

**EARLY INVOLVEMENT AND PATHWAY SPECIALIZATION:
A DROPOUT TRACK IN CROSS-COUNTRY SKIING?**

Grzegorz Więclaw

Master's Thesis in Sport and

Exercise Psychology

Spring 2013

Department of Sport Sciences

University of Jyväskylä

ACKNOWLEDGMENTS

First and foremost, I would like to thank the Research Institute for Olympic Sport (KIHU) for making this research project possible. Without KIHU's kind contributions and support, this master's thesis would have never been written. By letting me work on part of the data collected for one of their large longitudinal projects, KIHU has certainly helped me grow and develop as a researcher in the field of sport psychology. In particular, I would like to distinguish Niilo Konttinen, KIHU's head sport psychology researcher, for all the help and guidance I received from him while completing this project. I would also like to thank Tuomo Pihlaja, KIHU's statistician and Christoph Rottensteiner, PhD researcher at the institute.

Furthermore, I would like to thank two professors at the University of Jyväskylä, who have significantly contributed to my research: my main thesis supervisor, Dr. Maria Hassandra, for giving me signposts throughout the process and generously sharing her research knowledge and experience, and Dr. Marlen Harrison, for giving me a sense of direction and purpose at the beginning, when I was most confused.

With the process of the thesis revision the greatest support I have received was from Lara Pivodić, Jonathan Cagas, and Kristen Monahan. Their comments were indispensable and without a doubt improved the quality of my research work.

Last but not least, I would like to acknowledge all my other classmates and teachers whom I have encountered at University of Jyväskylä and University of Leipzig throughout the duration of this master's program. They have always been a source of inspiration and support, which among other things, helped me successfully accomplish this piece of research work.

ABSTRACT

Grzegorz Więclaw, 2013. Early Involvement and Pathway Specialization: A Dropout Track in Cross-Country Skiing? Master's Thesis in Sport and Exercise Psychology. Department of Sport Sciences. University of Jyväskylä. 58 pages.

Early sport specialization is often criticized for its potential to impair long-term athletic development. One of the most frequently cited consequences is dropout from further sport participation. Early diversification, within the Developmental Model of Sport Participation (DMSP), postulates that early sampling of various sports and late specialization should result in fewer dropouts. Still, empirical evidence supporting this claim remains scarce. The purpose of this study was to examine dropout rates among Finnish elite youth skiers in relationship to: (a) their developmental pathways, (b) age of first involvement with organized cross-country skiing, and (c) first encounter with organized sport.

This study adopted a retrospective follow-up design. The sample consisted of 152 skiers who raced competitively in the 2009/2010 season. Data concerning demographics and sport history was collected through a postal self-report questionnaire. The participation status of skiers was followed-up three years later from the Finnish Ski Association's data base.

Twenty-eight distinct developmental pathways were identified and assigned into specialized ($n = 7$) and non-specialized pathway ($n = 21$) categories. Based on the data distribution for age of first involvement, skiers were grouped into three categories: early (2-5 years), normal (6-8 years) and late (9-13 years). The mean age was 7.41 years ($SD = 2.51$). Eighty skiers (52.6%) in the sample indicated a cross-country skiing club to be their first ever encounter with organized sports, while the remaining 72 (47.4%) practiced other sports before engaging with organized cross-country skiing. The results of chi-square tests found no statistically significant association between dropout and the three variables (pathway category, age of first involvement, first organized sport experience). Only the comparison between normal and late involvement groups showed a significant difference between the groups, suggesting an association between late involvement and dropout. Thus, earlier involved skiers were less likely to drop out than skiers who started relatively late.

The results of the study are discussed within the DMSP framework. In general, they provide no clear support for the early diversification hypothesis; rather they suggest an optimal age window for first involvement in cross-country skiing and gradual specialization.

Key words: athletic development; early specialization; dropout; cross-country skiing

TABLE OF CONTENTS

ABSTRACT

1 INTRODUCTION.....	6
1.1 Theoretical Perspectives on Youth Sport Development.....	6
1.2 Dropout from Competitive Sports.....	18
1.3 Research in Cross-Country Skiing.....	20
1.4 Cross-Country Skiing in Finland.....	21
1.5 Research Gap.....	24
2 PURPOSE OF THE STUDY.....	26
3 METHODS.....	27
3.1 Study Design.....	27
3.2 Sampling Procedure and Data Collection.....	27
3.3 Participants.....	28
3.4 Measures.....	28
3.5 Data Analysis.....	31
4 RESULTS.....	32
4.1 Developmental Pathways.....	32
4.2 Time of First Involvement with Cross-Country Skiing.....	36
4.3 First Encounter with Organized Sports.....	37

4.4 Participation Status.	37
4.5 Hypothesis Testing.	37
5 DISCUSSION.	41
5.1 Developmental Pathways.	41
5.2 Time of First Involvement with Cross-Country Skiing.	42
5.3 First Encounter with Organized Sports.	43
5.4 Limitations.	44
5.5 Applicability of the Results.	47
5.6 Future Research Directions.	48
5.7 Conclusions.	49
6 REFERENCES.	50

APPENDIXES

1 INTRODUCTION

The following thesis presents the literature review, methods, results and discussion of a study conducted on dropout and early sport involvement and specialization in cross-country skiing. The research was conducted at University of Jyväskylä, Finland in close collaboration with the local Research Institute for Olympic Sports (KIHU).

In this chapter, the theoretical background of the study is discussed in light of recent literature. The primary focus is placed on the early sport specialization debate and dropout from further competitive sport participation. The research review has attempted to find specific evidence related to cross-country skiing in this debate as well. Furthermore, the context for the study is highlighted, with a brief history of cross-country skiing and its cultural significance in Finland.

1.1 Theoretical Perspectives on Youth Sport Development

Many psychological studies on acquiring expertise in areas such as art, medicine, science and sports were conducted in the last three decades (for reviews see Baker, Coble & Fraser-Thomas, 2009; Ericsson, Krampe & Tesch-Römer, 1993). In perhaps the most prominent and influential investigation in this field, Bloom (1985) followed 120 teenagers considered talented in disciplines such as academics, arts, mathematics, music, and sports (specifically, swimming and tennis). The study revealed that talent development involves more than a gifted individual, but rather an entire network of support systems including immediate family (most notably, parents), coaches, teachers, and institutions. Furthermore, talent development was described as a long-term process, which does not simply happen overnight (Bloom, 1985; Csikszentmihalyi, Rathunde, Whalen & Wong, 1993). Most importantly, Bloom's (1985) study served as a foundation and inspiration for further research on talent development in sports, which in turn resulted in the creation of stage models of youth sports development (e.g. Côté, Baker & Abernethy, 2007).

It has always been clear that only a small number of all youth athletes will ever attain elite levels of athleticism and potentially become champions in their disciplines (Güllich & Emrich, 2006; Malina, 2010). Thus, for the past decades both researchers and practitioners in sport have pondered how to foster development of young and gifted athletes. What developmental activities lead to continuous involvement with sport and,

eventually, expert performance? What developmental activities are detrimental? How early should a child get involved with a given sport and how early should they specialize?

A particularly big point of contention among practitioners and researchers is the so called early specialization among youth athletes (Baker, 2003). The question at hand is whether aspiring athletes must focus on development, training and competition exclusively in one sport early in their careers in order to persist and become elite.

The proponents of the early specialization framework (e.g., Ericsson et al., 1993; Ford, Ward, Hodges & Williams, 2009) argue that early involvement and specialization give the young athlete a competitive advantage in having more time to accumulate deliberate practice hours necessary for acquirement of expertise. The opponents of this framework (e.g., Côté, Lidor & Hackfort, 2009; Wiersma, 2000) posit another approach – early diversification, according to which a young athlete should sample different sports during their childhood and specialize only in late adolescence. Furthermore, the opponents of early specialization argue that early specialization carries severe developmental consequences for young athletes, including higher chances of dropout from further sport participation.

Thus far, the conceptual debate on the issue of sport specialization for optimal athletic development has been unresolved and empirical evidence quite equivocal. Let us have a closer look at each approach and then briefly discuss the framework for this study.

1.1.1 Early specialization

The classical view of athletic development postulates that early specialization in one sport is not only beneficial, but required for facilitating elite performance. According to this hypothesis, the earlier the start of specialization in one sport the better. Children who start practicing one particular sport earlier are more favorable to attain expert performance levels as adults and have a higher chance of becoming successful later in their athletic career (cf. Baker et al., 2009).

The notion of early specialization includes four specific parameters: (a) early start in organized sport, (b) early involvement in one sport, (c) early involvement in high intensity training, and (d) early involvement in competitive sport (Ericsson et al., 1993).

Literature oscillates between 5 and 11 years as a rough age range for early specialization (Côté et al., 2007). To give a specific example, in one study of youth English soccer players, the mean entry age into organized soccer clubs was 5 years old, while the commencement of specialized training was at 9 years of age for the players who later turned to become elite (Ford et al., 2009), which would be considered early for this type of sport.

However, the exact meaning of ‘early’ is disputed and inconsistent (Malina, 2010). It depends on a number of factors such as developmental traditions in the country, influences of significant others, and the nature of the sport. For example, in sports where peak performances typically start before the athlete reaches puberty (e.g., gymnastics, figure-skating) early specialization might be a necessary requirement for elite athleticism, but in others it might not be so (Côté, et al., 2007; Côté & Hay, 2002).

In the research literature, early specialization often entails high volumes of deliberate practice. As defined by Ericsson et al. (1993), deliberate practice is considered to be an effortful training activity, low in inherent enjoyment and designed to improve weaknesses. It is contrasted with playful interaction, paid work, observation of others, etc. The logic here assumes that the athlete who begins specialized training earlier will have more time to attain the required number of practice hours necessary for becoming an expert.

On a similar note, since it is generally easier to acquire skills and knowledge of a sport in young age, some researchers propose to begin specialized training earlier to build the foundation for later development (Ford et al., 2009). This claim is in accordance with the Power Law of Practice, where learning occurs rapidly at the beginning, but then slows down and it becomes more and more challenging to learn new things as one progresses (Baker, 2003).

It has been proposed that in order to achieve elite level expertise of practically any refined skill, the deliberate practice framework should be implemented for a minimum duration of 10 years (Ericsson et al., 1993). Here, 10 000 hours are given as a rough reference point, a rule of thumb for the amount of deliberate practice necessary for acquiring superior proficiency in any activity. Deliberate practice works because it focuses on skill repetition, error detection and correction, provides instant access to

feedback, while requiring full attention, maximal efforts and complete concentration from both the athlete and the coach (Ericsson et al., 1993; Ford et al., 2009).

Moreover, Ericsson et al. (1993) argue that the onset of deliberate practice needs to correspond to the sensitive periods of biological, social and cognitive development of an athlete, thus postulating early specialization. In conclusion, performance improvement is claimed to be directly related to the amount of deliberate practice making it the single most important factor in youth athletic development (Ericsson et al., 1993; Ward, Hodges, Starkes & Williams, 2007).

There are numerous case studies of famous athletes growing up strictly within one sport that provide some support for the early specialization hypothesis (Capranica & Millard-Stafford, 2011). There is also research evidence from across professional domains, including various sporting activities, that moderately support the early specialization hypothesis and the notion of deliberate practice (for review see Ward, Hodges, Williams & Starkes, 2004).

For example, studies of youth soccer players in England found that domain specific activities were more likely to lead the athlete to remain involved with sport and attain elite status (Ford et al., 2009; Ward et al., 2007). Specifically, the elite players differed from sub-elite in the proportion of team practice and playful activities as they developed. The elite players significantly increased the amounts of team practice and decreased the time spent on random play. These findings do not diminish the value of play; rather they suggest that an appropriate combination of practice and play is the most beneficial for young athletes to achieve elite status (Ward et al., 2007). Ford et al. (2009) also found no advantage of participation in other activities during ages 6-12 in the process of elite athletic development and attaining professional status at age of 16.

Despite moderate support for the early specialization hypothesis, most of the researchers suggest that early specialization with high volumes of deliberate practice is not the only way to get to the elite level of athletic performance, and actually might not be the best one either (e.g., Côté et al., 2007; 2009; Malina, 2010; Wall & Côté, 2007). In fact, much of the research body in favor of early specialization is based on anecdotal observations and case studies of famous athletes (see Capranica & Millard-Stafford,

2011), and research findings that were generalized to sports from other fields such as chess, music, arts and science (Malina, 2010).

There is empirical evidence from retrospective studies conducted in the United States and Canada, which suggests that many elite athletes did not specialize early (Baker, 2003; Côté & Hay, 2002). For example, some NHL hockey players did not fulfill the criterion of 10 000 hours of deliberate practice, yet still they play for the best professional hockey league in the world.

Other studies show that adult performance cannot be reliably predicted in childhood and even adolescence (Côté et al., 2009). Quite on the contrary, while success is so often highlighted at an early age, early success is no guarantee of later success (Malina, 2010), and there is even literature to suggest otherwise (e.g., Güllich & Emrich, 2006; Vaeyens, Güllich, Warr, Philippaerts, 2009). On a similar note, the study of Danish elite and near-elite athletes revealed that near-elite athletes specialized earlier and transitioned from one stage to another at an earlier age (Moesch, Elbe, Hauge & Wikman, 2011). Overall, evidence for effectiveness of early involvement and specialization remains disputed and equivocal (Malina, 2010).

As noted by Malina (2010) the widespread belief in early sport specialization has its roots in perceived effectiveness of Soviet and Eastern European talent development programs largely based on early specialization. This notion was then spread around by popular media shaping beliefs of the coaches and others concerned about youth athletic development worldwide (Malina, 2010). As a result youth sports have become more and more professionalized, including notions of early involvement and early specialization.

Nowadays, younger and younger children are faced with situations in which they must choose their preferred activities (Fraser-Thomas, Côté, & Deakin, 2008). This happens usually at a desire of the parents or coaches (Wall & Côté, 2007). However, some researchers claim that such notion carries more risks than advantages for athletes younger than 15 years of age (Gould & Carson, 2004). Furthermore, researchers point to many negative effects associated with early specialization and high volumes of early deliberate practice (Malina, 2010; Wiersma, 2000).

Ironically, first warning signs of adverse effects were coming from the studies conducted in the Soviet Union (e.g., Barynina & Vaitsekhovskii, 1992; for review see

Bompa, 1995). The recent literature emphasizes developmental disadvantages and perils of early specialization more strongly than ever. Among the most frequently cited risks associated with early specialization are: (a) limitation in overall development, (b) higher injury prevalence, (c) increased dropout rates (a more detailed discussion on dropout from competitive sport follows in Section 1.2 of this chapter), and (d) disinterest in continuation of physical activity later in life (Baker, 2003; Baker et al., 2009; Gould, Udry, Tuffey & Loehr, 1996; Malina, 2010; Wall & Côté, 2007; Wiersma, 2000).

The physical costs of early specialization are especially high. Specialized young athletes suffer from more injuries, and they are particularly prone to overuse injuries (Baker, 2003; Malina, 2010). Participation in a single sport also may limit non-sport developmental experiences in school, playground or extra-curricular activities (Gould & Carson, 2004).

Furthermore, the social and psychological development of the young athlete may be compromised (Baker, 2003). For example, due to high volumes of training and competition, they might be isolated from their peers, parents and family for a significant amounts of time (Malina, 2010; Wall & Côté, 2007). At the same time, they might get over dependent on people from their sport structure (Malina, 2010).

Finally, athletes who begin specialized training earlier oftentimes experience more chronic stress, negative performance evaluations, overtraining, and lack of social support. As a result they are more prone to developing burnout and/or dropout from further sport participation (Baker, 2003; Gould et al., 1996; Malina, 2010; Wiersma, 2000).

1.1.2 Early Sampling (Diversification)

Out of the critical appraisal for early specialization, an alternative approach emerged labeled early sampling or early diversification (Baker, 2003). In early diversification sampling of various sporting activities as well deliberate play are promoted, instead of sheer focus on one sport and deliberate practice for that sport.

Early diversification suggests that children should engage in a wide range of play-like activities, including semi-organized sports, games and free play such as yard games (e.g., soccer in the garden, hockey on the street, running through the playground etc.).

Fun and inherent enjoyment as well as general motor and skill development are emphasized with the benefit of a rounded development (Côté et al., 2009; Côté & Hay, 2002).

Not only physical and psychological well-being of the young athlete is at stake here. From a performance point of view, many skills are transferable from one athletic domain to the other (Baker, 2003; Baker et al., 2009). For instance, there are similar movement components in volleyball and badminton (jump and smash) or performance aspects in running and cross-country skiing (high endurance). There may also be transferability of tactical and psychological skills. One of the very challenging skills for ice hockey coaches is to teach their youth players how to open themselves space on ice. It can be practiced on soccer fields or basketball courts as well as in ice halls. Professional athletes also do this kind of training, except under a fancier label of ‘cross-training’ (Baker, 2003).

Importantly, in early diversification single sport specialization is delayed until late adolescence and the focus is on steady progression from play to practice (Côté et al., 2009). Indeed, many elite athletes from across disciplines in their early years participated in many activities prior to investment in one sport (Baker, 2003; Capranica & Millard-Stafford, 2011; Côté & Hay, 2002). Thus, early diversification is presented as an alternative and ‘healthier’ way of approaching youth athletic development (Baker, 2003).

Early diversification has been recently advocated not only by academic researchers, but also by many coaches and practitioners from the field of youth sport (e.g., Brown, 1999; Easter, 2008; Stubb, 2013). It is noted that practice of additional sport provides the athlete with an opportunity for balanced development, but also prevents overtraining, burnout and dropout (Easter, 2008). In pursuit of the athletic excellence, it is necessary to remember that young athletes still have needs of children and adolescents (Malina, 2010).

In 2009 International Society of Sport Psychology (ISSP) issued a position stand on the debate on sport specialization (Côté et al., 2009). This document included seven postulates about youth sport activities promoting continued participation and elite performance. It is quite evident that the ISSP position stand promotes early

diversification approach and deliberate play as opposed to early specialization and deliberate practice. The main intention of ISSP is to maintain the focus on developing a complete athlete with a range of sport skills, but while doing so maximize participation and minimize dropout. Below, all seven postulates are summarized and annotated. They offer a cornerstone for the rationale behind the hypotheses of the present study.

(1) *Early sport diversification does not hinder elite sport participation in adulthood.*

In fact, research shows that many top athletes sample different sports before they decide upon their main one (Capranica & Millard-Stafford, 2011). This is especially true for performers in disciplines, in which peak performance happens typically in late 20s or early 30s (Baker et al., 2005; Moesch et al., 2011).

(2) *Early sport diversification is associated with a longer career and long-term sport involvement.*

There is especially much evidence for more burnout and dropout among athletes who specialized earlier (e.g., Barynina & Vaitsekhovski, 1992; Gould et al., 1996; Fraser-Thomas et al., 2008; Wall & Côté, 2007).

(3) *Early sport diversification allows young people to participate in a wide range of contexts.*

A variety of experienced stimuli in different sport and non-sport contexts contribute to positive youth development in terms of their personal, psychological and social skills (Gould & Carson, 2004). These skills are considered foundational competencies for development, which help young people to adapt to different environments and situations later in both sports and life.

(4) *Deliberate play (as opposed to deliberate practice) builds a strong foundation for intrinsic motivation and intrinsic self-regulation.*

Consistently with self-determination theory, people who are assuming autonomy over their choices are more motivated to continue their active involvement in physical activity (Ryan & Deci, 2000). In other words, autonomous sampling of different sports in childhood gives a young athlete a chance to make a conscious

and self-regulated investment in late adolescence in their favorite sport. As a consequence, their continued participation and investment in one sport becomes more likely (Côté et al., 2009; Wall & Côté, 2007).

- (5) *Range of skills learnt outside of the main sport may be later successfully applied across contexts.*

The claim here is that what is learnt through participation in one sport can be later applied in another sport, therefore giving a competitive advantage to the athlete who practiced both. Transferable skills may involve both motor and cognitive skills (Baker, 2003). Some examples of transferable skills in various sports were given earlier in this section.

- (6) *At around age 13 young athletes should have an opportunity to specialize in their favorite sport or continue recreational participation.*

Having sampled various sports, ISSP recommends the athlete who aspires to become elite to begin specialization in secondary school. The focus from play to training should shift gradually; coaches and parents should be responsible for making this transition a smooth and healthy process (Fraser-Thomas et al., 2008).

- (7) *In late adolescence (16+) it is time to highly specialize in one sport.*

Once the athlete has chosen their favorite sport around age 16 it is time to highly specialize in that sport, which usually involves high intensity, all-year-round training. This age corresponds to current trends in youth development. In England, for example, it is a time when soccer players have an opportunity to sign a contract and turn professional (Ward et al., 2007; Ford et al., 2009). Nevertheless, some athletes, especially from endurance sports such as triathletes and cross-country skiers, delay their full specialization even further in time (Baker, Côté & Deakin, 2005; Ronbeck, Dunnagan & Stewart, 2004), which seems to be the key factor in their later success (Moesch et al., 2011).

Despite such a strong position stand from ISSP and an emerging voice of researchers and practitioners who advocate early diversification in youth sports, current trends in

youth sport development still promote institutionalization, elitism, early talent detection and early specialization (Capranica & Millard-Stafford, 2011; Côté et al., 2009; de Croock, 2011; Wiersma, 2000). With scholarships, professional contracts and sporting goods industry stakeholders, children specialize in one sport earlier and earlier (Malina, 2010).

This trend is further extended by the widespread belief of athletes, parents, coaches and sport management that the best ways to promote young athletic talents is to have them involved in one sport at an early age and have them practice that particular sport all the time (Malina, 2010). Labelling young kids as ‘talents’ and ‘prodigies’ naturally perpetuates their specialization, puts more pressure and expectations (Malina, 2010), and often results in more dropouts than elite performers (Fraser-Thomas et al., 2008; Güllich & Emrich, 2006; Wall & Côté, 2007; Wiersma, 2000).

As noted by Malina (2010): “Talented young athletes are often pawns in a complex matrix – the sport, adults who run the sport, parents, schools, sporting goods and services, media, and in some cases international politics” (p. 369).

Certainly, the exclusivity of elite sports implies that most of the participating athletes will never become Olympic champions and specialized pathways do not optimize production of such (Gould & Carson, 2004; Malina, 2010). By definition, elite sports is restricted for the best athletes in their disciplines and only a fraction of all participants will ever attain elite performance levels (Malina, 2010; Vaeyens et al., 2009).

Wiersma (2000) estimates that some 98% of youth athletes will never attain elite levels. Reports from different countries reviewed by Malina (2010) consider these chances even slimmer. Only 0.14% of 35 000 qualified Russian athletes make it from initial talent detection to elite performance level. In Germany, 15 of 4 972 athletes (0.3%) made it from initial selection to becoming top 10 in the world in their disciplines, while 192 of 11 287 (1.7%) graduates of German elite sports high schools won a medal at an international championship.

In professional leagues in North America this proportion is quite similar. The probability of competing in a professional sports team beyond high school is minimal. For example, only about 0.08% of basketball and soccer players make it to the respectively best leagues in the country – National Basketball League (NBA) and Major

League Soccer (MLS). This percentage increases for American football players (0.16%) who make it to National Football League (NFL) and baseball players (0.26%) who make it to Major League Baseball (MLB; Malina, 2010).

According to Baker (2003) there are no apparent risks or disadvantages associated with early diversification approach. Participation in youth sports carries plenty of potential physical, social and psychological benefits for young people (Gould & Carson, 2004). However, these benefits might not apply when it comes to specialized elite athletic development (Wiersma, 2000). Thus, early diversification (or multisport approach), might not only encourage more young people to participate in organized sports, but also provide more of them with an opportunity, rather than an obligation to progress to a higher level of sport expertise (Gould & Carson, 2004).

1.1.3 Developmental Model of Sport Participation (DMSP)

In order to better understand the nature of the early diversification approach, let us look at it from a theoretical perspective. The Developmental Model of Sport Participation (DMSP) is a comprehensive framework proposed by Côté and colleagues (Côté 1999; Côté et al., 2003; 2007; 2009), which tracks athletic developmental pathways from early childhood to adulthood. It was also influenced by the early research on talent development by Bloom (1985).

According to the DMSP there are multiple pathways leading up to elite athletic status and performance, involving both early specialization and early diversification approaches (Côté et al., 2009). DMSP has been chosen as a framework for this study and will be discussed here in detail.

DMSP is based upon four general stages, namely sampling (6-12 years), specializing (12-16), investment years (16 and on) and recreational years (13 and on). Thus, DMSP allows for both an early diversified and early specialized developmental pathway, which leads to attainment of athletic performance as well as a pathway leading to recreational participation (Côté et al., 2007; Figure 1).

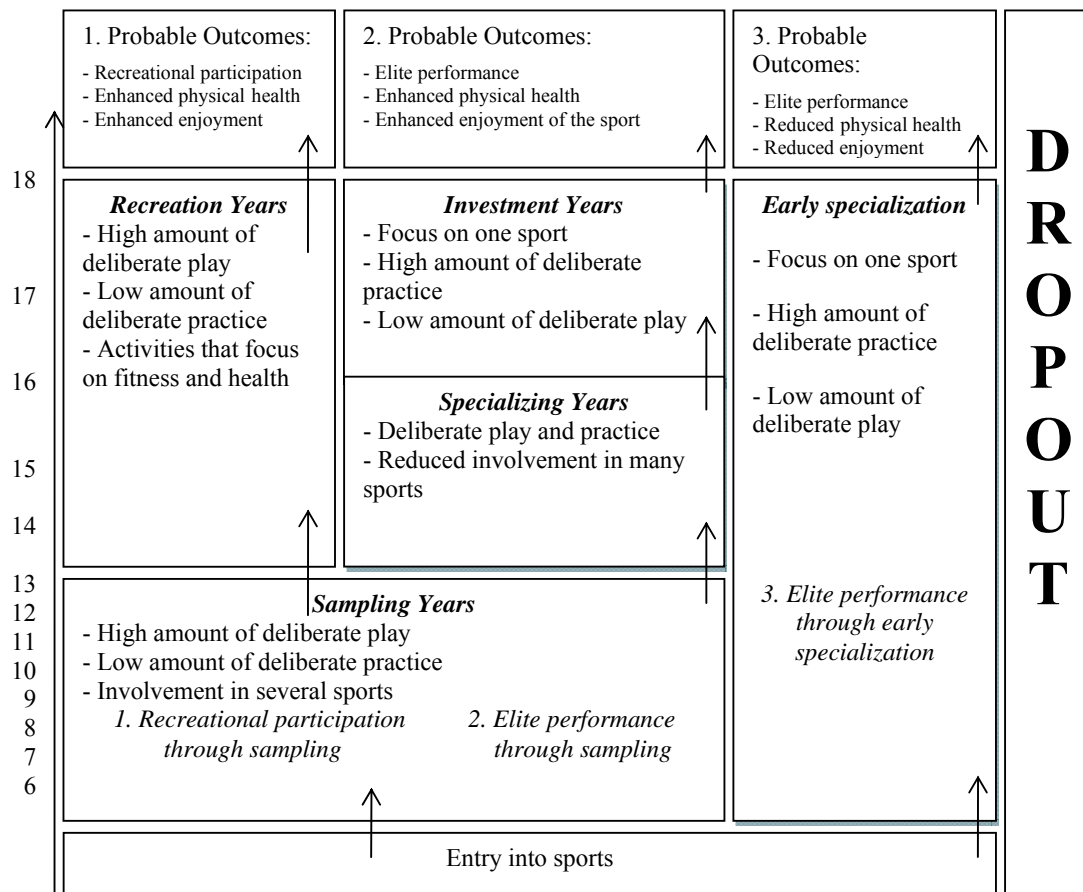


Figure 1. *Developmental Model of Sport Participation (Côté et al., 2007).*

During the sampling years, DMSP emphasises high levels of deliberate play, low levels of deliberate practice, and preferably involvement in several sports. Consistently with point (7) of the ISSP position statement (Côté et al., 2009), in this model, specialization happens ideally as a teenager, typically between 12 and 16 year of the athlete's life.

This is when the involvement in the number of sport disciplines becomes reduced, and the youth athlete chooses their favorite disciplines. Also, the volume of deliberate practice slowly increases, but still remains in a fair balance with deliberate play. Finally, in the later years of teenagers life, the focus on one sport becomes apparent; there is high volume of deliberate practice and low volume of deliberate play. The probable outcomes of such a model lead to further elite performance or recreational participation in sports.

Studies within DMSP framework found consistencies of the career paths of expert athletes in various sports such as rowing, tennis, basketball, netball, triathlon, ice-hockey and others (Baker et al., 2005; Moesch et al., 2011; Wall & Côté, 2007).

Embracing DMSP, the following research project adopted developmental pathways approach, which is able to identify the degree of specialization (i.e., amount of sport practiced and time of selection of the main sport). For the period between 3 and 6 years (Early Childhood), the developmental possibilities include: (a) organized sports and outdoor play, (b) only outdoor play, (c) only organized sports, (d) no activity. For the period between 7 and 12 years old (Primary School): (a) only main sport in a club, (b) main sport and other sports in clubs, (c) various sports in clubs, (d) only sporting activity outside organized sports, (e) no activity. Finally, for the period between 13 and 15 years old (Secondary School): (a) main sport in club and extra self-practice, (b) main sport and other sports in club, (c) main sport in a club and other sports outside of organized sports, (d) main sport only in club, (e) various sports in club, (f) 'late start' in sports. Such model provides a possibility for 120 different developmental pathways in youth sports (see Chapters 3 and 4 for more detail on developmental pathways approach).

1.2 Dropout from Competitive Sports

In research literature, discontinuation of participation in youth sports has been labeled 'dropout', 'attrition', or 'withdrawal' (Figueiredo, Gonçalves, Coehlo e Silva & Malina, 2009). Throughout this paper, all three terms are used interchangeably.

Dropout is cited as "the most damaging evidence against advocating early specialization" (Baker, 2003, p. 88). In a research review, Baker (2003) reports lack of fun and enjoyment as a leading motive to shift sports or discontinue further sport participation/competition altogether. Among others there are clash of interests, too much time spent in practice, pressure, lack of playing time, and sport competence issues (Wall & Côté, 2007). The main reasons for dropout according to Fraser-Thomas & Côté (2009) are negative coach experiences, parent pressure, and excessive stress.

As stated in the previous section only a few athletes who specialized early in one sport make it to the elite level, while an overwhelming majority of them dropout from competitive sport participation (Malina, 2010). Some 2/3 of sport participants dropout in adolescence, thus withdrawal from youth sports becomes a developing area of concern (Fraser-Thomas et al., 2008).

It has been reported that diminishing the role of excitement and fun in youth sports and not giving the children a chance to explore different sporting activities, and at the same time caring too much about winning, rankings and being the best all the time (be it from the coaches or parents) affect further participation (Gould & Carson, 2004; Malina, 2010). The main concern expressed here is that without the fun and love for the sport there will be no intrinsic motivation to sustain strenuous training regime (deliberate practice), which is necessary to attain expert performance levels (Gould & Carson, 2004; cf. Ryan & Deci, 2000).

Thus, it is argued that developing self-discipline and building intrinsic motivation to participate is more important than starting deliberate practice early in order to avoid dropouts (Gould & Carson, 2004). Furthermore, results of a massive study of German athletes revealed that athletic performance and relative success in childhood and adolescence is not a predictor of adult performance (Güllich & Emrich, 2006).

A Portuguese follow-up study of youth soccer players found that athletes who moved up to the elite level showed several advantages such as better physical parameters, higher maturity status, better scores on functional capacity tests, and better results on soccer-specific drills (Figueiredo et al., 2009). However, interestingly, the same study showed no differences between the groups of athletes who persisted at the same level or dropped out. In conclusion of the study, physical attributes were the decisive factor of athletic advancement for that sample (Figueiredo et al., 2009). Similar trends were observed among English youth soccer players; elite pathway dropout players did not sample more sports than the still involved players (Ford et al., 2009).

Another study of dropout from elite sports high school in Flanders, Belgium shows attrition rates as high as 41% with an average age of dropout at 15.5 years old (de Croock, 2011). The majority of the studied athletes chose their sport before the age of 12, although some sport variability was observed. The earliest specialized dropout athletes were competing in gymnastics, tennis and swimming (5 years old) and the oldest in cycling (11 years old).

In another study, Wall and Côté (2007) examined dropout against amount of time committed to deliberate play and deliberate practice during primary school years (i.e., between 6-13 years old) of high-level minor league ice hockey players. The researchers

conducted interviews with the parents. The results did not provide full support for early diversification, because both dropout and active players sampled various sports and had similar hour count investment in ice hockey specifically. The only difference found in this study was that dropouts had more off ice training and they began at an earlier age. As a recommendation they propose that youth sports should focus on the exploration of sport specific practices, games, play activities, and their goal should be having fun and enjoying time, rather than fitness conditioning and routine drill training (Wall & Côté, 2007).

Another similar qualitative study within DMSP looked at dropout among Canadian adolescent swimmers (Fraser-Thomas et al., 2008). The researchers also found consistency with the DMSP framework; both engaged and dropout athletes reported a diverse early practice and play experiences. However, the examination of their training patterns revealed that dropout athletes reported: early peak experiences, fewer or none opportunities for other activities than swimming, and had difficult transition to being the youngest in the group. On the other hand, the engaged athletes experienced a developmental approach, with healthy transitions, education on life skills, and an opportunity to explore other activities (Fraser-Thomas et al., 2008). The researchers concluded that early peak experiences particularly seemed to affect commitment, focus and further investment in swimming.

1.3 Research in Cross-Country Skiing

Being one of the most demanding Olympic sports (Rusko, 2003) cross-country skiing readily attracts attention of researchers. Nevertheless, most of the studies published on cross-country skiing have been dealing with physiology, biomechanics or the combination of the two (Lindinger, Ishikawa, Komi, Ohtonen & Linnamo, 2012).

In the past two decades, however, cross-country skiing has attracted growing interest of researchers from other disciplines, including sport psychology. For example, American researchers examined the effectiveness of mental skills training programs in US elite cross country skiers (von Guenther, Hammermeister, Burton & Keller, 2010). In Slovenia researchers examined the impact of different psychological attributes on competitive performance (Černohorski, Pustovrh & Tušak, 2006).

To the best of my knowledge only one study on early sport specialization in cross-country skiing was conducted up to date. Ronbeck et al. (2004) studied specialization trends among 107 elite male and female cross-country skiers in the USA. The findings of this research indicated that the most successful skiers got involved with the sport in their early childhood, but did not commit until ages 13-14. Overall, the results of the study supported the notion of early engagement (see Ford et al., 2009), but not early specialization in cross-country skiing. Still, psychological studies in cross-country skiing are scarce and represent the minority of all the studies conducted on performance expertise in this sport (Lindinger et al., 2012).

1.4 Cross-Country Skiing in Finland

Skiing has been an integral part of life in the Nordic region, long before it became a sport. Cross-country skiing is estimated to be 6,000 years old, like the Finnish word for *a ski* (suksi). More primitive versions of skis were probably used even earlier (Hannus, 1990). Originally, skiing was used as means of transportation and warfare (Hannus, 1990; Pouta, Neuvonen, & Sievänen, 2009; Watters, 2010). A semi-continental climate with relatively warm summers, but long freezing winters with heavy snowfalls throughout the region (Vasara, 1998), made skiing an efficient and natural way to move between widely spread communities (Hannus, 1990). Skis were also used as means of warfare as early as the medieval times (Vasara, 1998; Watters, 2010). One of the most notable uses of skis in combat was during the Winter War between Finland and Soviet Union in the winter of 1939-1940 (Hannus, 1990).

Nowadays, the Finns do not need to use their skis to fight for their lives. In the second part of the 20th century cross-country skiing has been transformed into a popular recreational activity (Watters, 2010) and one of the most demanding and refined endurance Olympic sports (Rusko, 2003).

1.4.1 Elite Cross-Country Skiing

Throughout its history, cross-country skiing has gone through arguably the most radical revolution in terms of equipment and performance (Brown 1999; Hannus, 1990; Rusko, 2003). The sport today is nothing like it was in the first winter Olympic Games of 1924 in Chamonix; it hardly resembles itself from the 1970s (cf. Brady, 1977; Suvikas, 1982; Rusko, 2003).

Especially in the recent decades cross-country skiing has become a science (cf. Rusko, 2003). At the top level every small detail matters, for example choosing the right skis depending on skiing style, weather conditions, and body composition of the skier might become a decisive factor between winning and losing (Brown, 1999). Oftentimes, the skiing team has a vast technical support crew responsible for proper preparation of the skis (Brown, 1999; Rusko, 2003).

Physiologically speaking, cross-country skiers are thought to be the fittest of all endurance athletes, because no other discipline requires engagement of so many muscle groups at a time (Brady, 1977; Rusko, 2003). Cross-country racing at the competitive level today varies from short sprints (approximately 1 kilometer) to distance events as long as 50 kilometers. There are also different technique styles and forms of the contest (Brady, 1977; Rusko, 2003).

The history of cross-country ski races naturally begins in the Nordic region, with Norway (1843), Sweden (1877), and Finland (1879) organizing first competitive events (Hannus, 1990). In Finland, the army organized skiing developmental scheme as early as the 1920s to determine the fittest men for the service. This system resembled the structure of a modern sport academy, where skiers competed at three different levels, namely national, district and village. The best skiers at each level represented their community at a higher level (Vasara, 1998). As part of the ski troops training, the Finnish soldiers went through a complete athletic training, which included cross-country skiing and shooting, downhill skiing, and racing with the entire military equipment (Watters, 2010; Vasara, 1998). Without a doubt, a strong military tradition has provided Finland with much Olympic success at both the summer and winter Games (Hannus, 1990).

The 1930s made cross-country skiing truly a national sport in Finland. In 1934 the government implemented annual week-long skiing holidays making literally everyone a skier. The Finns were emerging as an unquestionable leader in cross-country skiing in the world (Hannus, 1990). The national skiing project was continued after the World War II in a program called “Everyman’s Skiing” targeting the Finnish population of all ages throughout the entire country. Notably, the program produced a number of elite athletes in this discipline (Hannus, 1990).

Finland has played a big role in developing this discipline at the international level. Tapani Niku's bronze medal in the 18km race at the 1924 Chamonix Winter Olympic Games began a long lasting athletic tradition in elite cross-country skiing in Finland (Hannus, 1990). Up to date, with 73 cross-country skiing Olympic medals (19 gold, 22 silver, and 32 bronze) it is the third most successful sport in Finnish Olympic history and by far the most successful winter sport (Finnish Olympic Committee, 2012). This count also makes Finland the second most successful country in cross-country skiing at the Olympic Games, second only to Norway (Official Olympic Games results, 2012). In addition, Team Finland has won some 165 cross-country skiing medals in FIS Nordic Skiing World Championships since 1924, not to mention numerous individual and team victories and podiums in the World Cup (Finnish Olympic Committee, 2012).

Despite the rich history, elite Finnish cross-country skiing has experienced a crisis and several challenges in the recent years. Possible reasons for this trends could be the doping scandal of Lahti in 2001 (Halonen, 2012), inconsistent interest among the youth and poorer snow conditions during winters (Pouta et al., 2009).

1.4.2 Current Participation

Cross-country skiing is for top athletes as well as for recreational exercisers, especially popular among the Nordic nations (Brady, 1977). Through its historical and cultural significance, cross-country skiing is considered one of the national sports in Finland (Pouta, et al., 2009; Suvikas, 1982).

Finnish citizens are renowned for being physically active and engaged in sport activities (Finnish Olympic Committee, 2012). The popularity of sports is especially noticeable at the youth level. According to the national sport survey from 2010, some 424 000 Finnish children and youth are engaged in sports clubs. The estimated number of Finnish youth cross-country skiers between ages 3-18 is relatively stable over the period of the last two decades, stretching from 100 000 in 1995 through 163 000 (1998), 195 000 (2002), 190 000 (2006) to 147 000 (2010). Although noticing a slight drop in participation in recent years, cross-country skiing was still the fifth most popular recreational sports activity in 2010 among the youth population after football, cycling, swimming and running (Finnish Sport Federation, 2010b).

According to the national sports survey, some 663 000 Finnish adults and 147 000 Finnish children indicated cross-country skiing as their hobby (Finnish Sport Federation, 2010a; Finnish Sport Federation, 2010b). In general, 94% of Finns report being able to ski. In the younger section of the population (people between 15-24 years old), this rate is a little lower, but still incredibly high – 91% (Pouta et al., 2009). Skiing ability is usually acquired during childhood. On average children are taught to ski at the age of five, typically by parents or other family members (Pouta, et al., 2009).

According to the same survey, cross-country skiing is the most successful sport in Finland ever, followed by track and field, ice hockey and ski jumping. This is reflected by public interest and popularity of skiers. For example, the Finnish Sports Personality of the Year Award is selected by sports journalists and writers continuously since 1947. Between 1947-2013 Nordic skiers have been awarded this prize 23 times, more than any other athletes representing other sport disciplines. Most recently, the award was taken by Aino-Kaisa Saarinen in 2009, an Olympic and world championship multi-medalist (Aino-Kaisa Saarinen, 2010). In terms of TV coverage, team sports such as ice hockey and football hold the lead, followed by individual events of track and field as well as cross-country skiing (Finnish Sport Federation, 2010b).

Sports activities in Finland are organized by sports federations and clubs. There are around 7 800 clubs in Finland and 130 federations, most of which are non-profit. Cross-country skiing is under the umbrella of Finnish Skiing Association. As of March 2012 there are 612 ski clubs registered in the Finnish Skiing Association (Finnish Skiing Association, 2012).

The above mentioned trends and statistics clearly depict the importance and popularity of cross-country skiing as a competitive sport and recreational activity in Finland. It makes it arguably one of the best places on the planet to investigate the developmental systems in this sport.

1.5 Research Gap

Having reviewed empirical studies on dropout in contexts of early specialization and early diversification in this chapter, we may conclude that there is not enough convincing empirical evidence in favor of either of the hypotheses (see also Baker et al., 2009). Many researchers in the field call for further investigation on the issue of time

and degree of specialization and dropout (e.g., Baker, 2003; Capranica and Millard-Stafford, 2011; Wall & Côté, 2007). Specifically, this call urges to test assumptions standing behind the early diversification hypothesis on dropout while diversifying methods used as well as sports and countries at study (Côté et al., 2009; Wall & Côté, 2007).

Most studies supporting the early diversification approach are conducted in team sport settings and the findings are generalized from the studied sport discipline to sports in general (Baker, 2003). Not much research is done about youth development in less popular sports, such as cross-country skiing.

Furthermore, most of the studies on dropout from the developmental perspective focus on athletes', coaches' or parents' perceptions of dropout situation, rather than objective and observable facts about their participation (Wall & Côté, 2007). On the same note, many studies on early specialization and dropout have adopted qualitative nature (e.g., Fraser-Thomas et al., 2008; Wall & Côté, 2007). While they might provide us with valuable insights and promote understanding of the studied phenomena, it would be beneficial for the field to adopt a quantitative approach to test the early diversification hypothesis on a larger sample.

This study is ingrained within the DMSP, a relatively new framework for research in expertise development in sports. DMSP offers a unique opportunity to explore and study developmental trajectories of young athletes as they progress through their youth career (Côté et al., 2007; Ford et al., 2009). Thus far, the DMSP has not been studied extensively or systematically, especially in the context of dropout from further sport participation (Baker, 2003).

Given the unsatisfactory state of current research literature in sport sciences on early specialization and dropout in general and in cross-country skiing in particular, the following study intends to begin building an empirical case for this sport.

2 PURPOSE OF THE STUDY

The primary purpose of this study was to examine dropout in cross-country skiing within the DMSP and early diversification hypothesis. Specifically, the study intended to test whether dropout from further sport participation is related to three potentially predictive variables, namely degree of pathway specialization, age of first involvement with organized cross-country skiing, and the type of first organized sporting experience. The secondary purpose of the study was to explore the existing network of developmental pathways and trends for a sample of elite youth cross-country skiers in Finland.

The hypotheses for this study were based on the line of recent research critique of the early specialization hypothesis reviewed in the previous chapter (e.g., Baker et al., 2009; Fraser-Thomas, et al., 2008; Wall & Côté, 2007; Wieresma, 2000). Consistently with assumptions of the DMSP, sampling appears to be superior to specialization in early childhood, especially in endurance, individual and quantitative sports like cross-country skiing, typically associated with late specialization (Baker et al., 2005; Moesch et al., 2011). Thus, skiers with more diversified sporting experience (especially between ages of 6-12) as well as those who engaged later, should be less likely to drop out in late adolescence (Wall & Côté, 2007).

Thus, it was expected that there would be significant differences in dropout rates between the groups. It was hypothesized that skiers, who (a) followed a specialized pathway (i.e., selected the main sport as early as primary school), (b) entered organized cross-country skiing at an earlier age, and (c) began their organized sporting experience with cross-country skiing, would be more likely to drop out than skiers from the other groups.

3 METHODS

This study was an integral part of a large longitudinal investigation titled “Developmental Paths in Finnish Youth Sports” carried out by the Finnish Research Institute for Olympic Sports (KIHU) based in Jyväskylä, Finland. KIHU is the high performance unit of the Finnish Olympic Committee realizing the research and development program for Finnish elite sports.

For the purposes of this research project, KIHU has followed youth athletes born in 1995 competing in seven various sports (football, ice-hockey, basketball, cross-country skiing, figure skating, gymnastics, and track and field). This research endeavor was funded by the Finnish Ministry of Education and Culture. The data have been collected since 2010.

3.1 Study Design

Many studies in developmental sport psychology followed a cross-sectional retrospective design similar to Bloom’s (1985) classic study on talent development discussed in the previous chapter (Moesch et al., 2011). Despite many calls for longitudinal investigation, the majority of studies in the field remain retrospective and/or cross-sectional (Baker, 2003). This happens usually due to researchers’ limited time and resources. In spite of methodological flaws retrospective data collection is still an accessible way to early sport experiences of the athletes (Moesch et al., 2011). Thus, this study adopted a retrospective follow-up design and involved a postal survey of Finnish youth skiers.

3.2 Sampling Procedure and Data Collection

Finnish cross-country skiers born in 1995 with a valid racing license for the 2009/2010 season were included in the study. Contact information of the active skiers was obtained from the Finnish Ski Association’s data base with all the necessary permissions and the approval of the ethic committee.

Most of the data required for this particular study was collected in the summer of 2010 through an extensive questionnaire inquiring about demographics, sports history, current participation etc. (for the relevant parts of the questionnaire see Appendix 1).

The questionnaire was designed by KIHU and mailed with a return envelope to the entire population ($n = 369$) of Finnish cross-country skiers born in 1995. Participation in the survey was voluntary.

The follow-up data (i.e., current participation status information) on the sample of skiers was collected two and a half years later, in December 2012. It was done by obtaining the racing license registry for the 2012/2013 competitive season from the Finnish Ski Association. This data was then matched with the previous set in January 2013. All the data was coded and stored electronically in Microsoft Excel and SPSS software programs.

3.3 Participants

One-hundred-and-fifty two young skiers (81 were female and 71 male) responded to the questionnaire. The response rate was 41%. The sample in this study included all 152 questionnaire respondents.

A majority of 92 young skiers (60.6%) reported living in towns smaller than 20 000 inhabitants and the countryside. Forty-three skiers (28.3%) lived in medium sized towns and cities between 20 000 and 100 000 inhabitants. Only a small portion of skiers lived in cities larger than 100 000 inhabitants. Five skiers came from the capital area (3.3%) and 12 others from major Finnish urban centers such as Turku, Tampere, Oulu, Lahti and Jyväskylä (7.9%).

3.4 Measures

The variables analyzed for this study included demographics, developmental pathway information, time of first involvement with organized cross-country skiing, first encounter with organized sports, and dropout. The following subsections describe each one of these variables.

3.4.1 Demographics

The demographic information included gender, month of birth, height and weight, current dwelling place and basic family information (see Appendix 1, Questions 1-7).

3.4.2 Developmental Pathways

In order to find out the developmental pathway of a cross-country skier, their participation in sports was divided into three major stages following the DMSP model as described in Chapter 1. The stages included Early Childhood (3-6 years), Primary School (7-12 years) and Secondary School (13-15 years). In each stage the respondent was asked to choose from a few alternatives to best describe their sports and physical activity involvement.

The questionnaire primarily tapped into the nature of the sporting experience. Were the athletes always active? And if so, was their activity structured by coaches in clubs or did it mainly involve free play and physical activities provided by school and family? Furthermore, the developmental pathway reveals when the main sport was selected and whether there were any other sport practiced alongside. Only one answer was permitted per stage. Because of the retrospective nature of the questions, the young athletes were encouraged to ask their parents for help, had they needed it, while describing their sports and physical activity involvement.

For example, in the Primary School stage, the available options were: (a) *one main sport and no other sports* (I did my main sport in a sports club. I did other sports occasionally or in school), (b) *One main sport and other sports* (I did my main sport in a sports club, but it was not the only sport I practiced in a club or on my own. However, other sports were not as important to me as my main sport), (c) *Many different sports practiced evenly* (I did two or more sports in sport clubs. I did not select my main sport), (d) *Sporting activities outside of organized sports* (I did not do any sports in sport clubs, but I practiced sports regularly on my own), (e) *No sports at all* (I did not do any sports at all other than occasionally or in school). (see Appendix 1, Question 8).

Once the pathways were described they were grouped into two broad categories. The first category was labeled as ‘specialized pathways’. It included all the skiers who entered the organized sport structure already in their early childhood, chose to focus on cross-country skiing as their main sport in primary school, and sustained their interest in the secondary school.

The second category was labeled ‘non-specialized pathways’ and it included all the other cases. These skiers diversified their sporting experience in their early childhood, as well as primary and secondary school years.

3.4.3 Time of First Involvement with Cross-Country Skiing

In order to know the time of the first involvement of an athlete in organized cross-country skiing, the questionnaire asked: “At what age did you start practicing cross-country skiing in a club/organization?” The number indicating the right age was to be placed in the response space below the question (see Appendix 1, Question 9).

These results were also categorized into groups based on age of the first involvement (e.g., early vs. normal vs. late) with cross-country skiing. Depending on the type of the distribution of this variable the grouping was to be done by using quartile or standard deviation cut-offs. The comparison between the age groups was also to be computed.

3.4.4 First Encounter with Organized Sport

In order to know the type of the first organized sport encountered by athletes, the questionnaire asked: “Was cross-country skiing your first sport in a club/sport organization?” Two exclusive options were available here: (a) yes, and (b) no, my first sport was...” (see Appendix 1, Question 10). These results were also to be categorized into two groups – cross-country skiing and all the other sports.

3.4.5 Participation Status

The participation status variable was obtained in the process of follow-up data collection. It contained three different categories, namely (a) the athlete continued to ski competitively (the so called ‘B license’), (b) the athlete continued to ski recreationally (the so-called ‘ski pass’), (c) the athlete dropped out from organized cross-country skiing.

For the purposes of this study the ski pass holders were considered recreational skiers. Since they discontinued their competitive cross-country skiing career, they were considered elite pathway dropouts.

3.5 Data Analysis

Each variable was described using descriptive statistics. Due to the categorical nature of all variables, data analysis involved primarily chi-square tests for independence. More specifically, the analysis explored possible relationships between dropout from competitive youth cross-country skiing, and the other three variables in the study, namely pathway category (specialized vs. non-specialized), time of first involvement (early vs. normal vs. late), and first organized sports encounter (cross-country skiing vs. other sports). For all the analyses the significance level alpha was established at $p < .05$.

4 RESULTS

This chapter outlines the results of this study. First each variable in this study is extensively described, followed by the results of the hypothesis tests.

4.1 Developmental Pathways

Out of 120 possible developmental pathways, 28 were identified in the sample of Finnish youth cross-country skiers born in 1995 (Figure 2).

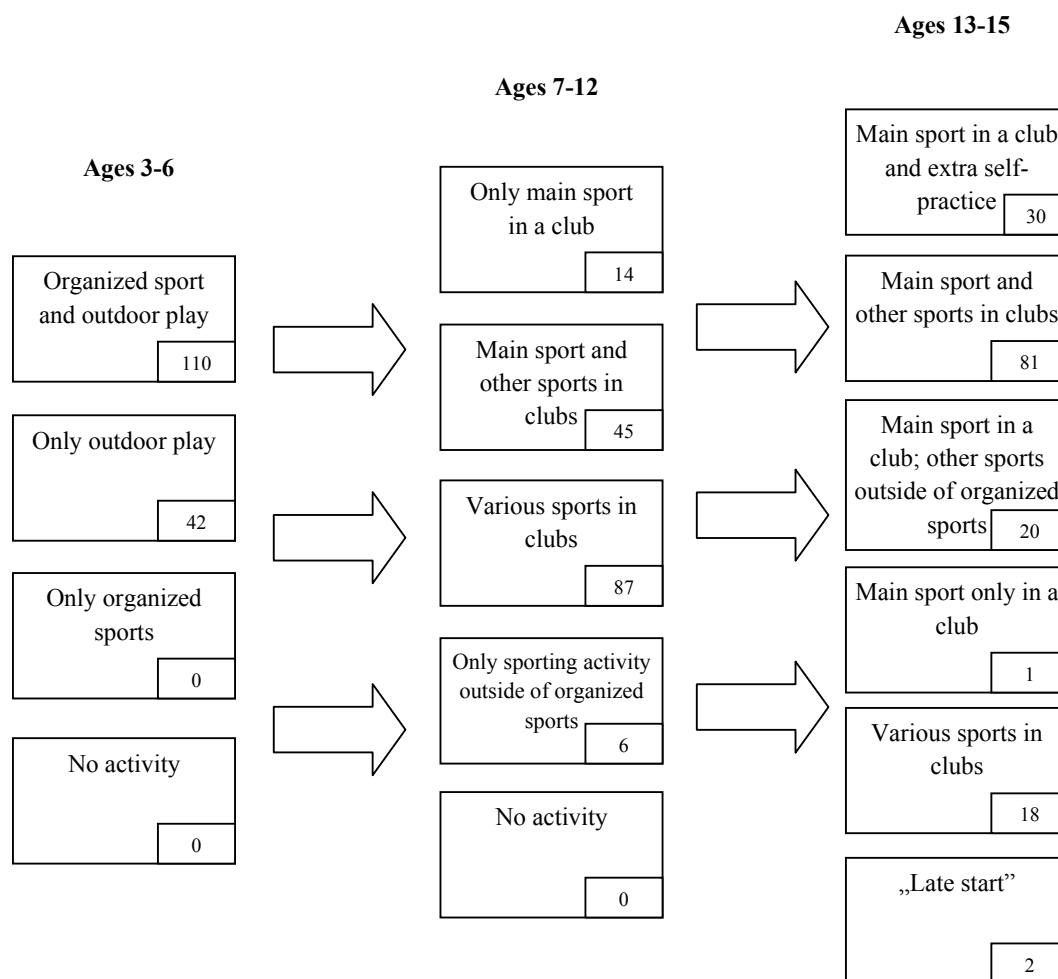


Figure 2. *Pathway progression in the sample of Finnish cross-country skiers; numbers represent number of participants.*

The most frequent pathway included 44 athletes, which progressed from organized sport and outdoor play in their early childhood, through practice of various sports in clubs in their primary school years, to selection of the main sport (cross-country skiing), but

continuation of practice of other sports in club structure in their secondary school (Figure 3).

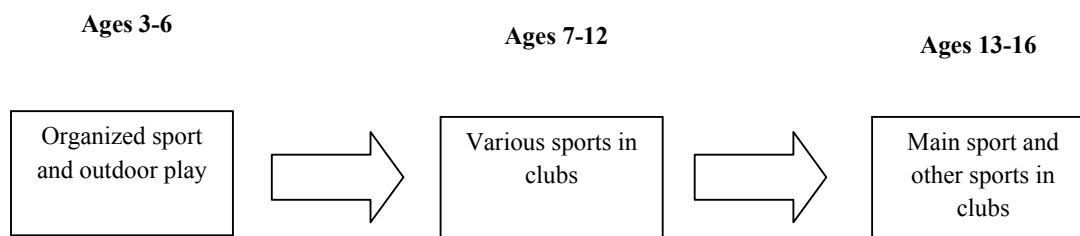


Figure 3. *The most frequent (n=44) developmental pathway in this sample of Finnish cross-country skiers.*

The four most frequent pathways included sport histories of 83 athletes (55%) and 18 most frequent ones cumulated 142 of them (93%). Ten pathways were unique for only one athlete in the sample each.

In the Early Childhood phase, between ages 3 and 6, 110 skiers (72%) participated in both organized sports and outdoor play. A smaller proportion of the sample (42 skiers, 28%) exclusively played outdoors. Not a single skier indicated participation only in organized sports at this developmental phase. However, noticeably, no participant was classified as inactive either.

In the Primary School phase, between ages 7 and 12, most of the sample continued to explore different sports in clubs (87 skiers, 57%) or outside of organized sports (6 skiers, 4%). On the other end, 14 athletes (9%) focused on organized cross-country skiing exclusively, and a further 45 of them (30%) decided to pursue it as their main sport, but still continued practicing at least one other sport in a club. However, an overwhelming majority had already entered an organized sports structure during this phase. Again, not a single participant was classified as completely inactive.

In the Secondary School phase, between ages 13 and 15, most of the athletes decided upon their main sport: cross-country skiing. However, their involvement varied in terms of intensity and commitment. Only one athlete (0.5%) reported practicing cross-country skiing in a club exclusively, and 30 other athletes (20%) skied exclusively in a club and held additional self-practice routines. Eighty-one skiers (53%) practiced cross-country skiing alongside other sports in clubs, 20 of them (13%) practiced cross-country skiing

and had other sporting involvements outside of organized sports. Noticeably, only a small portion of the sample remained undecided about their main sport. Eighteen of them (12%) still continued to practice various sports in clubs with equal emphasis on all of them and two (1.5%) considered themselves as ‘late starters’ in cross-country skiing.

In the following section, the detailed pathway progression is depicted. In order for the developmental trends among the Finnish youth cross-country skiers to remain clear, the DMSP was broken down into smaller, more readable sections. Each cell from the Primary School phase (the middle column) is presented with its preceding and following pathways (Figures 4-7).

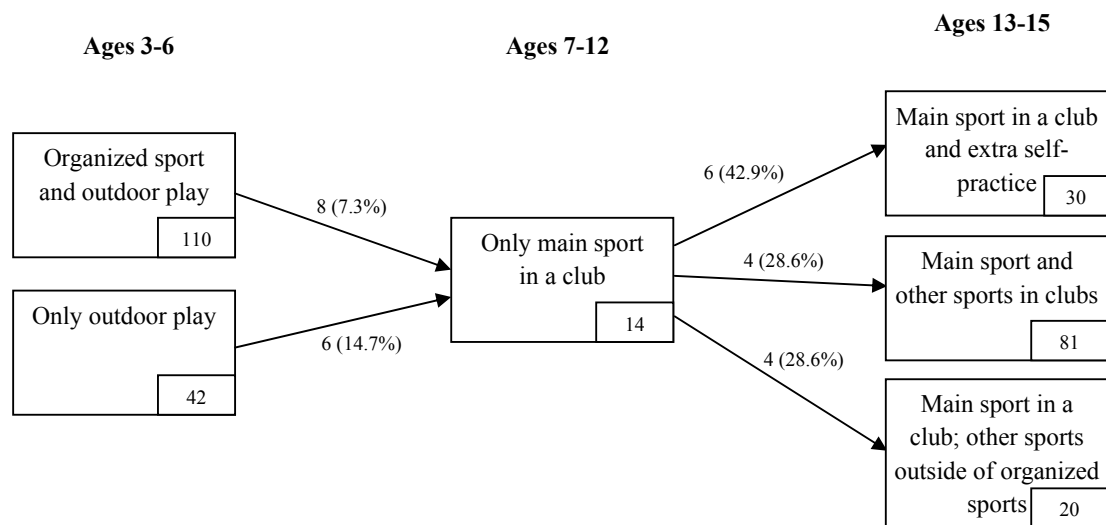


Figure 4. Cross-section of the DMSP in the sample of Finnish cross-country skiers. Numbers and percentages indicate participant frequencies, while arrows depict pathway progression to and from the middle cell (“only main sport in a club”).

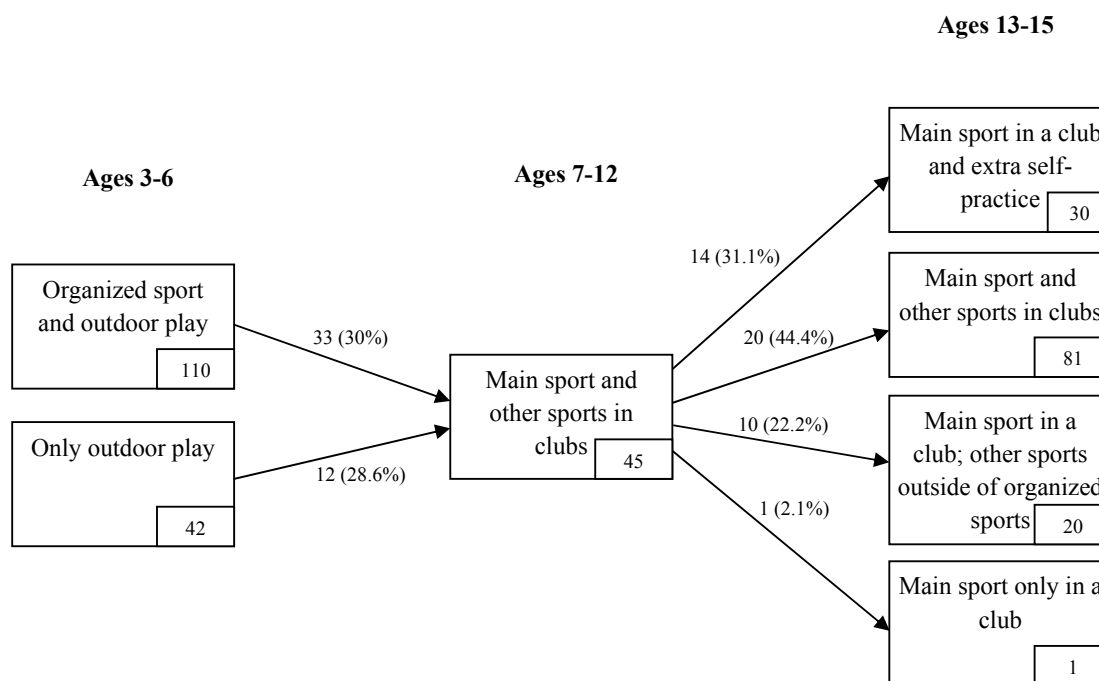


Figure 5. Cross-section of the DMSP in the sample of Finnish cross-country skiers. Numbers and percentages indicate participant frequencies, while arrows depict pathway progression to and from the middle cell (“main sport and other sports in clubs”).

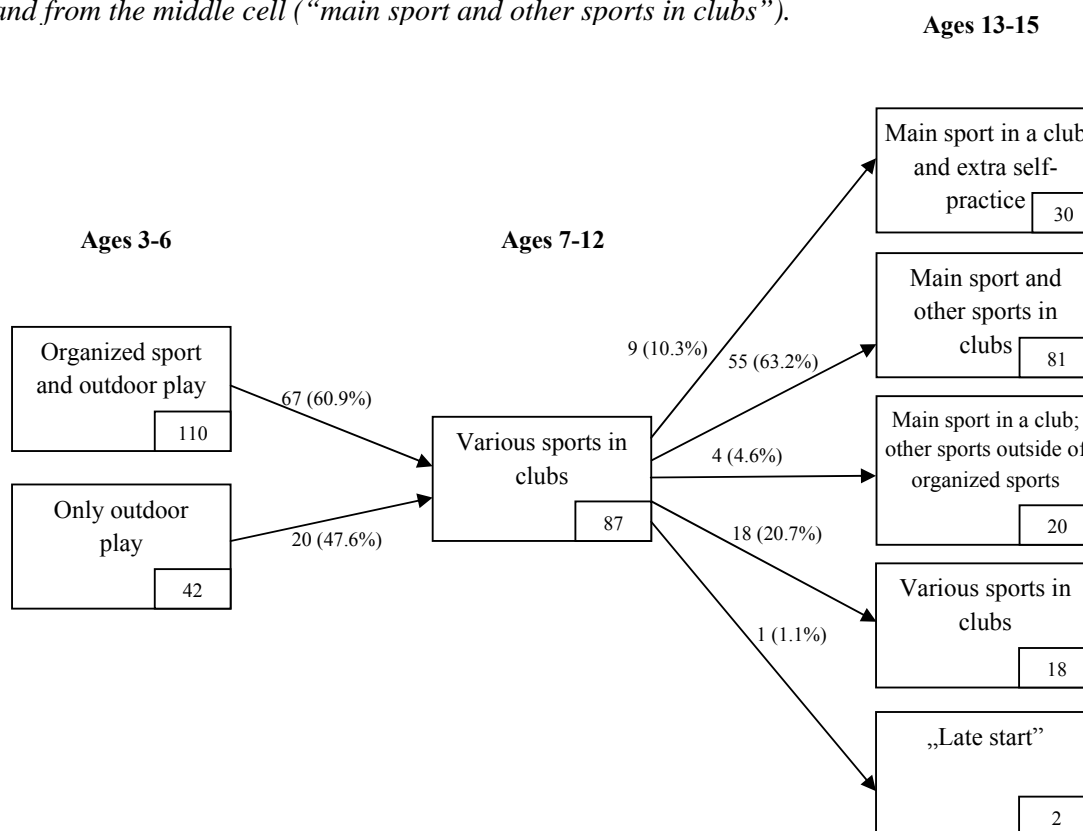


Figure 6. Cross-section of the DMSP in the sample of Finnish cross-country skiers. Numbers and percentages indicate participant frequencies, while arrows depict pathway progression to and from the middle cell (“various sports in clubs”).

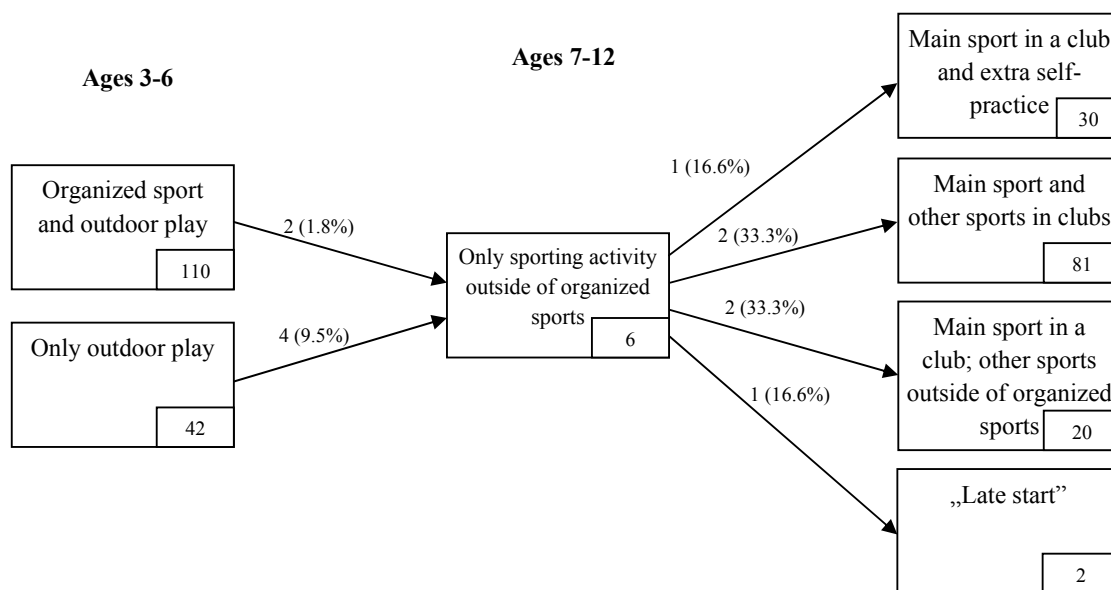


Figure 7. Cross-section of the DMSP in the sample of Finnish cross-country skiers. Numbers and percentages indicate participant frequencies, while arrows depict pathway progression to and from the middle cell (“only sporting activity outside of organized sports”).

For the purposes of this study the pathways were classified into two broad categories, namely specialized and non-specialized pathways. The specialized pathway included athletes who were exposed to organized sports at preschool age (cells 1 and 3), chose cross-country skiing as their main sport in their primary school years (cells 1 and 2), and continued to pursue their main sport in the secondary school (cells 1, 2, 3 and 4). All the other pathways were categorized as non-specialized pathways.

With this grouping procedure in mind, there were 7 specialized pathways and 21 non-specialized ones. Forty-one (27%) skiers in this sample followed specialized developmental pathways and 111 (73%) non-specialized ones.

4.2 Time of First Involvement with Cross-Country Skiing

The average age for first involvement with organized cross-country skiing was 7.41 years (SD = 2.51; age range: 2-13 years), while the most frequently reported age was 6 years. This was a normal distribution and for the purposes of the analysis it was classified into three broad categories using the quartiles: (a) early age of the first involvement (low 25 percentile, ages between 2-5), (b) normal age of the first

involvement (two middle quartiles, ages between 6-8), and (c) late age of the first involvement (high 25 percentile, ages between 9-13). There were 39 (25.8%) skiers in the early category, 66 (43.7%) in the normal, and 46 (30.5%) in the late. The value for one skier was missing.

4.3 First Encounter with Organized Sports

A slight majority of 80 skiers (52.6%) in the sample indicated a cross-country skiing club to have been their first ever encounter with organized sports. Other popular sports to start with included football ($n = 22$), track and field ($n = 18$), orienteering ($n = 8$), and gymnastics ($n = 7$). Less frequently cross-country skiers began their involvement with sports such as ice-hockey ($n = 3$), dance ($n = 3$), Finnish baseball ($n = 2$), swimming ($n = 2$), figure-skating ($n = 1$), volleyball ($n = 1$), wrestling ($n = 1$), badminton ($n = 1$), horse riding ($n = 1$) and others ($n = 2$).

For the purposes of further analysis, the sample was divided in two groups; the participants who started with cross-country skiing ($n = 80$, 52.6%) and those who began practicing other sports ($n = 72$, 47.4%).

4.4 Participation Status

Amongst the skiers active in 2009/2010 season who responded to the KIHU questionnaire, in the 2012/2013 season 97 (63.8%) continued to ski competitively (B-license), 10 (6.6%) continued to ski recreationally (ski pass), and 45 (29.6%) dropped out from organized cross-country skiing. Thus, dropout rate from the elite cross-country skiing pathway in the sample equaled to 55 skiers (36.2%).

However, noticeably, the dropout rates at the initial population level ($n = 369$) were higher. In total, 178 (48.2%) skiers active in 2009/2010 continued to ski competitively, 19 (5.1%) continued to ski recreationally, and 172 (46.6%) ceased their participation in organized cross-country skiing. Thus, dropout rate from elite cross-country skiing pathway in the population equaled to 191 skiers (51.7%).

4.5 Hypothesis Testing

Three Chi-square tests for independence were run in which the association between participation status and three pathway-related variables was tested. In the first analysis,

chi-square test for independence indicated no significant association between pathway category (specialized vs. non-specialized) and participation status, $\chi^2 (1, N = 152) = 3.382, p = .066, phi = -.149$. The frequencies are presented in Table 1.

Table 1. *Participation Status by Developmental Pathway Category*

	Specialized Pathway	Non-specialized Pathway	Total
Drop-out	10	45	55
% participation status	18.2%	81.8%	100%
% pathway category	24.4%	40.5%	36.2%
% total	6.6%	29.6%	36.2%
Continue	31	66	97
% participation status	32%	68%	100%
% pathway category	75.6%	59.5%	63.8%
% total	20.4%	43.4%	63.8%
Total	41	111	152
% participation status	27%	73%	100%
% pathway category	100%	100%	100%
% total	27%	73%	100%

In the second analysis, chi-square test for independence indicated a marginally insignificant association between time of first involvement with organized cross-country skiing and participation status, $\chi^2 (2, N = 152) = 5.914, p = .052, phi = .198$. The frequencies are presented in Table 2.

Table 2. *Participation Status by Time of First Involvement with Cross-Country Skiing*

	Early	Normal	Late	Total
Drop-out	15	17	22	54
% participation status	27.8%	31.5%	40.7%	100%
% time of involvement	38.5%	25.8%	47.8%	35.8%
% total	9.9%	11.3%	14.6%	35.8%
Continue	24	49	24	97
% participation status	24.7%	50.5%	24.7%	100%
% time of involvement	61.5%	74.2%	52.2%	64.2%
% total	15.9%	32.5%	15.9%	64.2%
Total	39	66	46	151
% participation status	25.8%	43.7%	30.5%	100%
% time of involvement	100%	100%	100%	100%
% total	25.8%	43.7%	30.5%	100%

Further chi-square tests for independence amongst age groups indicated no significant association between early and late starters, $\chi^2 (1, N = 152) = .753, p = .386, phi = -.094$, and between early and normal starters, $\chi^2 (1, N = 152) = 1.867, p = .172, phi = .133$. However, a significant relationship has been detected between normal and late starters, $\chi^2 (1, N = 152) = 5.817, p = .016, phi = -.228$ (see Table 3 for a summary).

Table 3. *Comparison Between the Age Groups and Participation Status (p-values)*

	Early	Normal	Late
Early	-	.172	.386
Normal		-	.016*
Late			-

In the third analysis, chi-square test for independence also indicated no significant association between first organized sport experience and participation status, $\chi^2 (1, N = 152) = .433, p = .510, phi = -.053$. The frequencies are presented in Table 4.

Table 4. *Participation Status by First Organized Sport Experience*

	Cross-country Skiing	Other Sports	Total
Drop-out	27	28	55
% participation status	49.1%	50.9%	100%
% first sport experience	33.8%	38.9%	36.2%
% total	17.8%	18.4%	36.2%
Continue	53	44	97
% participation status	54.6%	45.4%	100%
% first sport experience	66.2%	61.1%	63.8%
% total	34.9%	28.9%	63.8%
Total	80	72	152
% participation status	52.6%	47.4%	100%
% first sport experience	100%	100%	100%
% total	52.6%	47.4%	100%

5 DISCUSSION

The purpose of this study was to examine dropout in Finnish youth cross-country skiing within the DMSP framework and early diversification hypothesis. Specifically, dropout from further sport participation was examined in the light of three potentially predictive variables, namely degree of pathway specialization, time of first involvement with organized cross-country skiing, and the type of first organized sports experience. The main finding of this study indicates little association between the above mentioned variables and dropout from competitive cross-country skiing in Finland. Additionally, this study explored the existing network of developmental pathways and trends for a sample of elite youth cross-country skiers in Finland.

The following chapter discusses the results of the study in detail focusing on the descriptives as well as hypothesis testing. Furthermore, the chapter points to its strengths and limitations, as well as potential applicability and implications for future research directions.

5.1 Developmental Pathways

The results of this study are somewhat consistent with DMSP. Young skiers engaged in large quantities of play in early childhood, and tried out various activities and sports throughout their primarily school years (Ford et al., 2009; Fraser-Thomas, et al., 2008).

The most frequent pathway (see Figure 2, Chapter 4) and the overall proportions between specialized and non-specialized pathway categories reflect the diversification trends in this sample and possibly in the sport as well. As expected, very few skiers focused exclusively on cross-country skiing before the age of 12, and even those who did exclusively focus on cross-country skiing still stayed involved in other sport clubs (cf. Baker et al., 2005; Moesch et al., 2011). Notably, however, none of the skiers in the sample considered themselves inactive at any stage of their youth athletic career.

According to the results of the analysis, there was no statistically significant association between degree of pathway specialization and participation status in youth cross-country skiing in Finland. Similarly to Ford et al.'s (2009) results of the study on dropout in English soccer, this study does not fully support either side of the early specialization debate.

Thus, the hypothesis based on DMSP that early diversified pathways give young skiers an advantage to persist with training and competition in the sport cannot be supported. These conclusions might resemble those of the Danish researchers, who did not find developmental advantages of sampling more sports in acquiring elite status (Moesch et al., 2011). Multisport approach might create physically active people (cf. Gould and Carson, 2004), but it remains unclear whether it is successful in promoting future elite athletes in cross-country skiing.

5.2 Time of First Involvement with Cross-Country Skiing

In studies from Italy, England, and United States, children begin their involvement with organized sports in clubs and academies around the age of 8 (Capranica & Millard-Stafford, 2011; Malina, 2010; Ward et al., 2007). With the mean of 7.41 years old the sample of Finnish cross-country skiers is not very far from these other populations. However, it is very possible that most of them were already able to ski well before they joined the skiing clubs. Pouta et al. (2009) report 5 years of age to be the average time for Finnish kids to learn skiing, typically from the parents, relatives or teachers.

According to the results of this analysis, the association between time of first involvement with cross-country skiing and dropout was marginally insignificant. However, further analyses revealed differences between the age categories. In particular, it was interesting to observe that significant association was found between the late and normal time of involvement groups, suggesting that the skiers who began skiing later were more likely to drop out. This is contrary to the stated hypothesis; the earlier engaged skiers persisted in the sport, while those who committed later dropped out. No significant differences were found between other groups, perhaps due to small sizes of the stratified sample.

One explanation for such results might be the so called early engagement hypothesis proposed by Ford et al. (2009), which combines the notions of early specialization and deliberate play. It states that the best way to avoid dropout and maximize elite performance development does involve an early start in organized participation of the chosen discipline and minimal diversity in other sports. However, early engagement hypothesis also states that much play time is needed within the chosen sport at an early stage. According to Ford et al. (2009) such approach builds a foundational knowledge

and skills for becoming an elite athlete in the future, and at the same time protects the young athlete from the adverse effects of the traditional views of early specialization.

Importantly, deliberate practice framework in training regimes of young athletes must be applied with caution depending on the age and skill level (Ford et al., 2009). It is still important to promote love for an activity an early age, so children get enough time to explore it, while experiencing both failure and success (Bloom, 1985; Ronbeck et al., 2004). Deliberate practice volumes can be increased as the athletes mature, because the lack of enjoyment is not as much of an important reason for athletic dropout in late adolescence and adulthood as it is at very young ages (Wall & Côté, 2007). Also it is important for the parents, coaches and organizations supporting the young athletes to skillfully manipulate the three constraints to deliberate practice for it to be effective and prevent injury, burnout, and dropout (see Ericsson et al., 1993).

The difference found between the two groups might indicate an optimal window for getting involved with organized cross-country skiing (i.e., in the beginning of primary school years). The hypothesized claim that athletes should be more likely to persist in sport participation if they delay their involvement with organized cross-country skiing was not supported by the results of this study. Both dropout and non-dropout skiers did not gain any additional benefit from beginning their skiing career early, but starting too late might have been detrimental to continuation of their athletic career in this sport. This is consistent with the results of the other sport specialization study in cross-country skiing conducted in the USA (Ronbeck et al., 2004).

As Capranica and Millard-Stafford (2011) point out decision on sampling and specializing as well as timing of first involvement might also be dependent on a sport category – situational, quantitative and qualitative (see Moesch et al., 2011). In quantitative sports, like cross-country skiing, “career planning with early exposure, but later intensified training appears critical” (Capranica & Millard-Stafford, 2011, p. 574).

5.3 First Encounter with Organized Sports

It was interesting to discover that within the sample the distribution was quite even between cross-country skiing and other sports. Given previous studies in the field (e.g., Fraser-Thomas, 2008; Wall & Côté, 2007) it was expected to find more diversity among first sporting experiences. This trend might be explained by the popularity and cultural

significance of cross-country skiing among the Finnish people (cf. Pouta et al., 2009), constant expectation of athletic success in this particular sport (Finnish Sport Federation, 2010a) as well as the availability of skiing clubs throughout the country (see Chapter 1; Finnish Skiing Association, 2012). The results of this hypothesis test showed no significant association between the first encounter with organized sports and participation status in late adolescence.

5.4 Limitations

As elaborated in Chapter 1, there are strict criteria for definition of early specialization: (a) early start in organized sport, (b) early involvement in one sport, (c) early involvement in high intensity training, and (d) early involvement in competitive sport (Baker et al., 2009). The sample of skiers classified in this study as early involved and/or specialized satisfied the criteria (a) and (d). However, not enough information was obtained to confidently determine whether the studied skiers also satisfy the criteria (b) and (c).

In such stated criteria a question emerges, what does ‘early’ mean? And does it mean the same thing for athletes competing in different kind of disciplines? According to Capranica and Millard-Stafford (2011) sport specialization may be considered early when it happens before the athlete turns 12. Other researchers state various age values, sometimes dependent on the sport, from 3 years old in gymnastics (Malina, 2010), through 5 years of age in soccer (Ward et al., 2007), all the way to 11 years of age in cycling (de Croock, 2011).

Some researchers define sport specialization as the time when athlete’s sport participation (training and competition) gets limited to training in one particular sport during a year round basis (Capranica & Millard-Stafford, 2011; Wall & Côté, 2007; Wiersma, 2000). It is difficult (if not impossible) to define specialization in such terms in any sample of cross-country skiers, young or elite. This is because most of the skiers simply cannot pursue year round skiing training routines due to lack of snow or indoor skiing facilities. Not even in the Nordic region is it possible to ski all year round (Easter, 2008; Pouta et al., 2009). Consequently, many of the cross-country skiers in Finland practice other endurance sports such as orienteering, cross-country or long distance running, and track and field (Rusko, 2003). Could this perhaps be one of the

factors, which slows down the specialization of the skiers and protect them from the adverse effects of early specialization cited throughout the literature?

In this study the early specialization definition was compromised to time of selection of cross-country skiing as the athlete's main sport. Perhaps the diverse effects of early specialization in cross-country are naturally prevented by the skiers practicing another sport in the summer (Easter, 2008). Perhaps it is broad athletic interests of this sample of cross-country skiers, which contributed to sustaining their motivation and focus. Or perhaps in Finnish developmental scheme in cross-country skiing there is generally more emphasis placed on fun and enjoyment in training of young skiers as opposed to other sports and countries. In the literature there are several authors recommending that younger skiers should enjoy skiing and being out in the nature in the context of this sport, and the country (Brown, 1999; Easter, 2008; Stubb, 2013).

It is also recognized that development of any kind of expertise is a function of biological, psychological and sociological factors of a child (Baker, 2003; Wiersma, 2000). However, this study attempted to examine dropout in isolation with degree of developmental pathway specialization, time of the first involvement and first encounter with organized sports. In general, the study did not control for reasons of dropout such as genetic, social and environmental influences.

Since the prominent investigation of Bloom (1985) and postulates of Ericsson et al. (1993), there seems to be a trend in talent development research literature, which disregards genetic and hereditary influences on successful progression of young athletes from novice to elite level. According to this literature expertise it is all about the acquired experience – be it through deliberate practice or play – which makes the athletes successful in their sport.

To give an example of heredity importance in cross-country skiing, we can look at Eero Mäntyranta, one of the most successful Finnish skiers of all time. Born in 1937, Mäntyranta won seven Olympic (3 gold, 2 silver, 1 bronze) and 5 World Championship (2 gold, 2 silver, 1 bronze) medals in years 1960-1968 (Finnish Olympic Committee, 2012).

A large genetic study involving Mäntyranta's immediate and extended family revealed that he suffered from a condition called primary familial and congenital polycythemia.

Thus, Mäntyranta had recorded an increased blood cell mass and hemoglobin making his blood carry oxygen better than other skiers. As a result, he had a physiological advantage over other participants in any endurance event (de la Chapelle, Träskelin & Juvonen, 1993). Was it perhaps one of the factors that lead young Mäntyranta to persist in hard cross-country skiing training and competition?

Interestingly, the dropout study of Portuguese soccer players found that physical capacity and maturation status were one of the most important factors associated with continued involvement in competitive sports (Figueiredo et al., 2009). It might be beneficial to look at a population of cross-country skiers from this perspective in the future.

This study also did not take into account the role of parents and coaches, which has been cited as crucial in development of expert performance levels (Bloom, 1985). Ideally, parents provide more than just financial support. They give their children time to transport them to trainings and competitions, and most importantly stable and unconditional love and socio-emotional support. In doing so, parents of the most successful participants in Bloom's (1985) study encouraged disciplined independence, and avoided unnecessary pressure or unrealistic expectations. The research shows that the appropriate doses of support and push from the parents and caring adults such as coaches are needed in order to develop young talent optimally (Bloom, 1985; Côté, 1999; Csikszentmihalyi et al., 1993; Fraser-Thomas & Côté, 2009; Fraser-Thomas et al., 2008).

Among the environmental influences, which could affect the dropout rates are lack of snow/skiing facilities in the region the athlete is based, injuries, lack of funds for continuing training and competition etc.

Possible distortions of the pathways due to recall bias might have occurred a result of a retrospective data collection procedure (cf. Moesch et al., 2011). The 15 year old skiers were asked to recollect (with help of their parents) their experiences from earlier stages of their lives. The accuracy of the recall was never tested.

Also sample size might have been too small to detect statistically significant differences among the groups, especially in the analysis based on the time of first involvement, where the sample got even further stratified.

Lastly, the results of this study must be treated quite conservatively for one more reason. The discrepancies between dropout rate within the sample and at the population level might suggest that the studied sample is not quite representative. One explanation for this could be that only really devoted skiers responded to the questionnaire with regards to their participation in this particular sport.

5.5 Applicability of the Results

Despite its empirical and conceptual shortcomings, the results of this research study should be of interest and use for researchers and practitioners alike. As Capranica and Millard-Stafford (2011) and de Croock (2011) have already pointed out it is time to turn the fruitless debate on early specialization/early diversification into a discourse, which will help understanding the appropriate, but still healthy volume levels of sport training and competition for athletes in different sports. There will never be one golden rule, which applies to all athletes, sports and contexts. We must remember that elite sports by definition are exclusive and dropout from the competitive pathway is expected.

The results of this study could be especially interesting to the Finnish Skiing Association, individual clubs, coaches and parents of young skiers to help them better understand and manage participation and development of the young athletes (Fraser-Thomas et al., 2008). Furthermore, the results of this study might be a signpost for creating more optimal talent detection and development systems, including high quality guidance of the young athlete. Our biggest concern at the moment is to provide young athletes with an opportunity to achieve their full athletic potential, while avoiding burnout and dropout (de Croock, 2011). In doing so, the importance of attaining appropriate mental and life skills is often emphasized (Gould et al., 1996). In cross-country ski settings specifically, periodized mental training programs showed their effectiveness in reduction of stress and anxiety, while increasing confidence and knowledge of mental skills among athletes from the US ski team (von Guenther et al., 2010). Since mental training is so successful in elite setting, it should also be highly recommended for the young athletes aspiring to become elite.

Also there are more and more voices, which state that talent development programs cannot be generalized and different sport categories need to be treated differently (e.g., de Croock, 2011). As already mentioned earlier in this chapter, the results of this study

may suggest that there could be an optimal age window for engagement and specialization in cross-country skiing.

Thus, early engagement in this sport might be both necessary and beneficial as long as there is a healthy developmental approach in coach's and club's philosophies. Practice and deliberate practice in particular, is necessary for attaining expert performance levels in any sport (Ericsson et al., 1993; Ward et al., 2007). For play alone does not seem to produce expert performers (Ford et al., 2009). It is a matter of applying both practice and play at the right times and in the right proportions.

In conclusion, this study enriches the sport psychological research on early involvement and pathway specialization, and dropout. Although much research remains to be done to fully understand the best time and pathway of athletic involvement in sport, and cross-country skiing specifically, this study might provide coaches, parents and organizations with a hunch on developing appropriate programs for creation of future elite cross-country skiers in Finland.

5.6 Future Research Directions

In future research, early specialization and early diversification as well as deliberate practice and deliberate play have been thus far looked upon as exclusive categories rather than a continuum (Capranica & Millard-Stafford, 2011). Instead of focusing on one or the other, appropriate proportions of deliberate practice and play seem to be necessary in youth talent development programs (Ford et al., 2009; Ward et al., 2007).

In a research review, Baker (2003) points out that the amount of training time of expert and non-expert athletes did not differ until after 18 years of age. Only after this time, the experts significantly increased their training time and truly committed to the sport (e.g., Moesch et al., 2011). Because at the time of the follow-up data collection, most skiers just turned 18, and most of them still had one year of high school education to complete, it would be interesting to do two more follow-ups; after five (season 2014/2015) and ten (season 2019/2020) years. Participation status trends in relation to the three variables at hand would be very interesting to look at from a longitudinal perspective.

In this study, continued competitive participation in cross-country skiing was considered a 'success', while dropout a 'failure'. In the future it would be interesting to

investigate the role of the objective and perceived skiing success in relation to participation status in a population of skiers. For Fraser-Thomas et al. (2008) remarked that early success is good for young athletes' development only in the short-term. In the long-term they might lead to burnout and dropout (Güllich & Emrich, 2006; Malina, 2010).

Above all, it would be great to continue sport psychology research in the sport of cross-country skiing (cf. Lindinger et al., 2012). Further research on Ford et al.'s (2009) early engagement hypothesis among cross-country skiers in Finland would be especially interesting endeavor.

5.7 Conclusions

Nearly all the researchers in this field, even the ones who are promoting either of the approaches most fiercely (e.g., Baker et al., 2009; Ericsson et al., 1993) seem to agree that in order to attain elite athletic status and achieve expert performance levels in a sport, one must specialize at some point in their career. However, what differs is when to specialize and how much (Gould & Carson, 2004). This study mildly supports the notion of early engagement (Ford et al., 2009), but not early specialization.

This study, conducted within the DMSP framework, has served as an exploration tool of developmental trends in Finnish cross-country skiing. It is the first study of its kind and one of the first studies conducted in sport psychology in cross-country skiing specifically (cf. Lindinger et al., 2012).

While the results might not be conclusive on the early specialization debate in cross-country skiing, they should stimulate new research directions and provide some guidelines for cross-country skiing coaches and organizations, especially in Finland.

6 REFERENCES

- Baker, J. (2003). Early specialization in youth sport: A requirement for adult expertise? *High Ability Studies, 14*(1), 85-94.
- Baker, J., Cobley, S. & Fraser-Thomas, J. (2009). What do we know about early sport specialization? Not much! *High Ability Studies, 20*, 77-90.
- Baker, J., Côté, J. & Deakin, J. (2005). Expertise in ultra-endurance triathletes early sport involvement, training structure, and the theory of deliberate practice. *Journal of Applied Sport Psychology, 17*, 64-78.
- Barynina, I. I. & Vaitsekhovskii, S. M. (1992). The aftermath of early sports specialization for highly qualified swimmers. *Fitness Sports Review International, 8*, 132-133.
- Bloom, B. S. (1985). *Developing talent in young people*. New York, NY: Ballantine.
- Bompa, T. (1995). *From childhood to champion athlete*. Toronto, Ontario: Veritas.
- Brady, M. (1977). *Nordic touring and cross country skiing*. Oslo, Norway: Dreyers Forlag.
- Brown, N. (1999). *The complete guide to cross-country ski preparation*. Seattle, WA: The Mountaineers.
- Capranica, L. & Millard-Stafford, M. (2011). Youth sport specialization: How to manage competition and training? *International Journal of Sports Physiology & Performance, 6*(4), 572-579.
- Côté, J. (1999). The influence of the family in the development of talent in sports. *The Sports Psychologist, 13*, 395-417
- Côté, J., Baker, J., & Abernethy, B. (2003). From play to practice: A developmental framework for the acquisition of expertise in team sports. In J. L. Starks & K. A. Ericsson (Eds.), *Expert performance in sports: Advances in research on sport expertise* (pp. 89-110). Champaign, IL: Human Kinetics.

- Côté, J., Baker, J. & Abernethy, B. (2007). Practice and play in the development of sport expertise. In R. Eklund & G. Tenenbaum (Eds.), *Handbook of sport psychology* (pp. 184-202). Hoboken, NJ: Wiley.
- Côté, J. & Hay, J. (2002). Children's involvement in sport: A developmental analysis. In M. Silva & D. Stevens (Eds.), *Psychological foundations of sport* (pp. 484-502). Boston, MA: Allyn and Bacon.
- Côté, J., Lidor, R. & Hackfort, D. (2009). ISSP position stand: To sample or to specialize? Seven postulates about youth sport activities that lead to continued participation and elite performance. *International Journal of Sport & Exercise Psychology*, 7(1), 7-17.
- Csikszentmihalyi, M., Rathunde, K., Whalen, S. & Wong, M. (1993). *Talented teenagers: The roots of success and failure*. New York, NY: Cambridge University Press.
- Černohorski, B., Pustovrh, J. & Tušak, M. (2006). Impact of psychological dimensions of psychosomatic status on potential competitive performance in cross-country skiing. *Kinesiology*, 38(2), 143-157.
- De Croock, S. (2011, September). *Career development of elite athletes who graduated from an elite sports high school*. Paper presented at the Nineteenth Conference of the European Association for Sport Management in Madrid, Spain.
- De la Chapelle A., Träskelin A. L. & Juvonen E. (1993). Truncated erythropoietin receptor causes dominantly inherited benign human erythrocytosis. *Proceedings of the National Academy of Science USA*, 90(10) 4495-4499.
- Easter, J. (2008). When is it time to specialize? *Cross Country Skier*, 28(2), 40.
- Ericsson, K. A., Krampe, R. T. & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100(3), 363-406.

- Figueiredo A. J., Gonçalves C. E., Coehlo e Silva, M. J. & Malina, R. M. (2009). Youth soccer players, 11-14 years: Maturity, size, function, skill and goal orientation. *Annals of Human Biology*, 36(1), 60-73.
- Finnish Olympic Committee [Website]. (2012). Retrieved October 12, 2012, from http://www.noc.fi/in_english/
- Finnish Sport Federation (2010a). Kansallinen liikuntatutkimus 2010. Aikuiset. [National sports survey 2010. Adults.]. Retrieved February 25, 2013, from <http://www.slu.fi/liikuntapolitiikka/liikuntatutkimus2/>
- Finnish Sport Federation (2010b). Kansallinen liikuntatutkimus 2010. Lapset ja nuoret. [National sports survey 2010. Children and youth.]. Retrieved February 25, 2013, from <http://www.slu.fi/liikuntapolitiikka/liikuntatutkimus2/>
- Finnish Skiing Association [Website]. (2012). Maastohiihtoseurojen kotisivut [Cross-country ski clubs' websites]. Retrieved March 7, 2013 from <http://www.hihtoliitto.fi/maastohiihto/kenttatoiminta/jasenseurat/>
- Ford, P. R., Ward, P., Hodges, N. J. & Williams, A. M. (2009). The role of deliberate practice and play in career progression in sport: The early engagement hypothesis. *High Ability Studies*, 20(1), 65-75.
- Fraser-Thomas, J. & Côté, J. (2009). Understanding adolescents' positive and negative development in sport. *The Sport Psychologist*, 23, 3-23.
- Fraser-Thomas, J., Côté, J. & Deakin, J. (2008). Understanding dropout and prolonged engagement in adolescent competitive sport. *Psychology of Sport and Exercise*, 9, 645-662.
- Gould, D., Udry, E., Tuffey, S. & Loehr, J. (1996). Burnout in competitive junior tennis players: A quantitative psychological assessment. *The Sport Psychologist*, 10, 322-340.
- Gould, D. & Carson, S. 2004. Fun and games? Myths surrounding the role of youth sports in developing Olympic champions. *Youth Studies Australia*, 23, 19-26.

- Güllich A. & Emrich E. (2006). Evaluation of the support of young athletes in the elite sport system. *European Journal of Sport Sociology*, 3, 85-108.
- Halonen, A. (Director). (2012). Sinivalkoinen valhe [Blue and white lies]. In A. Halonen (Producer). Finland.
- Hannus, M. (1990). *Flying Finns: Story of the great tradition of Finnish distance running and cross country skiing*. Helsinki, Finland: Tietosanoma.
- Aino-Kaisa Saarinen cleans up at the sports gala. (2010, January 12). *Helsingin Sanomat*. Retrieved March 18, 2013 from <http://www.hs.fi/english/article/Aino-Kaisa+Saarinen+cleans+up+at+Sports+Gala+/1135252082131>
- Malina, R. M. (2010). Early sport specialization: Roots, effectiveness, risks. *American College of Sports Medicine*, 9(6), 364-371.
- Moesch, K., Elbe, A.-M., Hauge, M.-L. T. & Wikman, J. M. (2011). Late specialization: the key to success in centimeters, grams, or seconds (cgs) sports. *Scandinavian Journal of Medicine and Science in Sports*, 21, 282-290.
- Lindinger, S. J., Ishikawa, M., Komi, P.V., Ohtonen, O. & Linnamo, V. (2012, May). *Methodological aspects, movement control, and performance in cross-country skiing*. Paper presented at the Second International Congress on Science and Nordic Skiing in Vuokatti, Finland.
- Official Olympic Games results [Website]. (2012). Retrieved October 14, 2012, from <http://www.olympic.org/olympic-results>
- Pouta, E., Neuvonen, M. & Sievänen, T. (2009). Participation in cross-country skiing in Finland under climate change: Application of multiple hierarchy stratification perspective. *Journal of Leisure Research*, 41(1), 91-108.
- Ronbeck, N. F., Dunnagan, T. & Stewart, C. (2004). Early specialization in elite nordic racers: Fact or fiction. Retrieved February 25, 2013, from http://www.coachesinfo.com/index.php?option=com_content&view=article&id=

315:better-coach-nordic&catid=91:general-articles&Itemid=170

Rusko, H. (2003). *Handbook of Sports Medicine and Science: Cross Country Skiing*.

Oxford, UK: Blackwell Science.

Ryan, R. M. & Deci, E. L. (2000) Self-determination theory and the facilitation of

intrinsic motivation, social development and well being. *American Psychologist*, 55, 68-78.

Stubb, A. (2013). Youth and sport. *Blue Wings*, 1, 30.

Suvikas, J. (1982). *Finland: The home of cross-country skiing*. Helsinki, Finland:

Suomen Latu.

Wall, M. & Côté, J. (2007). Developmental activities that lead to dropout and

investment in sport. *Physical Education and Sport Pedagogy*, 12(1), 77-87.

Ward, P., Hodges, N. J., Starkes, J. L. & Williams, M. A. (2007). The road to

excellence: Deliberate practice and the development of expertise. *High Ability Studies*, 18(2), 119-153.

Ward, P., Hodges, N. J., Williams, A. M. & Starkes, J. L. (2004). Deliberate practice

and expert performance: Defining the path to excellence. In: A. M. Williams and N. J. Hodges (Eds.), *Skill acquisition in sport: Research, theory and practice* (pp. 231-258). London, UK: Routledge.

Watters, R. (2010). Skis, war and wooden horses. *Cross Country Skier*, 30(3), 16-22.

Wiersma, L. D. (2000). Risks and benefits of youth sport specialization: Perspectives

and recommendations. *Pediatric Exercise Science*, 12, 13-22.

Vaeyens, R., Güllich, A., Warr, C. R. & Philippaerts, R. (2009). Talent identification

and promotion programmes of Olympic athletes. *Journal of Sport Sciences*, 27(13), 1367-1380.

Vasara, E. (1998). Maintaining a military capability: The Finnish Home Guard, European

fashion and sport for war. In H. Meinander & J. A. Mangan (Eds.), *The Nordic world: Sport in society* (pp. 157-172). London, UK: Frank Cass.

Von Guentbner, S., Hammermeister, J., Burton, D. & Keller, L. (2010). Smoke and mirrors or wave of the future? Evaluating a mental skills training program for elite cross country skiers. *Journal of Sport Behavior*, 33(1), 3-24.

APPENDIX 1 Selected Questions from the KIHU Questionnaire

**Kilpa- ja huippu-urheilun tutkimuskeskus (KIHU)
Maastohiihto 2010**

Nimi _____
 Postitoimipaikka _____ (Esim. 01260 Vantaa)
 Puhelinnumero _____
 Sähköposti _____

TAUSTATIEDOT**1. Sukupuoli**

- 1 Nainen
- 2 Mies

2. Syntymäkuukausi _____ -kuu

3. Pituus ja paino _____ (cm) _____ (kg)

4. Asuinpaikka

- 1 Pääkaupunkiseutu (Helsinki, Espoo, Vantaa tai Kauniainen)
- 2 Turku, Tampere, Oulu, Lahti tai Jyväskylä
- 3 Muu 50.000-100.000 asukkaan kaupunki
- 4 Muu 20.000-50.000 asukkaan kaupunki
- 5 Alle 20.000 asukkaan kaupunki
- 6 Asutuskeskus maaseudulla
- 7 Muualla maaseudulla

5. Kenen kanssa asut tällä hetkellä?

- 1 Isän ja äidin kanssa
- 2 Isän kanssa
- 3 Äidin kanssa
- 4 Isän ja äitipuolen kanssa
- 5 Äidin ja isäpuolen kanssa
- 6 Muu vaihtoehto; mikä? _____

6. Kuinka monta alle 18-vuotiasta lasta kodissasi asuu tällä hetkellä sinun lisäksesi?

_____ lasta

7. Harrastaako siskosi tai veljesi maastohiihtoa tai muuta urheilua?

- 1 Minulla ei ole siskoja tai veljiä
- 2 Ei harrasta
- 3 Kyllä, hiihtoa
- 4 Kyllä, muuta urheilua kuin hiihtoa
- 5 Kyllä, sekä hiihtoa että muutakin urheilua

HUOM! Käännä sivua ja jatka. Täytä huolellisesti jokaisen sivun molemmat puolet!

URHEILUN HARRASTAMINEN

8. Mitkä seuraavista vaihtoehdoista kuvaavat parhaiten liikunta- ja urheiluharrastuksiasi eri ikävaiheissa. Ympyröi vain yksi vastaus/ ikävaihe. Kirjoita pyydettyessä viivalle päälajisi nimi.

HUOM! *Pyydä tarvittaessa apua vanhemmiltasi.*

Varhaislapsuus (3-6 vuotta)

- 1 **Pihaleikkejä ja ohjattua liikuntaa.** Olin usein mukana erilaisissa pihaleikeissä ja peleissä, joissa juostiin, hypittiin ja kiipeiltiin. Osallistuin myös urheiluseurojen järjestämiin liikuntaharrastuksiin.
- 2 **Vain pihaleikkejä.** Olin usein mukana erilaisissa pihaleikeissä ja peleissä, joissa juostiin, hypittiin ja kiipeiltiin. En osallistunut urheiluseurojen järjestämiin liikuntaharrastuksiin.
- 3 **Vain ohjattua liikuntaa.** En juurikaan osallistunut sellaisiin pihaleikkeihin tai peleihin, joissa juostiin, hypittiin ja kiipeiltiin. Osallistuin kuitenkin urheiluseurojen järjestämiin liikuntaharrastuksiin.
- 4 **Ei pihaleikkejä, ei ohjattua liikuntaa.** En juurikaan osallistunut sellaisiin pihaleikkeihin tai peleihin, joissa juostiin, hypittiin ja kiipeiltiin. En myöskään osallistunut urheiluseurojen järjestämiin liikuntaharrastuksiin.

Alakouluikä (7-12 vuotta)

- 1 **Yksi päälaji, ei sivulajeja.** Harrastin urheiluseurassa vain päälajiani _____ . Harrastin muita urheilulajeja vain satunnaisesti tai koulun liikuntatunneilla.
- 2 **Yksi päälaji, sivulaji/ -lajeja.** Harrastin urheiluseurassa päälajiani _____ , mutta se ei ollut ainoa urheiluseurassa tai omatoimisesti harrastamani urheilulaji. Muiden lajien harrastaminen ei ollut minulle yhtä tärkeää kuin päälajini harrastaminen.
- 3 **Useita lajeja tasapuolisesti.** Harrastin urheiluseuroissa kahta tai useampaa eri urheilulajia. Minulla ei vielä silloin ollut varsinaista päälajia, johon olisin halunnut keskittyä.
- 4 **Omatoimista urheilun harrastamista seuratoiminnan ulkopuolella.** En harrastanut mitään urheilulajia urheiluseurassa, mutta harrastin urheilua säännöllisesti omatoimisesti.
- 5 **Ei urheiluharrastuksia.** En harrastanut mitään urheilulajia muuten kuin satunnaisesti tai koulun liikuntatunneilla.

Yläkouluikä (13-15 vuotta)

- 1 **Yksi päälaaji, omatoimista päälaajin harjoittelua.** Olen harrastanut kilpailumielessä vain päälaajiani _____. Ohjattujen harjoitusten lisäksi olen harjoitellut päälaajiani säännöllisesti myös omatoimisesti. Muita lajeja olen harrastanut vain satunnaisesti tai koulun liikuntatunneilla.
- 2 **Yksi päälaaji, kilpailemista myös sivulaajissa/ -lajeissa.** Olen harrastanut kilpailumielessä päälaajiani _____, mutta olen samalla harrastanut kilpailumielessä myös muita lajeja. Muiden lajien harrastaminen ei ole ollut minulle yhtä tärkeää kuin päälaajini harrastaminen.
- 3 **Yksi päälaaji, muiden lajien omatoimista harrastamista.** Olen harrastanut kilpailumielessä vain päälaajiani _____. Ohjattujen harjoitusten lisäksi olen säännöllisesti harrastanut omatoimisesti myös muita lajeja.
- 4 **Yksi päälaaji, ei omatoimista harjoittelua tai harrastamista.** Olen harrastanut kilpailumielessä vain päälaajiani _____. Ohjattujen harjoitusten lisäksi en ole harjoitellut päälaajiani omatoimisesti. Muita lajeja olen harrastanut vain satunnaisesti tai koulun liikuntatunneilla.
- 5 **Myöhemmin tehty lajivalinta.** Olen harrastanut kilpailumielessä eri urheilulajeja. En ole vielä valinnut päälaajiani tai olen vasta viime aikoina päättänyt keskittyä vain yhteen päälaajiin _____.
- 6 **Myöhemmin aloitettu kilpaurheiluharrastus.** Olen alkanut harrastaa urheilua kilpailumielessä vasta viime aikoina.

MAASTOHIIHDON HARRASTAMINEN

9. Minkä ikäisenä aloitit maastohiihdon harrastamisen seurassa? _____ vuotiaana

10. Oliko maastohiihto ensimmäinen seurassa aloittamasi urheiluharrastus?

- 1 Kyllä
- 2 Ei; ensimmäinen seurassa harrastamani laji oli _____