in parental understanding through their regular communication with parents at practice. The continued attempt to increase parent knowledge was well experienced by coaches in club A. Coaches explained that parents' understanding of the model was of crucial importance during the adoption at their club. Coaches added that it becomes a burden for them when they have to continually explain the model to each parent. This adds to the time commitment required to effectively adopt the LTAD model into their coaching practice. Time required to adopt the innovation was coded as an incompatible attribute of the model.

Adoption Decision

Coaches in different clubs experienced the innovation-decision process differently, most notably in who the change agents were at the decision stage. Larger clubs (A & C) had regular meetings of the club executive who mandated the decision to adopt the LTAD model into their club's structure. One coach from Club A explained that a five-year plan was put in place by the executive and then supported by coaches and parents within the club. In contrast, Club B's decision to adopt was made by the individual coaches and not experienced club wide. It was also mentioned (although not part of this study) that the LTAD principles were not implemented consistently from one coach to another. Although the coaches ultimately accomplished each club's adoption, larger clubs had support from the club community because of the executives' decision. This additional support included a larger amount of resources and seminars provided to parents, increased parental volunteers/coaches, and/or increased coach development through observation, instruction, and mentoring.

Although each club has adopted the model in some capacity, the reasons behind this decision seemed to differ club-to-club and coach-to-coach. More research is needed to identify the varying processes of adoption and strategies for the implementation of LTAD. Furthermore, Rogers' (2003) explains that adoption and implementation are "often not the terminal stage in the innovation-decision process" (p. 189). After the adoption and implementation of an innovation, many communities will experience a confirmation stage (Rogers, 2003). This confirmation stage allows communities to review and reinforce the decision they made to adopt an innovation. Club A's coaches were already in this stage of the innovation-decision process using club mentoring, parental surveys, and coach education to support the adopted principles of LTAD. Furthermore, coaches from Club A told us that they were comfortable in their continued adoption and only

minor changes to their implementation of LTAD's principles. Coaches from Clubs B and C, having only recently adopted the model, had not completed their adoption-process and were still adopting many of the LTAD principles.

Conclusion

This research study examined three XCS club's coaches, and used Rogers' (2003) theoretical framework to better understand what attributes of the LTAD model influence the decision to adopt the model into a club environment. Results indicate that XCS club coaches, regardless of their clubs' size or focus, perceive positive relative advantages (e.g., FUNdamentals) and compatibilities (e.g., sport should be fun) towards LTAD. However, XCS club coaches also have common negative perceptions of some attributes of the model in both relative advantage and compatibility (e.g., access to resources and competition model alignment). The LTAD model was seen as relatively easy to understand (i.e. negatively complex), although there was a perception that parental understanding was minimal and that there was a need to better educate them. There were no cross-case themes coded for trialability or observability.

Coaches from the same club experienced certain attributes because of their club's size and/or focus. Each club's focus had an impact on their coaches' perceptions of certain attributes of the LTAD. For instance, coaches from competitive clubs adopted the model more easily than coaches from clubs with a recreational L2S environment.

Several themes of particular interest emerged throughout the analysis which should be studied more in depth:

1. The varying perceptions of retention in all three clubs
2. The use of the model as a communication tool (i.e., with parents and/or athletes) by Club A's coaches

3. The controversy over the name of LTAD by Club B's coaches

Each club's coaches adopted the model in some capacity, and it can be concluded that the adoption has been more positive than negative. More research needs to be done to assess the implementation of LTAD in XCS clubs, how coaches implement the LTAD within their daily coaching practices, and the consistency of LTAD's implementation within Canada. Furthermore, research should assess the confirmation stage of the adoption process, specifically, how clubs evaluate the results of the model's implementation within their club structure. Research examining the influence of a club's characteristics (e.g., structure, focus, & objectives) on its coaches adoption of the LTAD should also continue in skiing as well as other types of sports (e.g., team vs. individual). Research in these areas will allow coaching science a more complete understanding of the adoption of the LTAD model in Canada.

References

Alfermann, D., & Stambulova, N. (2007). Career transitions and career termination. In G. Tenenbaum, & R. Eklund (Eds.), *Handbook of sport psychology* (pp. 712-733). Hoboken, NJ: John Wiley & Sons Inc.

Banack, H., & Bloom, G. (2009). Promoting long-term athlete development (LTAD): Does the introduction to community coaching course promote the principles of LTAD? (Report)

Bayli, I., & Way, R. (1995) Ling-term planning of athlete development: The training to train phase. *BC Coach, no volume,* 2 – 10.

Black, D. E., & Holt, L. H. (2009). Athlete development in ski racing: Perceptions of coaches and parents. *International Journal of Sports Science & Coaching, 4*(2), 245 – 260.

Canadian Fitness & Lifestyle Research Institute (CFLRI). (2006). *Health Behaviour in school-aged children's study.* Retrieved March 12, 2011, from http://www.cflri.ca/eng/statisticsa/surveys/2006HBSC.php

Canadian Heritage. (2007). The Canadian Sport Policy. Author.

Canadian Sport Centres (2006). Canadian sport for life. Ottawa, ON: Canadian Sport Centre. Retrieved August 14, 2010, from http://www.ltad.ca/groups/LTAD%20Downloads/English?LTAD_Resource_Paper.pdf

Canadian Sport Centres. (2011). The Canadian sport for life rectangle. Ottawa, ON: Canadian Sport Centre. Retrieved May 4, 2011, from http://www.canadiansportforlife.ca/resources/cs4l-rectangle

Coaching Association of Canada (CAC). (2008). Coaching association of Canada. Retrieved April, 2010, from http://www.coach.ca/eng/

Côté, J., & Fraser-Thomas, J. (2007). Youth involvement in sport. In P. Crocker (Ed.), *Introduction to sport psychology: A Canadian perspective* (pp. 266-294). Toronto: Pearson Prentice Hall.

Côté, J., & Hay, J. (2002). Children's involvement in sport: A developmental perspective. In J. Silva, & D. Stevens (Eds.), *Psychological foundations in sport* (pp. 484-499). Boston: Allyn and Bacon.

Durand-Bush, N., Salmela, J. (2001). The development of talent in sport. In R. Singer, H. Hausenblas, & C. Janelle (Ed.), Handbook of sport psychology (2nd ed., pp. 269- 289). New York: John Wiley & Sons.

Elliot, B. (2005). *Using narrative in social research: Qualitative and quantitative approaches* SAGE publications.

Gowan, G. R. (1992). Canada's national coaching certification program (NCCP) - past, present, and future. *Journal of Physical Education, Recreation & Dance, 63*(7), 50-54.

Haber, J., & Singh, M. D. (2009). Sampling. In G. Lobiondo-Wood, & J. Haber (Eds.), Nursing Research in Canada (252 – 278). Toronto: Elsevier Canada.

Hopman-Rock, M. (2000). International congress on physical education, aging, and health. *Science and Sports, 15*(4), 180-186.

Ifedi, F. (2005). *Sport participation in Canada*. Ottawa, Canada: Statistics Canada.

Jackson, J. J., Heron, P. R., & McLachlin, H. J. (1978) Examing the diffusion of innovations in physical education, recreation, and sports settings: Methodology. *Review of Sport and Leisure, 3*(2), 93 – 111.

Miles, B., M. & Huberman, A., M. (1994). Qualitative Data Analysis. Thousand Oaks: SAGE Publications.

Newell, S., & Swan, J. (1995). The diffusion of innovations in sport organizations: An evaluative framework. *Journal of Sport Management, 9*, 317 – 337.

Parry, K., & Kavanagh, E. (2009). *Learn to walk before you run: Locating the origins of long-term athlete development in ancient Greece.* Manuscript submitted for publication.

Perkins, D., Jacobs, J., Barber, B., & Eccles, J. (2004). Childhood and adolescent sports participation as predictors of participation in sports and physical fitness activities during young adulthood. *Youth Society, 35*, 495-520.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Schreier, M., Oberhauser, S., & Prugl, R. (2007). Lead users and the adoption and diffusion of new products: Insights from two extreme sports communities. *Marketing Letters, 18*, 15–30.

Stake, R. (2006). *Multiple case study analysis*. New York: The Guilford Press.

Thompson, A., Humbert, M., & Mirwald, R. (2003). A longitudinal study of the impact of childhood and adolescent physical activity experiences on adult physical activity perceptions and behaviors. *Qualitative Health Research, 13*, 358-377.

Tremblay, M. S., Katzmarzyk, P. T., & Willms, J. D. (2002). Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity & Related Metabolic Disorders, 26*(4), 538.

Tremblay , M. S., & Willms, J. D. (2003). Is the Canadian obesity epidemic related to physical inactivity? *International Journal of Obesity, 27*, 1100-1105.

Trudel, P., & Gilbert, W. (2006). Coaching and coach education. In D. Kirk, D. Macdonald & M. O'Sullivan (Eds.), *The handbook of physical education* (pp. 516-539). London: SAGE.

Warburton, D. E. R., Nicol, C. W., & Bredin, S., S.D. (2006). Health benefits of physical activity: The evidence. *CMAJ: Canadian Medical Association Journal, 174*(6), 801-809.

Yin, R. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks: SAGE.

CHAPTER 3: ARTICLE 2

A CASE STUDY OF CROSS-COUNTRY SKI COACHES: COACH CHARACTERISTICS AND THE ADOPTIVE ATTRIBUTES OF LTAD

Increasing numbers of sedentary youth combined with decreased participation in sport and physical activity (Ifedi, 2005) have been linked with the rising levels of obesity in the Canadian population (Thompson, Humbert, & Mirwald, 2003; Tremblay, Katzmarzyk, & Willms, 2002). This combination increases the likelihood of youth developing various health problems such as cardiovascular disease, cancer, and diabetes (Warburton, Nicol, & Bredin, 2006). These health trends present a growing problem for the future of the Canadian health care system. Canada's Sport Policy was created in response to these combined issues and identified the need to enhance participation, excellence, capacity, and interaction at all levels of sport (Canadian Heritage, 2007). The creation of Canada's Long-Term Athlete Development (LTAD) model (Figure 1) was a direct result of this policy.

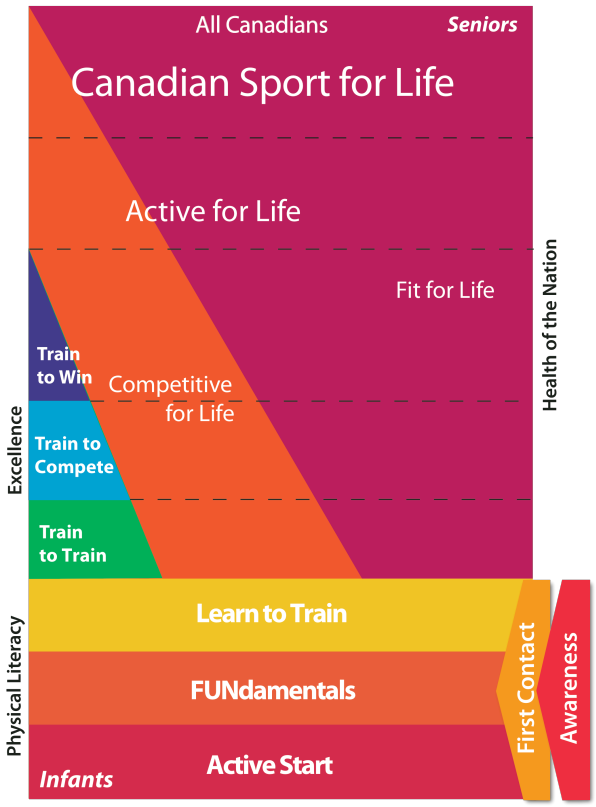


Figure 1: The Canadian Sport for Life Rectangle (CSC, 2011)

Canada' LTAD is a sport development model organized as a seven-stage continuum (Canadian Sport Centres [*CSC*], 2006) that identifies the proper training, competition and recovery protocols for athletes at each stage of development. These seven stages are Active Start, FUNdamentals, Learn to Train, Train to Train, Train to Compete, Train to Win, and Active for Life. The model outlines the various paths that athletes take to reach their maximal potential in sport and physical activity whether that is completing a marathon, winning an Olympic gold medal, or hiking a 15km a day. The expected

outcomes of the LTAD model line up with those of the Canadian Sport Policy: (1) increase Canadian's participation in sport and physical activity, and (2) increase the number of Canadians performing consistently at an international level by "identifying and developing the next generation of internationally successful athletes" (CSC, 2006, p. 14). This combination of goals could provide Canadians the opportunity to engage in PA and sport in order to create an active and healthy population (CSC, 2006; Canadian Heritage, 2007). Up to this point, however, no research has been done to evaluate the implementation or effectiveness of either of these goals.

LTAD represents a unique model for the sustenance of an internationally successful Canadian sport community; however, its adoption and successful implementation depends on individual coaches at the practical level. Coaches are the change agents (Rogers, 2003) who implement the principles of LTAD (CSC, 2006), so it is important to understand who they are, how they perceive attributes of the model, and whether personal characteristics impact their decision to adopt or reject the model.

Coach education in Canada is presented by the National Coaching Certification Program (*NCCP*), which was developed to provide coaches with skills, training techniques and knowledge (Gilbert & Trudel, 1999). Coach education was traditionally delivered "on a continuum from novice to expert" (Werthner & Trudel, 2006, p. 208); however, the NCCP now recognizes "the specificity of the different coaching contexts whether those contexts are recreational, developmental, or elite" (p. 208). The new NCCP is divided into three competency-based coaching streams, which address the needs of the numerous types of coaches who contribute to the Canadian sport system (Coaching Association of Canada [*CAC*], 2008). The three streams of the NCCP classify coaches according to their coaching context (i.e., community, competition, and instructional [CAC, 2008]).

A review of literature found little research about Canada's LTAD model; in fact, only one published article was peer reviewed (Black & Holt, 2009). Nonetheless, there is information about Canada's LTAD model in the form of unpublished articles (Parry & Kavanagh, 2009), non-refereed research (Bayli & Way, 1995), unpublished reports (Banack & Bloom, 2009), and some research on early versions of Bayli's model (Ford et al., 2011). Moreover, some research exists on various European models of LTAD (Lang & Light, 2010), which are presently implemented in countries like the UK. Although forms of LTAD are implemented in Europe, the Canadian LTAD is an innovative model in Canadian literature. This research will help to understand how attributes of the LTAD can lead to a sport coach's adoption or rejection of the LTAD. Furthermore, this research project will identify individual characteristics that influence sport coaches to adopt or reject the model into their coaching practices.

Thus, the purpose of this study was to better understand the adoption of Canada's LTAD model by Cross-Country Ski (*XCS*) coaches. Rogers' (2003) *Diffusion of Innovations* theoretical framework was used to structure the study's interview guide, analysis protocols, results, and discussion. Rogers' theory also structured following two research questions, which guided the focus of the study:

1. What are the perceived attributes of the LTAD model as experienced by XCS coaches?
2. How do personal characteristics affect a coach's perceived attributes of LTAD?

Theoretical Framework

Rogers' (2003) theory on the *Diffusion of Innovations* was used to shape and make sense of the data obtained in this study. Rogers defines an innovation as an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (p. 12). Furthermore, Rogers proposed that the adoption of an innovation follows five predictable stages of the *innovation-*

decision process (Figure 2). Rogers' theory helps us understand the process by which an innovation is learned about by a community until the innovation's implementation and evaluation by members of that community (Rogers, 2003). This study will limit its scope to the *persuasion* and *decision* stages of the model; specifically, how perceived attributes of the LTAD affect a XCS coach's decision to adopt or reject the model. Within the persuasion stage of the innovation-decision process, Rogers' identifies five key attributes that affect a community's decision to adopt or reject an innovation. These attributes are as follows:

1. *Relative Advantage*- "is the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229).
2. *Compatibility*- "is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 240).
3. *Complexity*- "is the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257).
4. *Trialability*- "is the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 258).
5. *Observability*- "is the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258).

Rogers' (2003) theory has been used as far back as the 1970s (e.g., Jackson, Heron, & McLachlin, 1978) and more recently in areas of sport research including health promotion (e.g., Hopman-Rock, 2000), drug prevention (e.g., e.g., Simons-Morton, Donohew, & Crump, 1997) , and sport management (e.g., Newell & Swan, 1995); however, no literature was found using Rogers' framework in understanding the adoption of a sport model or a way of thinking about coaching.

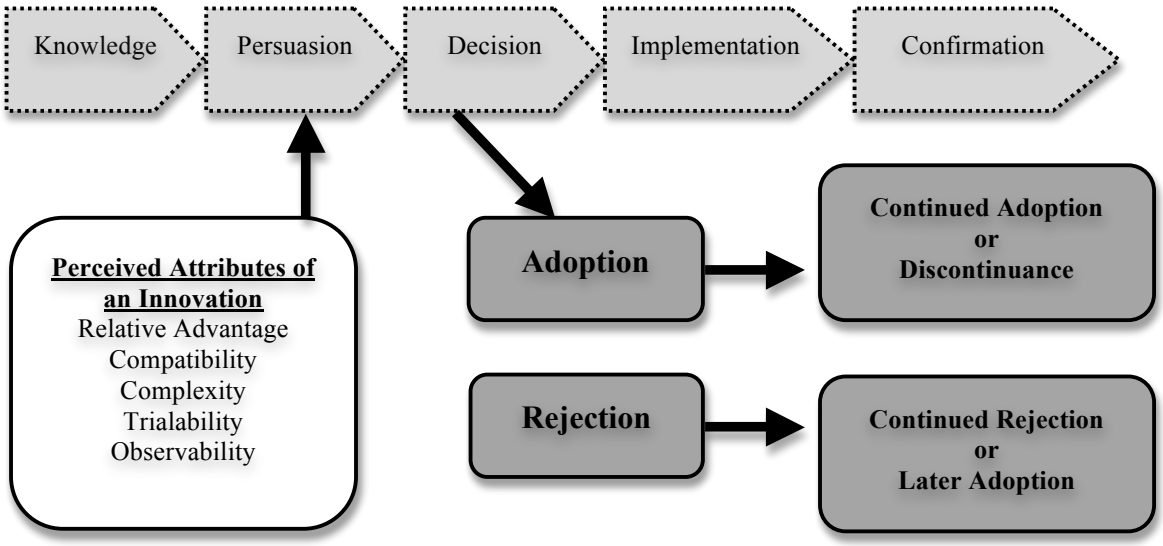


Figure 2: Rogers (2003) Innovation-Decision Process

Methods

This article had the objective to better understand the adoption of the LTAD model by individual sport coaches. Data for this portion of the study was obtained using in-depth, narrative interviewing with XCS coaches (N = 13) and was organized and presented as a descriptive qualitative study.

Multiple XCS coaches were interviewed providing multiple sources of data, and allowed for variation in their personal characteristics (e.g., coaching experience, level of coach education, and coaching roles). This variation enabled us to gather a rich amount of data from each coach. Moreover, it allowed us to bring to light the common themes experienced by all XCS coaches.

Recruitment

XCS coaches were contacted using information found on XCS club's websites. Initial responses from six coaches allowed for the first wave of interviews to be completed. Following these, snowball sampling led to an additional seven interviews. Interviews were conducted with coaches from Ontario and Quebec during the fall of 2010.

Several selection criteria were put in place to create a standardized sample group. These criteria ensured that coaches would have the knowledge and experience to answer most questions included in the interview guide. Coaches must have coached a minimum of one year before and after the 2007 XCS season. This date was chosen to ensure that participants had experience coaching before and after the creation and dispersal of the LTAD model by Cross Country Canada (*CCC*), which occurred in the 2007 athletic season. Moreover, coaches must have completed one or more NCCP courses under the new competency based framework. Most XCS coaches (n = 11) had completed the Introduction to Community Coaching (*ICC*) course, which provides a "basic understanding of the LTAD" (Banack & Bloom, 2009, p. 12). Lastly, participants had to be active coaching members at a XCS club, which was partly ensured by the recruitment strategy identified above. Coaches not meeting the above criteria were not included within this case study, but they were encouraged to participate in a larger study supported by Sport Canada.

Participants

Participants ranged in age from 25 – 64 years, and were made up of males (n = 9) and females (n = 4). Several characteristics were compiled during the interview or asked after the interview (e.g., age, type of coach, and coach education), a compilation of these characteristics can be viewed in Table 1.

Table 1

Compiled Coach Characteristics Organized by Age & Coaching Experience

Coach	Gender	Age Range (years)	XCS Coaching Experience (years)	Volunteer/Paid Coach	New NCCP Modules (# of courses completed)	Old NCCP Courses (level completed)	Sport/PA/HK related Schooling Background
1	M	25 – 29	5 – 9	P	> 5[a]	3	Y
2	M	25 – 29	5 – 9	P	3 - 4	2	Y
3	F	25 – 29	10 – 14	P	> 5	3	Y
4	F	30 – 34	5 – 9	V	1 – 2	1	N
5	M	30 -34	10 -14	P	3 – 4	3	Y
6	M	30 – 34	10 – 14	V	1 – 2	2	N
7	F	40 – 44	5 – 9	V	1 – 2	N/A	N
8	F	40 – 44	5 – 9	V	1 - 2	1	N
9	M	45 – 49	10 – 14	V	3 – 4	2	N
10	M	50 – 54	10 - 14	V	1 – 2	2	N
11	M	50 – 54	20 – 24	V	3 – 4[b]	2	N
12	M	55 – 59	15 – 19	V	3 – 4[b]	3	N
13	M	60 – 64	30 +	V	3 – 4	3	Y

Note: Abbreviations: F = female; M = male; V = volunteer; P = paid; N/A = not applicable; Y = Yes; N = No; coach education was an approximation by most coaches as they did not know how many courses they had taken that were from the new NCCP; a) coach 1 was a facilitator for the ICC course; b) coaches 11 & 12 participated in pilot ICC courses

Data Collection

Data was collected using a narrative interview guide[9] developed to encourage participants to tell a story about their own path as a coach and their experience with the LTAD model. Elliott (2005) explained that narrative interviews help participants to organize an experience into a series of events, allowing them to have a better recall of the whole. This narrative structure helped to create a chronological understanding of the adoption process by XCS coaches. Participants responded to a set of three questions creating the beginning, middle and end of their story (Elliot, 2005). These questions focused on three topics:

(1) *Coach history* - Tell me about you as an athlete, and as a coach; what your background is in sport, and how you got started?

(2) *Determinants of adoption* - Tell me about your experience with Sport Canada's model for long-term athlete development and how you first perceived the LTAD model in your ski club?

(3) *Barriers to the adoption of LTAD* - What would be the ideal situation if you were to adopt LTAD in its entirety?

Each question was accompanied by a set of probe questions that deepened our understanding of each coach's experience. Probe questions (e.g., What do you enjoy most about coaching?) took the form of checklists and were often responded to naturally by the participants. Interviews lasted between 45 and 75 minutes, were digitally recorded and then transcribed verbatim by the lead researcher.

[9] The University of Ottawa Board of Ethics gave ethical approval for this interview guide and participants received and signed an informed consent form.

Data Analysis

Transcriptions were analyzed using QSR NVivo8 computer software and conceptual thematic matrices (Miles & Huberman, 1994) that helped to organize, structure and understand the data using Rogers (2003) theoretical framework. The coding structure derived from Roger's (2003) allowed for the emergence of new themes; however, these themes most often fit within one or more of the original attributes. The supervising professor peer reviewed each stage of analysis to ensure that the trustworthiness of data was maintained. The lead researcher compiled a reflexive journal that kept track of the analysis progress (e.g., decisions made, highlights, and rationales) for future reference.

Coaches' transcriptions were analyzed in three stages:

First Stage: Coach's individual interviews were analyzed using Rogers' attributes as a skeleton coding format establishing the unique characteristics of each coach.

Second Stage: The interviews were contrasted with one another to find common experiences shared by each coach. Common experiences are discussed in a separate article in relation to the case-specific and cross case themes experienced by coaches in a single club, or in all XCS clubs respectively.

Third Stage: Characteristics of coaches and themes experienced by each coach were organized to create a template for understanding the adoption of the LTAD model by creating a classification system for types of coaches (e.g., volunteer, paid, and/or competitive).

The following results and discussion will present two topics: a classification for XCS coaches, and perceived attributes of the LTAD model linked with each type of coach.

Results & Discussion

A Classification for Coaches

The analysis of results allowed for a classification of XCS coaches to be created. The classification of coaches allowed us to better understand the adoption of the LTAD in terms of a coach's role in a XCS club (paid or volunteer), the value they place on sport, and their personal sport experiences. Coaching types also allowed a unique look at the attributes of LTAD as experienced by each type of coach. Four coaching types were found within the context of this study: (1) paid-competitive (*PC*), (2) volunteer-competitive (*VC*), (3) volunteer-recreational (*VR*), and (4) volunteer-participatory (*VP*).

Trudel and Gilbert (2006) accumulated and presented various other typologies for classifying coaches; these typologies were used by coach education programs and researchers to differentiate between varying coaching contexts (e.g., Lyle, 2002; Wankel & Mummery, 1996; as cited in Trudel & Gilbert, 2006, p. 519). The method of classification in the current study was not found in the literature; however, the National Coaching Credentialing Program proposed to organize coaches "into two curriculums- one for volunteer coaches and one for professional (paid) coaches" (Trudel & Gilbert, 2006, p. 518). This study produced an expanded version of this classification system, made possible through the rich descriptive data obtained from interviews with XCS coaches.

Table 2 identifies which coaches were classified as each type of coach as well as their shared characteristics. Coaches were classified into the four types depending on three features within their narratives: (1) whether they were paid or volunteer, (2) the value they place on sport, and (3) their personal sport experiences. These features were chosen after analysis; they seemed to help predict which attributes individual coaches experienced. Thus, coaches who were paid,

valued competition more highly, and had a high level of personal sport experience perceived similar attributes. Interestingly, the level of athlete coached was also consistent dependent on each type of coach. For example, VP coaches only worked with Active start athletes, while coaches classified as PC coached athletes from Learn-to-train and on.

Table 2

Types of Coaches And Common Characteristics

Type of Coach	Role at club	Value of sport	Personal sport experience	Level of athlete coached
PC coaches (1, 2, 3, 5)	Paid	Comp.	Highly competitive	L2T, T2T, L2C, T2C
VC coaches (9, 11, 12, 13)	Volunteer	Comp.	Competitive	L2T & T2T
VR coaches (4, 6, 10)	Volunteer	Rec.	Some competitive, most recreational	FUNdamentals
VP coaches (7, 8)	Volunteer	Rec.	Late comer, recreational	Active Start

Note: Personal sport experience represents a continuum from highly competitive (International/National) to late-comers (entered XCS as an adult, never raced); Learning to Train (*L2T*), Training to Train (*T2T*), Learning to Compete (*L2C*), Training to Compete (*T2C*), Training to Win (*T2W*), competitive (Comp.), recreational (Rec.)

The first feature of classification was easily identified as either a paid coach or volunteer coach within the club, which complimented the classification proposed by the National Coaching Credentialing Program (Trudel & Gilbert, 2006). Paid coaches were defined as coaches that received a regular salary from the club and had full-time coaching responsibilities. Volunteers were parents, community members, or co-op members of a ski club who assisted in some

capacity during training sessions. These volunteer coaches did not necessarily design training plans for their athletes, but they did over see practices.

The second feature, value placed on sport, was determined by looking at a coach's entire narrative transcription and the overall value they placed on competition vs. recreation. It was clear that some coaches valued the competitive side of sport more than the recreational side, and vice versa. It is important to understand that although some types of coaches placed a higher value on competition (PC and VC), they did not disagree with recreational outcomes. This idea is seen in the results of the previous article that described a common theme showing the importance of fun and recreation in sports. Similarly, coaches classified as recreational (VR & VP) did see value in competitive sides of sport; however, recreational aspects of XCS were valued higher.

Lastly, a coach's personal sport experience validated the grouping of PC and VC coaches; and allowed for the delineation between VR and VP coaches. Both VR and VP coaches valued the recreational side of sport higher than competition; however, VP coaches began to skiing later in life and were more participatory coaching-members of XCS clubs. One VP coach began skiing at the same time as her son, and the other at the same time as her nephew. The lack of personal sport experience placed limitations on both their coaching abilities because they were still learning to ski. This difference led to their classification as a distinct type of coach.

Paid-competitive coaches.

PC coaches (n = 4) were full-time, salaried coaches who were highly educated in the field of coach education and sport; for example, Coach 1 had a Level 3 in the old NCCP system, was a facilitator in the new NCCP system, and had a degree in Kinesiology. Levels of coach education and schooling background such as this empowered PC coaches with an excellent understanding of the LTAD model; thus, they were able to give detailed narrative responses that provided a rich

amount of information. PC coaches were members of large and medium sized XCS clubs that had the resources to employ 1 - 2 paid coaches. PC coaches also came from competitive XCS backgrounds giving them a lot of experience with skiing techniques; however, there was disagreement whether some of this experience was good or bad. For instance, coach 2 quit XCS competitively because of the stress placed on her by her coaches.

PC coaches were the youngest demographic of coach; all but one (i.e., Coach 5) were between the age of 25 and 29 years of age. Coach 5 was in the age range of 30 – 34. The relatively young age of these coaches may have impacted their decision to adopt the LTAD model. Younger coaches seem to be more flexible to change; in fact, one VC coach explained that older coaches with 30+ years of experience have their own "methodology that [they are] comfortable and extremely successful with" and are not "willing to change" (Coach 12). Younger coaches seemed to be the motivators in the persuasion and decision stages of adoption (i.e., apart from the club executive). Younger coaches (25 - 34) agreed that they influenced the adoption of the LTAD at each of their clubs. Coach 2, a young PC coach, explained that he had "been one of the driving forces in getting coaches at ~~our~~ [his] club educated on the model." Elite coaches, in our case PC coaches, according to Trudel and Gilbert (2006), appear to value "experimentation as a method of developing coaching skills" (p. 524), which could explain their role as change-agents at their clubs. Additionally, PC Coaches 1 and 3 had the most coach education, and all PC coaches had sport-related schooling (e.g., kinesiology & physical education). Rogers (2003) indicates that a high degree of knowledge in relation to an innovation is a characteristic of early innovation adopters. These coaches also initiated many of the implementation strategies at clubs (e.g., strategic planning, parental seminars, and coach mentoring).

Volunteer coaches (VC, VR, & VP).

VC coaches were all male-parents of children in the XCS program or of children who had gone through the XCS program (n = 4). These coaches were volunteers with medium – high participation in coach education; on average, they had similar levels of coach education to PC coaches. Although, they did not have the same schooling background as PC coaches, it become apparent that many VC coaches represented either volunteer head coaches from smaller clubs or coaches who had taken on more responsibilities within their club community. These levels of coach education, allowed VC coaches to understand the LTAD almost as well as PC coaches; and in fact, coaches in this group perceived many of the same attributes as PC coaches. For example, VC and PC coaches discussed specific principles of the LTAD model (e.g., Peak-Height Velocity) while VR and VP coaches did not make reference to these principles with the exception of FUNdamentals. Similarities in the perceived attributes of competitive coaches (VC and PC) might have arisen from their shared understanding of the LTAD through coach education and/or their value of competition.

VR coaches (n = 3) placed value on competition; but primarily valued XCS for its recreational outcomes (i.e., athletes enjoying skiing, family skiing outings, etc.). Although VR coaches understood that competition was important for some skiers, their main reason for coaching was to have kids enjoy sport and have fun. It is not surprising that VR coaches coached athletes at the FUNdamental stage of the LTAD, where competition has not been introduced. Finally, VR coaches had a basic understanding of many of the LTAD principles; however, they had less coach education than PC and VC coaches. This corroborated Trudel and Gilbert's (2006) finding that recreational coaches participate in less formal coach education than developmental and elite sport coaches.

Lastly, VP coaches (n = 2) were both female, and had only recently begun skiing. Coach 8 began skiing when her son joined a XCS club, and Coach 7 began skiing when her nephew joined the same club. Coach 7 and 8 participated in less coach education than other coaches; and although both VP coaches had completed the ICC course, they did not have a good understanding of the LTAD model. This result somewhat contradicts the report completed by Banack & Bloom (2009) who interviewed XCS coaches one and six months after they participated in the ICC course. One explanation for these differing results is that coaches may have initially had a good understanding of the LTAD (i.e. directly following the ICC course) but did not retain this knowledge over time. A second hypothesis is that VP coaches are not as actively involved in practice planning and may coach considerably less than other types of coaches. More research is needed to clarify this discrepancy and to assess the long-term effectiveness of the ICC course.

VP coaches, unlike other types of coaches, had a negative attitude towards competition perceiving more negative consequences than positive outcomes. One VP coach, who was a latecomer to sport, firmly believed that the LTAD model was too focused on competition and did not cater to those entering sport at a late stage of development. VP coaches' negative attitudes toward competition might stream from their lack of experience as competitive athletes.

Volunteer coaches (i.e., VC, VR, & VP) were most often parents of a child either currently in the XCS program or a child who had gone through the program (n = 7 out of 9[10]). Trudel & Gilbert (2006) indicate that it is a common feature for recreational coaches to be "parents of athletes on the team they coach" (p. 521). Although many of the younger coaches' children were not coached directly by them, many older coaches told us that they had continued

[10] One of the two other coaches (Coach 7) had a nephew involved with the ski program.

coaching their children throughout their XCS career. One VC coach explained that he had coached his son from the time he could walk until he left for university.

Perceived Attributes of the LTAD

Table 3

Perceived Attributes of LTAD of Each Type of Coach

Coded Attribute		PC	VC	VR	VP
Relative advantage	(+) Development of appropriate drills	■	■		
	(+) Weight training guidelines (female athletes)	■	■		
	(+) Retrospective errors in coaching	■	■		
	(+) Flexibility of model		■	■	
	(+) More structure		■	■	
Compatibility	(-) Measuring of athletes	■			
	(+) Validation or reinforcement	■			
	(+) Competitive component of LTAD	■	■		
	(+) Personal sport experiences	■	■		
	(-) Competitive focus of the model			■	■
Complexity	(+) Names of levels are difficult to understand			■	

Note: Shaded sections represent attributes that were perceived by that type of coach; (+) identifies positively perceived attributes (-) identifies negatively perceived attributes.

Perceived attributes were identified using Rogers' (2003) theory as a pre-established coding structure. More positive relative advantage and compatible attributes emerged in comparison to complexity, trialability, and observability; in fact, observability and trialability could not be linked to a type of coach at all. This result is not uncommon; Rogers explained that

relative advantage and compatibility weigh more heavily on a decision to adopt an innovation than other attributes. Each group of coach perceived similar attributes of the LTAD model that helped to solidify the distinction between each group. There were, however, several commonalities that emerged with competitive coaches (PC & VC), and certain non-competitive coaches (VR & VP). Table 3 provides a complete list of perceived attributes coded for each group of coach.

Relative advantage.

Competitive coaches (PC & VC).

All types of coaches, with the exception of VP coaches, saw relative advantages to the LTAD model. Competitive coaches shared three perceived relative advantages: (1) the development of appropriate drills, (2) weight training guidelines, and (3) retrospective error identification.

Competitive coaches explained that the development of new drills became easier because the LTAD model provided guidelines (e.g., for strength and/or speed), skill checklists, and stages of development. One VC coach described that it was "very difficult for an inexperienced coach to identify when, where, and why to introduce certain things at certain intensities" (Coach 12) adding that his "biggest praise for the new system [was] that it provided those key identification points to coaches for drill and skills." Alternatively, a PC coach explained that it allowed them to focus their training in order to "work on age appropriate practices such as balance, skill and technique" (Coach 2).

Each competitive coach saw the LTAD's weight training guidelines for female athletes as a relative advantage. One coach offered that:

> It is a big thing for us to have this document and be able to show that younger girls could be doing some pretty significant weight lifting, or have the ability to do weight lifting. That was a big change because the only knowledge we had was that weight lifting too early would stunt their growth. (Coach 1)

These guidelines enabled competitive coaches to appropriately strength train female athletes at a younger age and may have impacted the increased retention rate of competitive female athletes. Weight training has long been known to increase muscular performance in skiers (e.g., Hoff, Helgerud, & Wisøff, 1999); however, the LTAD provides coaches with appropriate guidelines in order for coaches to help but not hinder their athletes.

Coaches' ability to see retrospective errors in how they had been coached or how they themselves coached was a relative advantage of the model. A female PC coach told us that her experience as an athlete had been with "old school European coaches" (Coach 3) who did not have the same respect for developmental stages as she has now. She was able to see the errors in how she was coached, and be able to adjust her coaching accordingly.

VC & VR coaches.

VC and VR coaches perceived relative advantages in the flexibility of the model but also its ability to provide structure to their coaching practices. Flexibility was seen in the LTAD's ability to address sport specific needs, equipment constraints, developmental stage selection and exercise prescription. One coach said that the LTAD's "flexibility is inherent in that it really is just a basic framework" and allows coaches to "cater the program to the individual, and to the club or environment" (Coach 6). LTAD is not a concrete set of rules but rather a set of guidelines to help coaches create a structured program that works for their athletes or club. One volunteer coach explained that "the model has established a good structure for training programs; before

that, a structure in this form did not exist, and it was a lot more work to establish guidelines and principles" (Coach 6) within a training group. Structure was also seen in LTAD's use as a communication tool. One VR coach explained that the LTAD provides, "a structure to communicate information" ([Coach 10] e.g., progression and stage selection) to parents and athletes at younger stages of development.

Compatibility.

Paid-competitive coaches.

PC coaches perceived the measuring of athletes as an incompatible given their constraints as a coach. The LTAD identifies the need to regularly measure athletes in order to identify important windows of trainability for "motor skills, muscular growth, and/or aerobic power" (CSC, 2006, p. 25). PC coaches saw the time and effort it would take to 'regularly' measure their athletes unworkable with their coaching limitations. Two PC coaches explained that instead of taking practice time to weigh and track each athlete, they communicated to parents the importance of keeping track of their child's growth. This compromise provides coaches more time to apply the principles of the LTAD using the data kept by parents. Interestingly, the CSC (n.d.) provides resources for parents on LTAD, stages of development, and physical literacy. More research should be done to further understand if and how parents are using these resources.

Secondly, PC coaches shared the belief that the LTAD validated[11] many of their existing coaching practices. In this research study, validation was defined as a positive attribute of adoption because it persuaded coaches to adopt. PC coaches explained that many of the principles of the LTAD were already in practice, and it only made sense to adopt a model that validated this direction. One coach solidified the concept of validation when he said the LTAD

[11] Coaches also used terms or phrases like legitimized, solidified, reinforced, and gave confidence to.

"gave words and different thoughts to what I had already appreciated as an athlete myself, and as a coach" (Coach 5). However, could validation act negatively if a coach, having already put these principles into practice, saw the adoption of the model as trivial? Coaches in this situation might not adopt the model and continue to use the principles they had previously accepted. Because each coach experiences attributes individually, some coaches may see something as positive while another sees it as negative (Rogers, 2003).

Competitive coaches (PC & VC).

It is no surprise that competitive coaches saw the competitive focus of the model as compatible with their coaching values, while some VR and VP coaches saw this as a disadvantage. PC coaches were employed by XCS clubs and had certain competitive benchmarks to achieve. These coaches readily accepted the LTAD's competitive components (e.g., train to win, goal to increase international sport performance, and the term 'athlete' development) while recreational coaches were more questioning of the same components.

Competitive coaches also perceived the model's competitive focus as compatible with their individual sport experiences. Some competitive coaches explained that the LTAD's emphasis on competition was inline with their positive sport experiences. A PC coach explained that the long-term vision of a highly competitive Canadian sport system was in line with his beliefs as a coach. He experienced the benefits of long-slow progression in sport (i.e., transitioning from a recreational athlete to a competitive athlete). Other competitive coaches agreed with the competitive focus, but linked their decision to adopt the LTAD as an alternative to their own negative experiences. One PC coach had been forced to peak early and had a negative experience; she told us the following:

> I loved it because my own personal background with sport was with eastern European coaches and they had me on a 35-hour a week training program when I was 15, and I peaked when I was like 17 and then it was a total burnt out slog from then on. (Coach 3)

VR & VP coaches.

Both VR and VP coaches thought the competitive focus of the model was incompatible with their coaching practice. These coaches maintained that the focus of the model should be on getting the Canadian population active and not about international sport performances. One VR coach explained that it depends on "…how coaches and athletes interpret the model" (Coach 4). He expressed that depending on how coaches apply the model will impact an athlete's response to it. More research should be done to better understand how coaches apply the LTAD, specifically at the implementation stage of Rogers' (2003) innovation-decision process.

Complexity: VR coaches.

VR coaches thought the names of each stage of development were difficult to distinguish from each other (e.g., training to train, training to win, learning to train, etc.). One coach explained:

> I think the names are easy to understand, but sometimes complicated to distinguish between. Parents have more difficultly than anyone else because they hear all of them, and if they don't see the interconnectedness. They are a bit overwhelmed. (Coach 4)

In the first article presented in this thesis, parental understanding was shown to be negatively compatible to XCS club coach's adoption of the LTAD model. Club coaches saw parental understanding as a crucial part of the club's adoption of LTAD. This belief came from a club perspective, where parent-volunteers make up the majority of the club executive. Having parents understand the model would be paramount to the decision to adopt the model. VP coaches did

not share the perception that the names for each stage of development were complex. However, this may have been due to a lack of exposure to the names themselves, because of their participation in less formal coach education. Having participated in more coach education, VR coaches had potentially been exposed to more stages of development and were more confused by the names. More research should be done to determine whether a change in the names of each stage of development would influence more VR coaches to adopt the LTAD model.

Conclusion

This research project was intended to increase our understanding of the decision to adopt or reject the LTAD model into a XCS coach's practice. Rogers' (2003) theoretical framework was useful to understand how attributes of the LTAD model influenced XCS coaches' decisions to adopt or reject the model. Results allowed for the creation of a new coach classification system linked to a coach's role within the club, the value they place on sport, and their personal sport experiences. The four types of coaches found were PC, VC, VR, and VP coaches.

Several attributes were found that influenced mainly one type of coaches' decision to adopt the LTAD model. Examples of these attributes include measurement of athletes (PC) and complexity in the names of each stage of development (VR). Most attributes were perceived by two types of coaches; for instance, competitive coaches (PC & VC) perceived weight training guidelines and development of new drills as relative advantages of the model while volunteer coaches (VR & VP) perceived the competitive focus of the model as incompatible with their coaching values.

Several areas should be more closely researched in order to obtain a broader understanding of the adoption of the LTAD model by XCS coaches as well as sport coaches in other disciplines. Continued research using the coach classification we have created within this

study could greatly contribute to a better understanding of the Canadian coach population and how such profiles could help in predicting their practices in coaching. Furthermore, research is also needed in the following areas: (1) coach education on LTAD and its long-term impact on coach's knowledge, (2) parental use of available LTAD resources, (3) VR and VP coaches' role in coaching, (4) implementation of the LTAD into the existing coaching practices and whether the aforementioned goals of the LTAD model are met, and (5) other sport's adoption of LTAD.

References

Banack, H., & Bloom, G. (2009). Promoting long-term athlete development (LTAD): Does the introduction to community coaching course promote the principles of LTAD? (Report)

Bayli, I., & Way, R. (1995) Ling-term planning of athlete development: The training to train phase. *BC Coach, no volume,* 2 – 10.

Black, D. E., & Holt, L. H. (2009). Athlete development in ski racing: Perceptions of coaches and parents. *International Journal of Sports Science & Coaching, 4*(2), 245 – 260.

Canadian Heritage. (2007). The Canadian Sport Policy. Author.

Canadian Sport Centres. (2006). Canadian sport for life. Ottawa, ON: Canadian Sport Centre. Retrieved August 14, 2010, from http://www.ltad.ca/groups/LTAD%20Downloads/English?LTAD_Resource_Paper.pdf

Canadian Sport Centres. (n.d.). Canadian sport for life: A sport parent's guide. Ottawa, ON: Canadian Sport Centre. Retrieved May 4, 2011, from http://www.canadiansportforlife.ca/upload/docs/LTAD%20Downloads%20Eng/A%20Sport%20Parent's%20Guide.pdf.

Canadian Sport Centres. (2011). The Canadian sport for life rectangle. Ottawa, ON: Canadian Sport Centre. Retrieved May 4, 2011, from http://www.canadiansportforlife.ca/resources/cs4l-rectangle

Coaching Association of Canada (CAC). (2008). Coaching association of Canada. Retrieved April, 2010, from http://www.coach.ca/eng/

Elliot, B. (2005). *Using narrative in social research: Qualitative and quantitative approaches* SAGE Publications.

Ford, P., De Ste Croix, M., Lloyd, R., Myers, R., Moosavi, M., Oliver, J., Till, K., Williams, C. (2011). The long-term athlete development model: Physiological evidence and application. *Journal of Sports Sciences, 29*, 389 – 402. doi: 10.1080/02640414.2010.536849

Gilbert, W., & Trudel, P. (1999). An evaluation strategy for coach education programs. *Journal of Sport Behavior, 22*(2), 234-250.

Hoff, J., Helgerud, J., Wisløff, U. (1999). Maximal strength training improves work economy in trained female XCSers. *Medicine & Science in Sports & Exercise, 31*(6), 870 – 877.

Hopman-Rock, M. (2000). International congress on physical education, aging, and health. *Science and Sports, 15*(4), 180-186.

Ifedi, F. (2005). *Sport participation in Canada*. Ottawa, Canada: Statistics Canada.

Jackson, J. J., Heron, P. R., & McLachlin, H. J. (1978) Examing the diffusion of innovations in physical education, recreation, and sports settings: Methodology. *Review of Sport and Leisure, 3*(2), 93 – 111.

Lang, M. & Light, R. (2010). Interpreting and implementing the long term athlete development model: English swimming coaches' views on the (swimming) LTAD in practice. *International Journal of Sports Science & Coaching, 5*(3), 389 – 419. Retrieved from http://www.multi-science.co.uk/sports-science&coaching.htm

Miles, B., M. & Huberman, A., M. (1994). Qualitative Data Analysis. Thousand Oaks: SAGE Publications.

Newell, S., & Swan, J. (1995). The diffusion of innovations in sport organizations: An evaluative framework. *Journal of Sport Management, 9*, 317 – 337.

Parry, K., & Kavanagh, E. (2009). *Learn to walk before you run: Locating the origins of long-term athlete development in ancient Greece.* Manuscript submitted for publication.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Schreier, M., Oberhauser, S., & Prugl, R. (2007). Lead users and the adoption and diffusion of new products: Insights from two extreme sports communities. *Marketing Letters, 18*, 15–30.

Thompson, A., Humbert, M., & Mirwald, R. (2003). A longitudinal study of the impact of childhood and adolescent physical activity experiences on adult physical activity perceptions and behaviors. *Qualitative Health Research, 13*, 358-377.

Tremblay, M. S., Katzmarzyk, P. T., & Willms, J. D. (2002). Temporal trends in overweight and obesity in Canada, 1981-1996. *International Journal of Obesity & Related Metabolic Disorders, 26*(4), 538.

Trudel, P., & Gilbert, W. (2006). Coaching and coach education. In D. Kirk, D. Macdonald & M. O'Sullivan (Eds.), *The handbook of physical education* (pp. 516-539). London: SAGE.

Warburton, D. E. R., Nicol, C. W., & Bredin, S., S.D. (2006). Health benefits of physical activity: The evidence. *CMAJ: Canadian Medical Association Journal, 174*(6), 801-809.

Werthner, P., & Trudel, P. (2006). A new theoretical perspective for understanding how coaches learn to coach. *Sport Psychologist, 20*(2), 198-212.

Yin, R. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks: SAGE.

CHAPTER 4: GENERAL CONCLUSION

Thesis Findings

This thesis had the goal of better understanding the adoption process of Canada's LTAD model from the perceptions of XCS coaches. In particular it was interested in how attributes of the model influenced a XCS coach to adopt or reject the model into his or her coaching practice. During each interview it was already clear that all XCS coaches had adopted the model in some capacity; however, there was variation in how each coach was introduced to the model (i.e., knowledge stage) and what persuaded them to adopt the model (i.e., persuasion stage).

Some coaches were mandated to adopt the model and received additional support from club executives and parent volunteers. Alternatively, some coaches were the change-agents at their clubs and made the decision to adopt the model themselves. With these unique experiences in mind, results were presented in two articles; the first introduced case-specific and cross-case themes that emerged. The second article showed the common trends experienced by different types of coaches (e.g., paid competitive and volunteer competitive).

Article 1 Findings

The first article presented the perceived attributes which XCS coaches from different clubs identified as influencing their decision to adopt the LTAD model. Three participating clubs allowed for XCS coaches to be organized into three separate cases:

First- *Club A's coaches were from a* large club with > 1000 active members

Second- *Club B's coaches* were from a small club with < 400 active members

Third- *Club C's coaches were from* a medium sized club with 400 - 800 active members

Case-specific themes were coded for club A, B, and C. Case-specific themes represent attributes of the model that were perceived by only one or two clubs depending on unique characteristics of those clubs (e.g., membership size, club focus, or coach education). Case-specific themes were coded for relative advantage, compatibility, complexity, and observability.

Club A's coaches perceived more case-specific attributes of the LTAD model than Club B or C. Club A's coaches had adopted the LTAD farther and it's club executive was committed to updating coach education for their volunteer coaches. This increased knowledge and face-time with the LTAD model may have influenced each coach's ability to perceive attributes of the model more readily. Club B and C's coaches did not have the same level of access to coach education that Club A's coaches did, partly because of the resource constraints of small to medium sized clubs.

Observable attributes of the LTAD model were perceived as case-specific themes at each club. Club A's coaches perceived the LTAD having the most observability that could be a result of their role as early adopters in the XCS community. However, Club B and C's coaches agreed that the most observable attribute of the LTAD was the results they saw at another XCS club.

A club's focus emerged as a key theme within the entire discourse of Article 1. Competitive attributes of the model were more favourably adopted by club coaches in a competitive setting (i.e., Club A), while coaches in recreational and adventure settings (i.e., Club B and C respectfully) perceived many of these attributes as incompatible. Clubs fully adopted a life-long vision and FUNdamentals as they were seen as compatible with each club's goals and beliefs.

The second major result that emerged, cross-case themes, was coded for relative advantage, compatibility, and complexity. Cross-case themes represent attributes of the model that were perceived by a majority of coaches from all three clubs. In most instances all coaches within the study (N = 13) experienced these cross-case attributes.

Cross-case relative advantages were seen in the model's emphasis on FUNdamentals, multiple sport participation, life-long vision, and developmental stages. These various

advantages may have led to the models quick rate of adoption by XCS club coaches; however, one disadvantage that was perceived was a lack of accessible resources. Practical online and in-print resources were perceived by coaches to be inaccessible to themselves and parents. This lack of accessibility may have influenced XCS coaches' perception that parents do not fully understand the model. It was shown that coach education increases a coach's understanding of the model (Banack & Bloom, 2009), and can subsequently influence parents understanding (Black & Holt, 2009). Coaches explained that the minimal understanding that parents do posses is provided through the conversations they have with coaches.

Coaches linked several of the relative advantages (i.e., FUNdamentals, multiple sport participation, & developmental stages) to a shared belief that sport should be fun and enjoyable for youth participators. In fact, this enjoyment is related to the common understanding that youth who enjoy sport at a young age will engage in sport later in life (Perkins, Jacobs, Barber, & Eccles, 2004). This belief (i.e., sport should be enjoyable) was coded as a cross-case compatibility of the LTAD model. Compatibility was also perceived in the models life-long vision and its usability in a large club setting. Coaches from all clubs told us that a large club would have an easier time adopting the model than a smaller club with less resources, parent volunteers, and paid-coaches. Club size emerged as a key theme throughout this analysis. Coaches in larger clubs had access to more monetary resources, parental volunteers, and facilities. These resources made the adoption of LTAD easier. Smaller clubs did not have the same access to these resources and had more difficulty adopting certain aspects of the model.

Article 2 Findings

Article 2 presented a descriptive qualitative analysis of XCS coaches (N = 13) and the attributes they perceived impacting their decision to adopt the LTAD model. During analysis and

an examination of the participant's characteristics, a classification system for XCS coaches emerged. This classification was based on three main features of coaches: XCS coach's role within a club (e.g., paid or volunteer), the value coaches placed on sport (e.g., competition, recreation, or participation), and a coach's personal sport experiences (e.g., competitive athlete vs. latecomer into sport). The types of XCS coaches identified in this article were as follows:

1- Paid-Competitive (*PC*)
2- Volunteer-Competitive (*VC*)
3- Volunteer-Recreational (*VR*)
4- Volunteer-participatory (*VP*)

Both VR and VP coaches valued the recreational side of sport higher than competition; however, VP coaches began to XCS later in life and were more participatory coaching-members of XCS clubs.

Coaches of the same type had similar experiences with the LTAD model and perceived similar attributes (e.g., developmental stage selection, drill development, validation, etc.). This classification allowed a better understanding of the attributes of the LTAD model that impacted certain coaches to adopt the LTAD model.

PC coaches were male (n = 3) and female (n = 1) coaches who received a regular salary from a XCS club. PC coaches had participated in the most formal coach education courses (3 – 5 or more) within the new NCCP while VP coaches had participated in the least (1-2 courses). Most PC coaches had an academic background in Human Kinetics that provided them with an excellent understanding of the LTAD model. This understanding might have led to their role as change agents within the club; that is, they played a large role in the persuasion and decision stages of Rogers' (2003) innovation decision process.

VC coaches were all male-parents of children in the XCS program or of children who had gone through the XCS program (n = 4). Akin to PC coaches, VC coaches had a good understanding of the LTAD having participated in three to four courses within the new NCCP competency based framework; however, only one VC coach had a Human Kinetics background. VC coaches shared the high amount of value for competition that PC coaches had.

VR coaches were volunteers within the club setting who placed a higher value on the recreational aspects of sport rather than on competition. These coaches were male and female and worked primarily with children in the FUNdamental stage of development. This stage of development does not include competition, and focuses on games to increase basic motor skills. An introduction to competition begins during the Learning to Train stage of development. The FUNdamentals stage prepares athletes who "decide to leave the competitive stream[;] the skills they acquire during the FUNdamentals stage will benefit them when they engage in recreational activities" (CSC, 2006, p. 38). Similarly, VP coaches worked with children in the Active Start stage of development, which does not include a competitive aspect either. The Active Start stage "helps children learn to move skillfully and enjoy being active" (CSC, 2006, p. 37) in a recreational atmosphere. Both VR and VP coaches use games and fun activities to engage children in PA and encourage their love for XCS. VP coaches were also volunteers who placed a higher value on participation than competition, although it was unclear how much practice planning they were involved in. These coaches had participated in the least amount of coach education, and showed a minimal understanding of the LTAD.

Attributes were coded and organized by each type of coach; however, no perceived attributes were coded for observability or trialability. Most attributes, with three exceptions (i.e., athlete measurement, validation, and name difficulty), were perceived by more than one type of

coach. Competitive coaches (PC & VC) perceived the model as relatively advantageous in its development of appropriate drills, weight-training guidelines, and in the identification of retrospective coaching errors. VC and VR coaches also perceived shared relative advantages in the flexibility of the model and its ability to provide structure to coaching practices.

Compatibility with competitive coaches' beliefs about sport was seen in the model's competitive features (e.g., the development of Canadian elite athletes) and their lived sport experiences. Interestingly VR and VP coaches saw many of the same competitive features as incompatible with their own sport beliefs. In fact, one VP coach was outspoken on the exclusivity that the LTAD places on competition with regard to latecomers to sport.

PC coaches perceived two attributes exclusively: (1) the incompatibility of measuring athletes, and (2) the compatibility of LTAD as a validation tool for coaching practices. These attributes may have been perceived because of PC coaches' intricate knowledge of the LTAD model and/or their experience working with varying levels of athletes.

General Findings

The two analyses outlined above allowed for a large amount of data to be coded, as well as several unique perspectives on the adoption of the LTAD model. The use of both analyses has provided a more holistic understanding of coaches' decisions to adopt the LTAD model within XCS clubs. Four key results were obtained: case-specific themes, cross-case themes, a coach classification system, and attributes linked with types of coaches.

Coaches from all XCS clubs adopted the model in some capacity; however, the method of adoption differed depending on the type of coach. PC coaches were part of Club A (n = 2) and Club C (n = 2), large and medium sized clubs respectively. These coaches worked primarily with the competitive programs and athletes, although they helped to structure many of the lower tiered

programs as well. Club C's competitive program was still new and being developed by their new head coach, but the focus of their club remained largely community based. In stark contrast, VP coaches, who valued the recreational sides of sport, were members of Club B whose focus was on Learning to Ski.

Trialability and observability did not emerge as cross-case themes and also were not related to a type of coach. Roger (2003) discussed that these attributes are more difficult for some adopters (e.g., *late adopters, early adopters)* to perceive. This may have led to their lack of emergence within this study; however, more research is needed to determine the affect of trialability and observability on coaches' decisions to adopt the LTAD model. A richer amount of data, for these attributes, may emerge from case studies of club executives and sport associations. Furthermore, future studies may have more success in determining attributes of observability and trialability as more clubs and coaches adopt the LTAD model.

Overall, I found that coaches perceived more attributes of the model that increased adoption than attributes that decreased adoption. This trend accounts for the unanimous decision by XCS coaches to adopt the model in some capacity. Of particular interest were the cross-case themes of relative advantage, compatibility, and complexity presented in Table 2. These attributes were first presented in Article 1, and the secondary round of analysis in Article 2 verified their value. According to Rogers (2003), these attributes would have the most influence on an adopter's (i.e., a XCS coach's) decision to adopt an innovation. It was not surprising, in this case, that these attributes were experienced by a majority of coaches in each club. Additionally, there were more cross-case themes for relative advantage and compatibility than complexity; relative advantage and compatibility influence the rate of adoption more heavily than complexity (Rogers, 2003).

Table 2

Cross-Case Themes Highlighted in Article 1 that Increase Rate of Adoption

Attribute	Cross-Case Themes
Relative Advantage	FUNdamentals Multiple Sport participation Life Long Vision Developmental Stages
Compatibility	Sport should be fun Life Long Vision Large Club Size
Complexity	Coach education increases understanding of LTAD

A lack of parental understanding was seen in the results of both analyses. Within the literature, Black and Holt (2009) explained how "parents' knowledge of the program appeared to depend on the extent to which their child's coach communicated with them" (p. 253). XCS coaches in this study agreed and told us how parent understanding was integral to the adoption of the model, but largely relied on coach's conversations with their athlete's parents.

Coach recommendations.

XCS Coaches indicated several ways that Sport Canada, CSC, and CCC could increase coaches' adoption of the LTAD. Not surprisingly, there was a general sense that more funding, from Sport Canada and CCC, is needed to properly adopt and implement the LTAD into clubs. In fact, during the pilot interviews, conducted at the beginning of this thesis, one coach specified that more money was needed "at a club operations level." Coaches explained that the largest

benefit to increased funding would be the hiring of additional paid coaches who would be able to implement the LTAD day-to-day.

Additionally coaches told us that more specific resources for the implementation of LTAD should be developed by CSC and CCC, and made available to XCS clubs. These resources would standardize the content and curriculum being taught at Canadian XCS clubs, as well as make the implementation of LTAD more consistent from club-to-club. Black and Holt (2009) found that there was little consistency from club-to-club in terms of athlete assessment. This varying assessment may have stemmed from "concerns about the ability of coaches to assess the ski racers' level of development" (Black & Holt, 2009, p. 253). This concern could be addressed through a standardized level of coach education for XCS required for coaches working with certain stages of development.

Lastly, coaches expressed the need for CCC's current competitive model to be aligned with the LTAD model's principles. One VC coach from Club A offered that, "the competition model really needs to be revisited to align with what the [LTAD] model is saying" (Coach 11). Coaches saw much of what the competition model said, although theoretically sound, was impractical with the XCS community. These coaches argued that there should be some degree of compromise between what is theoretically correct and what is practical for XCS courses and clubs. One coach explained, "if you are travelling 500km to do a 10s race twice, is kind of a waste of time…some of these things although technically correct, the practical application of them wasn't right" (Coach 1).

Limitations

As with any study, certain limitations existed that will minimize the generalizability, transferability, usability of the data obtained in this thesis. A relatively small sample population

of coaches (N =13) was interviewed because of the time constraints of a Masters thesis. Thirteen interviews with XCS coaches cannot be generalized to the vast majority of XCS coaches in Canada. Nevertheless, because of the criteria put in place during recruitment, a rich amount of meaningful data was obtained in a short amount of time. This data was then described using thick description in the results and discussion sections of Article 1 and 2, which added to the transferability of results. Researchers will be able to use the results of this study to inform the research questions, methods, and analysis of future studies on Canada's LTAD model. In essence, this study will act as a building block for the future research on LTAD.

A second limitation of this study, also due to time constraints, was the limited focus of interviews on XCS coaches. To obtain a more complete understanding of the adoption of LTAD, interviews should be done with a wider range of key players such as parents, members of the club executive, and members of CCC's LTAD team. Unfortunately, the time required to recruit, interview, and analyze this number of participants was not feasible for this Masters thesis. However, these results represent the first step in a much larger project interested in the determinants of adoption of the LTAD. This larger study will take place over the next three years and is interested in the knowledge that sport coaches have about the LTAD, the determinants of adoption, and the decision to adopt or reject the LTAD in all disciplines of Canadian Sport.

Future Research

LTAD is still being adopted and implemented in Canada and is a key area where future research needs to be done. Throughout the completion of this thesis, many contexts where research is needed emerged. In this study, the persuasion and decision stages of Rogers' (2003) innovation-decision process were focused on. Future research should continue to use this process

to understand the implementation and confirmation of LTAD in XCS clubs and other sports clubs. Several questions need answering in both stages, for example:

1- What parts of the LTAD are being implemented at sport clubs and coaches?
2- How consistent is the implementation of LTAD in Canadian sport clubs?
3- How do club executives evaluate a club's implementation of LTAD?
4- How do coaches implement the LTAD?
5- How does the adoption of LTAD continue or evolve over time?

By continuing to use the *innovation-decision process*, a complete understanding of LTAD's diffusion into Canadian sport can be obtained.

Secondly, this study focused on *club* coaches as informed by pilot interviews. However, the difference in the perceived attributes by *interscholastic* coaches should be studied. One of the goals of the LTAD is to align all aspects of the Canadian sport system, including interscholastic sport. However, how different are interscholastic sport coaches' experiences with LTAD than those of club coaches? Furthermore, for LTAD to work it

> must be supported and promoted by all levels of government including Canadian Heritage (Sport Canada) and the provincial/territorial ministries responsible for sport and recreation; provincial/territorial health ministries and Health Canada; provincial/territorial education ministries; other relevant federal and provincial/territorial departments and ministries; and municipal governments" (CSC, 2006, p. 33).

Several coaches in this study have questioned the amount of support from these various levels of the Canadian sport system. Research should be completed to assess the amount of support given by these various levels, what form support takes, and where the support goes (i.e., sport clubs, interscholastic sport, elite sport, and/or grassroots).

A third subject for future research became evident during the classification of coaching types in Article 2. XCS coaches in this study fit within the four identified groups; however, do other coach groups, such as paid-recreational, exist? If these coaches exist, what roles do they play within a club's structure or other community structures, and how do they perceive attributes of the LTAD model? These questions could be answered given further research into the various types of coaches in sport clubs.

Two interesting results emerged around the name of the LTAD (i.e., *Long-term Athlete Development*) and the names associated with each stage of development (e.g., Training to Train and Learning to Train). Club B perceived the name of LTAD as negatively compatible with their club's goals and beliefs about sport, and explained that coaches should start referring to it as "Canadian Sport for Life" (CSC, 2006). In addition, VR coaches felt that the names associated with each stage of development were difficult to distinguish between. Rogers (2003) explained that the name given to an innovation could influence its adoption by a community. More research should be done to assess the impact of the name "LTAD" and the names of the LTAD's stages of development on the adoption of the model.

Lastly, the concept of *misadoption* presented by Rogers (2003) needs closer examination. Misadoption is when an innovation is adopted but incorrectly used. Some XCS club coaches adopted the LTAD after a mandate by their club executive. Moreover, Black and Holt (2009) explained that all "[f]ederally funded Canadian sports are required to have a Long Term Athlete Development (LTAD) plan" (p. 1). XCS coaches from Club A explained that the LTAD is flexible as a sport development model. So the questions must be posed:

1. How does this mandated adoption affect what a coach implements?
2. How consistent is the implementation of LTAD from one coach to another?

3. How do coaches evaluate the implementation of LTAD?

Further research is necessary to answer these questions.

Given the exploratory nature of this thesis and the scarcity of literature on the LTAD, it is imperative for scientists to continue to enhance the amount of Canadian research on the LTAD model. This project and the articles presented within this thesis, provide valuable information for future research to build on. Furthermore, I have presented several areas of research that need further investigation. LTAD is an opportunity for Canadian sport to reach a new level of quality and success. This success may be seen in the future health of the Canadian population or the athletic results obtained on the world stage. However, research should continue to evaluate and inform the goals and principle of Canada's LTAD model.

References

Banack, H., & Bloom, G. (2009). Promoting long-term athlete development (LTAD): Does the introduction to community coaching course promote the principles of LTAD? (Report)

Black, D. E., & Holt, L. H. (2009). Athlete development in ski racing: Perceptions of coaches and parents. *International Journal of Sports Science & Coaching, 4*(2), 245 – 260.

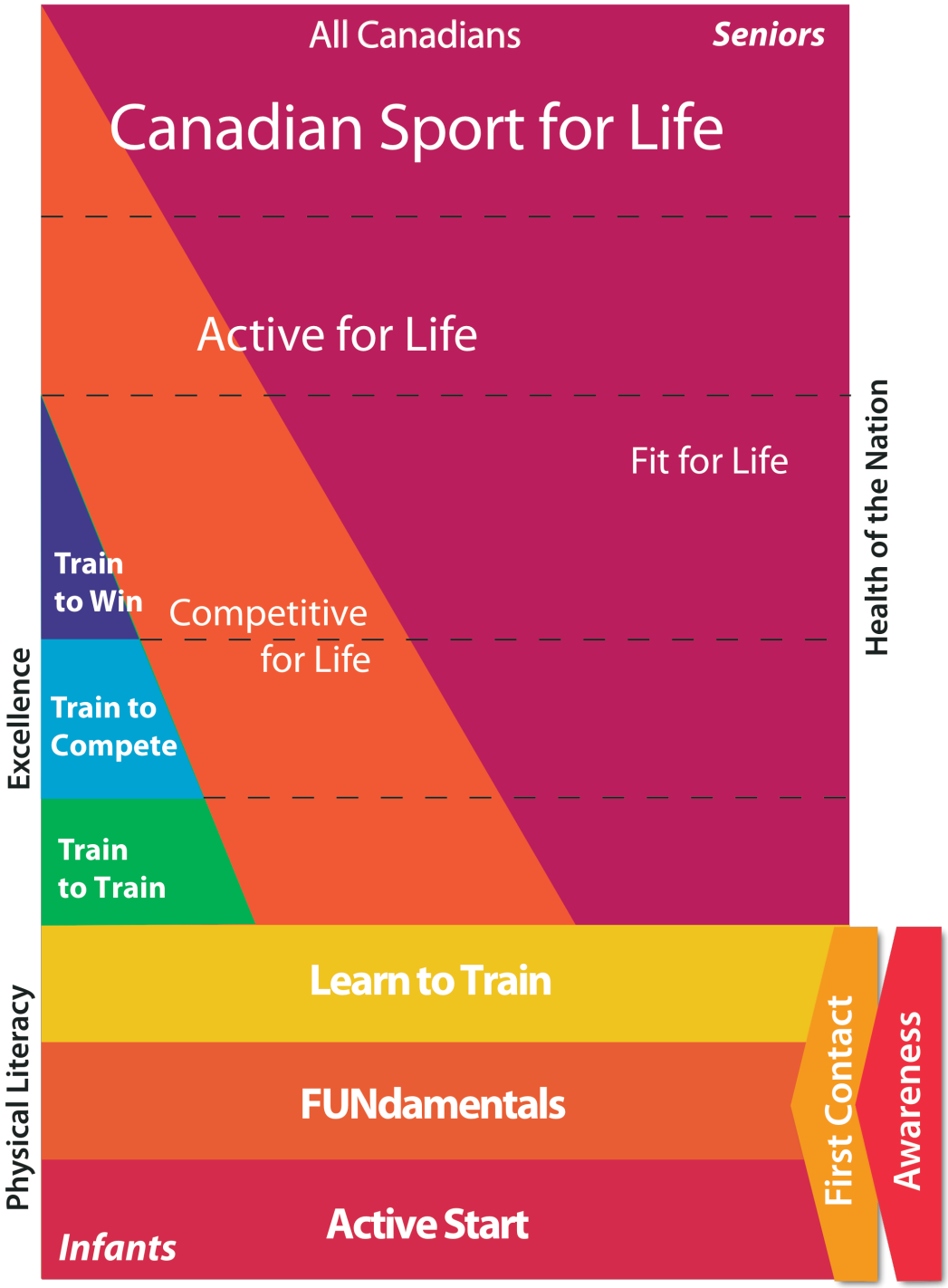
Canadian Sport Centres. (2006). Canadian sport for life. Ottawa, ON: Canadian Sport Centre. Retrieved August 14, 2010, from http://www.ltad.ca/groups/LTAD%20Downloads/English?LTAD_Resource_Paper.pdf

Perkins, D., Jacobs, J., Barber, B., & Eccles, J. (2004). Childhood and adolescent sports participation as predictors of participation in sports and physical fitness activities during young adulthood. *Youth Society, 35*, 495-520.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Appendix A

Sport for Life Rectangle: LTAD (CSC, 2011)



Appendix B

Narrative Interview Guide

Question 1)
Tell me about yourself as an athlete and as a coach; what your background is as a coach, and how you got started.

- What are your past experiences as an athlete?
- (Sports Played, level achieved, awards, etc.)
- What sparked your interest in coaching?
- How did you first get involved in coaching?
- How many years have you been coaching?
- What do you enjoy the most in coaching?
- What coach education or training have you participated in?
- (Show the chart and have them check off the boxes)
- What type of athletes/teams have you worked with as a coach?
- What coaching positions have you held? (Head coach, assistant, etc.)
- What coaching tasks or responsibilities have you been in charge of?
- What competitions have you and your athletes/team participated in?
- Do you intend to continue coaching?
- What motivates you to continue your involvement in coaching?

Question 2)
Tell me about your experience with Sport Canada's model for long-term athlete development and how you first perceived the LTAD model within the Ski environment.

- How did you become aware of Sport Canada's LTAD model?
- How did you become aware of your sports specific LTAD model?
- While completing your NCCP coursework, what knowledge did you gain about the LTAD model?
- How is the LTAD model different from the way you coach at present?
- How would you describe the LTAD model?
- What are the advantages of the LTAD model?
- How is the LTAD model was compatible with your values, past experiences as a coach, and the needs of your sports club and its athletes? Explain.
- How the LTAD model was incompatible with your values, past experience as a coach, and the needs of your athletes? Explain.
- How complex do you find the LTAD model to understand?
- Do you find the ten guiding principles of LTAD complex to understand?
- What characteristics of the model make it difficult to understand?
- Did you have the opportunity to try using LTAD? Examples?
- How can LTAD be used on a trial basis?
- How flexible was the LTAD model and its principles to your sport specific needs?
- Since you became aware of the LTAD model, has it influenced your coaching?
- How did it impact your coaching?

- Which principles did you use? Have you observed any impact on your athletes/team, coaches, or parents?
- If appropriate, how have your athletes reacted to your change in coaching technique?
- How has your sport, club, and/or coaching staff responded to the LTAD model?
- Have other coaches expressed an interest in your adoption of LTAD? Why?
- How comfortable are you to try out new coaching strategies like LTAD?
- How comfortable were you to try out the LTAD?

Question 3)
What would be the ideal situation if you were to adopt LTAD in its entirety?

- What is missing in your situation that prevents you from adopting the LTAD model?
- Is there anything else you wish to mention, regarding LTAD, before we conclude this conversation?

Appendix C

Results of Pilot Interviews

Table 1

Summary of Three Coach Biographies

	Participant A	Participant B	Participant C
Sex:	Male	Male	Female
Years Coaching XCS:	20 years	37 years	7 years
Spark for Coaching:	Child's participation in sport	Asked to help	Child's participation in sport
Current Coaching Role:	Youth aged ≤5 (Ski Club)	Youth aged 10-12 (Ski School)	Youth aged 9-13 L2T (Ski Club)
Coach Education:	Level 1 & 2 (Old NCCP) L2T & T2T	Theory Level 1 Tech. Level 1 (Football); Tech. Level 3 (Javelin)	L2T T2T (coursework)
Sports Played as an Athlete:	Alpine, Backcountry, & XCS; Rugby	Javelin; Football	Soccer; Field Hockey; Cycling; XCS
Motivation to Stay in Coaching:	Providing more positive experiences, Retention of athletes, Club community	Ability to learn, Parental appreciation, Allows him to stay young	The kids, The coaches, Team coaching atmosphere, Community/sense of belonging

Table 2

Attributes of LTAD as identified by participants (A, B, & C)

Rogers' (2003) Attributes	Examples from Narratives
Relative Advantage	Stages of Development, better Communication with Parents, emphasis on Play and Fun for skill development, retention of Athletes into a Program, females aged 16-20
Compatibility	Focus on active living and Long-term participation, retention of athletes, increasing the difficulty of moving athletes into higher levels of competition, enhancement of the program, natural transition
Complexity	Disagreement on complexity of Basic LTAD model, level of Coach, level of Athlete, available Resources
Trialability	Flexible, Resources available
Observability	Retention of athletes, less injuries, increased technique, more skill, more team unity, more success, consistency

Appendix Table 3

Barriers to Adoption of LTAD

Barrier Type	Examples from Narratives
Environmental	- Training Space - Number of races available to skiers
Resources	- Time - Opportunities to compete - Funding at an operations level
Social	- Parents - Overtraining of kids- over programmed - Skiers and Parents Level of Commitment - Number of Coaches - Resistance to Change - Coach development vs. Coach knowledge

Appendix D

CCC's Coach Education Model

CCC. (2008). *Cross Country Canada- Coaching Development.* Retrieved March, 3, 2010, from http://www.cccski.com/