

**THE ROLE OF DEVELOPMENTAL ACTIVITIES ON SELF DETERMINED
MOTIVATION, PASSION AND SKILL IN YOUTH SOCCER PLAYERS**

by

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B.Sc. (Hons.), Edinburgh Napier University, 2003

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

THE FACULTY OF GRADUATE STUDIES

(Kinesiology)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

October 2012

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Abstract

Based upon postulates derived from the Developmental Model of Sports Participation (Côté et al., 2012) we tested the effects of domain specific activities (play and practice), as well as sporting diversity during the sampling years, on the development of motivation, passion and skill ratings. The first component of our study required testing predictions that play and diversity during the sampling years (age 5-12 yr) were positively correlated with intrinsic motivation and passion. We questioned elite youth level soccer players (N= 148), across 3 age groups, who were on the pathway towards achieving professional status at the adult level. Overall, we found no significant correlations between play and early sporting diversity during the sampling years with scores of motivation or passion. A small, yet significant positive correlation was observed between accumulated hours in soccer practice and integrated regulation. However, independent analysis of age groups yielded significant negative correlations between hours accumulated in soccer practice and measures of intrinsic motivation (Under 15 yr) and harmonious passion (Under 17 yr). The second study component investigated associations between time spent in soccer activities during the sampling years and across participants' full careers as well as sporting diversity with coach ratings of skill. For the U17 group, hours accumulated in organized practice were related to creative and overall skill, while accumulated hours in soccer practice were related to technical skill for the U15 group. Moreover, for the U17 group, % accumulated hours in play negatively correlated with technical and overall skill ratings. The youngest group (U13) showed a different pattern of results to the older players, with more hours in play (% and total) related to creative skill. Due to these overall relationships, we conclude that recommendations towards early sporting diversity and more time in deliberate play activities (i.e., individually-led practice or play) should be treated with caution, because they do not

inoculate against any hypothesized negative effects of early specialization in sport and are negatively related to predictors of skill (at least for the older players). Follow-up longitudinal analysis is recommended to determine how these practice and motivation variables are related to future success.

Preface

The basic research concepts reported in this thesis document were primarily co-designed and developed by me, David Thomas Hendry, and my supervisor, Dr. Nicola Hodges. The other members of my committee, Dr. Dick Mosher and Dr. Peter Crocker, provided input of ideas and suggestions for investigation at the proposal stage.

All data collection was carried out by the Scottish research team, including myself, coaching staff and students from Forth Valley College, under the guidance of Dr. Nicola Hodges.

Manuscript preparation for all components of this thesis document was completed by me, David Thomas Hendry, with significant editorial contributions from my supervisor, Dr. Nicola Hodges.

Ethics approval was provided by the UBC Behavioural Research Ethics board, certificate number H11-01946.

Table of contents

Abstract	ii
Preface.....	iv
Table of contents.....	v
List of tables.....	vii
List of figures.....	viii
Acknowledgements	ix
Dedication.....	x
1. Introduction	1
1.1 The Developmental Model of Sport Participation.	2
1.1.1 Early sampling pathway.	4
1.1.2 Early specialization pathway.	5
1.2 Consequences of early and late specialization pathways.....	6
1.2.1 Self-determined motivation.	6
1.2.2 Harmonious passion.....	10
1.2.3 Soccer performance.	11
2. Methods.....	22
2.1 Participants.....	22
2.2.1 Players.....	22
2.1.2 Coaches.....	23
2.2 Procedure.....	23
2.2.1 Players.....	23
2.2.2 Coaches.....	29
2.3 Data analysis.....	31
2.3.1 Demographics.....	31
2.3.2 Relationships between sport activities, motivation, passion and skill.....	31
2.3.3 Reliability.....	31
3. Results.....	33
3.1 Demographics.....	33
3.1.1 Hours per week in soccer activities.....	35
3.1.2 Accumulated hours in soccer activities.....	36
3.2 Reliability and validity of the practice estimates.....	39
3.3 Descriptive statistics for self-determined motivation and passion.....	41
3.4 Relationships between soccer activities and indices of motivation and passion.....	44
3.5 Relationships between soccer activities and coaches' assessment of skill.....	56

3.6 Correlations within the practice and play measures.....	58
4. Discussion.	62
4.1. Play and diversity in sport and their relation to motivation.	63
4.1.1 Assessment of motivation.....	64
4.1.2 Age and experience as moderators of play-motivation relationships.....	66
4.1.3 Diversity.....	72
4.1.4 Conclusion.....	72
4.2 Play and diversity in sport and their relation to skill.	73
4.2.1 Soccer practice and soccer play.....	75
4.2.2 Diversity.....	79
4.3 Overall conclusions and points of discussion.	82
4.3.1 Was our sample representative of future elite soccer players?	82
4.3.2 Why were the U13 players different to the older players?	84
4.3.3 Generalizability.....	85
4.3.4 Retrospective recall.....	85
4.3.5 Operational definitions of play and practice.....	86
4.4 Overall summary and conclusions.....	87
References	90
Appendices	99
Appendix A – Club letter	99
Appendix B - Parent/Guardian Information Letter.....	102
Appendix C - Coach Information Letter	104
Appendix D – Player questionnaire.....	105
Appendix E – Parent questionnaire.....	116
Appendix F – Coach questionnaire.....	121

List of tables

Table 1: An outline of the components of SDI along with formulas used to calculate the various subscale dependent measures.....	28
Table 2: Demographics related to current age and start age in soccer related activities (Means, SDs, and range in yr.)	34
Table 3: Student t-test comparisons between Mean (SD) coach and player hours per week (HPW) estimates of current years practice.....	40
Table 4: Descriptive statistics for measures of self-determined motivation and passion.....	43
Table 5: Pearson's r correlations between accumulated hours (and % hours) in soccer play and practice, number of sports and indices of motivation, passion and skill ratings during the sampling years.	46
Table 6: Pearson's r correlations between percent and total accumulated time in soccer activities during the sampling years and across players' career and indices of motivation, passion and coach ratings of skill for the U17 age group.....	48
Table 7: Pearson's r correlations between percent and total accumulated time in soccer activities during the sampling years and across players' careers and indices of motivation, passion and coach ratings of skill for the U15 age group.....	50
Table 8: Pearson's r correlations between percent and total accumulated time in soccer activities and indices of motivation, passion and coach ratings of skill for the U13 age group..	52
Table 9: Pearson's r correlations between total accumulated and percent accumulated hours in soccer activities for the U13 age group during the sampling years.	59
Table 10: Pearson's r correlations between total accumulated and percent accumulated hours in soccer activities for the U15 age group during the sampling years and across their careers.....	60
Table 11: Pearson's r correlations between total accumulated and percent accumulated hours in soccer activities for the U17 age groups during the sampling years and across their careers.	61

List of figures

Figure 1- The Developmental Model of Sports Participation. Adapted from Côté, Baker & Abernethy, (2007).	3
Figure 2. The Self-Determination Continuum (adapted from Lonsdale & Hodge, 2008).....	8
Figure 3. Mean hours per week in practice and play as a function of age and age group.	37
Figure 4. Mean accumulated hours in practice and play as a function of age group and career age.	38
Figure 5. Relationship between accumulated hours in organized practice and harmonious passion (HP) for U17 group.	54
Figure 6. Relationship between accumulated hours in organized soccer practice and intrinsic motivation (IM) for U15 group.	55
Figure 7. (a,b,c,d). Relationships between accumulated hours in soccer activities during the sampling years for the U17 players with ratings of skill.	57

Acknowledgements

To my supervisor Dr. Nicola Hodges, thank you for giving me the opportunity to return to education and study under your guidance. Your support, compassion and encouragement have given me so much confidence to succeed. For that I am entirely grateful.

To my thesis committee members, Dr. Dick Mosher and Dr. Peter Crocker, thank you for your patience, guidance and advice. To all of those within the Motor Skills Lab who have helped me over the last few years, a huge thank-you for your help and support.

I would also like to acknowledge my Scottish research team; Iain Milligan, Gavin Banks, Billy Brotton, John Scully and Grant Patterson for all of their help in driving around the country during data collection. Thank you also to Neil Mackintosh at the Scottish F.A. and all of the coaches, players and parents that took part in the study.

I wish also to thank my family in Scotland for being so supportive of all of my endeavors over the years and for being so understanding of my decision to move to Canada. Finally, to Kim, thank you for your bravery, support, understanding, and love that you have given me. I wouldn't have managed this without you.

Dedication

This work is dedicated to Lawrence Haggart.

1. Introduction

Soccer is the most popular participation and spectator sport in the world. An estimated global audience of over 3.2 billion, accounting for 46% of the world's population, watched the 2010 FIFA World Cup Finals held in South Africa (FIFA 2010). It is estimated that 265 million people play soccer on a regular basis (FIFIA, 2007) and from this figure only 0.04% compete at a professional level. Therefore the technical, tactical, physical and psychological skills required to reach the top level of soccer are vast. Due somewhat to the popularity and financial rewards in soccer, a great deal of research has been conducted to investigate how future success can be achieved and what is the best pathway for attaining elite performance (e.g., Helsen, Starkes & Hodges 1998, Ford, Ward, Hodges & Williams 2009, Ward, Hodges, Williams & Starkes, 2007). The Developmental Model of Sports Participation (DMSP) (Côté, 1999, Côté, Baker & Abernethy 2007) provides one theoretical framework for exploring and potentially explaining expert performance attainment in sport. Based upon this framework a number of predictions have been made relating the different pathways of the DMSP and their particular outcomes. The purpose of this study is to test some of the more contentious predictions in a soccer context, exploring the role of early sport activities in the psychological and skill development of expert youth soccer players.

1.1 The Developmental Model of Sport Participation.

There is currently debate as to the most effective developmental pathway towards achieving expert sporting performance (for a review see Ford, Williams & Hodges, in press). This debate stems around three major factors; the age at which specialized training should commence and the roles of ‘play’ type activities and sport diversity (that is participation in a variety of sports) in attaining expert sporting performance. The Developmental Model of Sports Participation (DMSP) (see Figure 1) was proposed as a conceptual framework by Côté and colleagues (Côté, 1999, Côté et al, 2007) which charted the route from initial sports participation to either recreational participation or elite performance as an adult. In addition to providing a framework of sports participation at a recreational level, something we will not discuss, the DMSP categorizes two distinct and opposing pathways towards reaching an eventual expert level of performance in sport. These two distinct pathways (as shown on the right of the figure) emerge through; i) early sampling/ diversification and later specialization and ii) early specialization. The two expertise pathways take place across three distinct stages; i) the sampling years (6-12), ii) the specializing years (13-15) and iii) the investment years (16+). Both pathways specify the necessity of domain specific deliberate practice but fail to agree with regard to when specialized practice should occur.

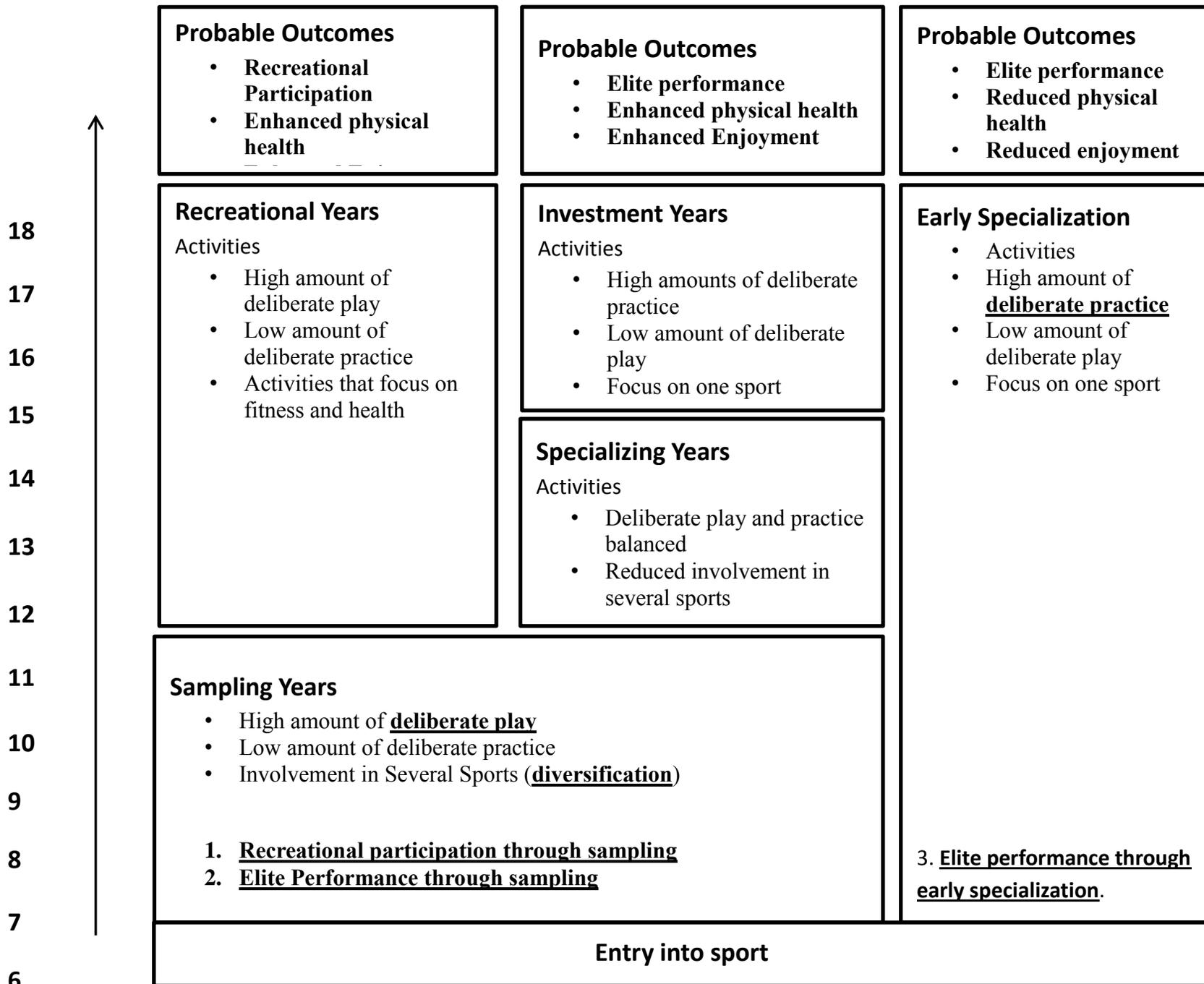


Figure 1- The Developmental Model of Sports Participation. Adapted from Côté, Baker & Abernethy, (2007).

1.1.1 Early sampling pathway.

In the early sampling pathway, future expert performers are said to develop through exposure to a large variety of sports, a high amount of play activity and a low amount of structured or organized practice. As athletes progress, beyond the sampling years (5-12 years) into the specializing years (13-14 years) the amount of time spent in play activity and total number of sports is reduced. Athletes then begin to spend more time in organized practice and also start to concentrate more on one particular sport. Finally, athletes enter the investment phase (15-18 years), whereby emphasis is placed exclusively on improving performance in one sport through structured/organized practice, and the amount of playful activity is vastly reduced.

The early sampling pathway consists of two main elements; 1) participation in deliberate play and 2) involvement in a wide variety of sports. The term “deliberate play” (Côté, 1999) is used to distinguish unstructured activities, such as street soccer, from structured/organized practice sessions. Deliberate play involves early developmental activities that are highly enjoyable versions of unstructured games, using rules adapted from the adult form that are monitored by themselves or an adult involved in the activity (Côté, Baker & Abernethy, 2007). According to Côté et al. (2007) deliberate play affords participants “...freedom to experiment with different movements and tactics and the opportunity to learn to innovate, improvise and respond strategically. It also allows children to perfect skills that would not be practiced in organized situations “(p 186). As of yet, no distinction has been made in the DMSP between general play activity and play in the young athlete’s primary sport. It has been proposed, however, that there is some transfer of cognitive and motor skills from participating in a large number of sports and playful activities (Côté et al, 2007, Abernethy, Baker & Côté, 2005) which can offset the

necessity to accumulate vast volumes of sport specific practice (Baker, Côté, & Abernethy, 2003).

1.1.2 Early specialization pathway.

The second pathway towards reaching expert status is through early specialization. According to Baker, Cobley and Fraser Thomas, (2009) the early specialization pathway is typified by four parameters; an early involvement in sport; early involvement in a single sport (5 or 6 years of age), high amounts of focused, high intensity practice and early competitive involvement in a sport. The DMSP predicts that early specializing athletes will engage in low amounts of play and high amounts of ‘deliberate practice’ in one sport. According to the theory of deliberate practice (Ericsson, Krampe, & Tesch-Römer, 1993) expertise is not only developed through experience but via a process of highly relevant, structured practice activities, engaged in by performers for the primary purpose of improving performance. According to Ericsson and colleagues, deliberate practice is further characterized as requiring immediate access to feedback, opportunities for repetition, full attention and high levels of effort (cognitive and/or physical). A monotonic relationship is proposed between accumulated time spent in deliberate practice activities and level of expertise. In sport, there is considerable evidence to support this relationship between accumulated hours in deliberate practice and skill level (see Ford, Williams & Hodges, 2012 for a review). However, in sports, at least, it is somewhat contentious whether deliberate practice hours have always been captured (i.e., structured practice activities designed to improve performance rather than activities engaged in for fun) and although distinctions have been made between individual and team practice, organized games and practices have not always been separated from self-initiated activities, which might be important in distinguishing positive pathways for success, as we expand below.

1.2 Consequences of early and late specialization pathways.

Using the DMSP as a framework, Côté, et al(2009; Cote et al., 2012) made a series of 7 postulates relating to the role that sampling and deliberate play, as opposed to deliberate or organized practice, may have during childhood in promoting continued participation and eventual expert performance. Of particular relevance was postulate 4 which states:

“High amounts of deliberate play during the sampling years (5-12 yr) builds a solid foundation of intrinsic motivation ...and promotes intrinsic regulation...deliberate play is an activity that may help promote the development of children’s harmonious passion towards sport” (Côté, Murphy-Mills, & Abernethy, 2012 pp. 278-279).

Central to Côté and colleagues postulate are Self-Determination Theory (SDT) (Deci & Ryan, 2000) and the Dualistic Model of Passion (Vallerand et al, 2003). According to both theories, autonomously controlled, intrinsically rewarding (enjoyable) activities, such as deliberate play, are crucial in maintaining an individual’s intrinsic motivation and harmonious passion over long time periods. Involvement in early play activity is thought to enhance an individual’s inclination to participate in more externally controlled activities such as organized practice over time.

1.2.1 Self-determined motivation.

Self Determination Theory (SDT) is a meta-theory that consists of 5 sub theories; Cognitive Evaluation Theory (CET), Organismic Integration Theory (OIT), Causality Integration Theory (CIT), Basic Psychological Needs Theory (BNT), and Goal Content Theory (Deci & Ryan, 2002). The first sub-theory is Cognitive Evaluation Theory which is concerned with Intrinsic Motivation and its social context. Bearing in mind that not all behaviour is intrinsically motivating, Organismic Integration Theory explains the way in which extrinsic motivation can be

internalized (i.e., become more self-determined). OIT consists of 4 behavioural regulations (Integrated, Identified, Introjected & External regulations) which lie along a continuum of internalization (self-determination). The third theory, Causality Orientation Theory, describes the tendency for an individual to take to a behavioural regulation based upon autonomous (i.e. interest, value in the activity) or controlled (i.e. gains, rewards, approval) orientations. The context in which the basic psychological needs theory; consisting of competence, autonomy and relatedness are met (or not) are said to facilitate motivation and well-being (Deci & Ryan, 2002). Finally, Goal Content Theory distinguishes between intrinsic and extrinsic goals with greater levels of motivation and well-being associated with intrinsic goals that are congruent with basic need satisfaction (Deci & Ryan, 2002).

Self-Determination Theory (see Fig. 2) succinctly combines all of the sub-theories together so that it consists of three broad types of motivation; intrinsic motivation, extrinsic motivation (which is further divided into autonomous and controlled extrinsic motivation) and amotivation. SDT therefore comprises of six behavioural regulations which lie along a continuum of self-determination (intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, amotivation). According to SDT, the extent to which an individual's behaviour is regulated by processes that are in line with their own sense of self, the higher degree of self-determined motivation (Deci & Ryan, 2002).

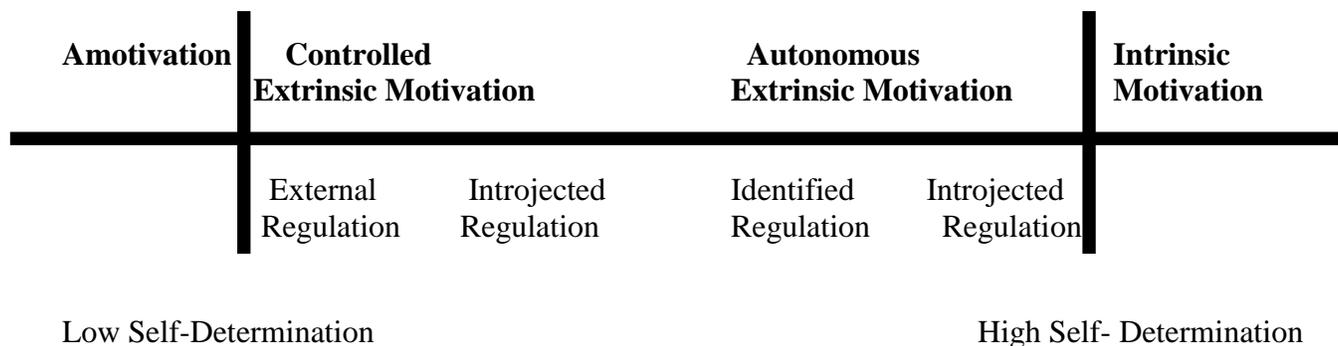


Figure 2. The Self-Determination Continuum (adapted from Lonsdale & Hodge, 2008).

Intrinsic motivation (IM) is the most self-determined motivation and occurs when an individual participates in an activity for the pleasure or enjoyment of the activity itself. Autonomous extrinsic motivation (EM), which lies next on the continuum of self-determined motivation, is often referred to as “want to” behaviour. It is comprised of integrated and identified regulation types. Autonomous, extrinsically motivated individuals become involved in an activity due to a sense of volition over their involvement. Research has shown a strong positive relationship between autonomous regulatory styles and effort, persistence, performance and psychological wellbeing (Vallerand, 2007). The most self-determined form of extrinsic motivation is integrated regulation in which an individual participates in sport due to the sport being in line with deeply held values and their sense of self. Identified regulation occurs when an individual participates to attain benefits that are personally important to him/her. Controlled extrinsic motivation can be characterized as less self-determined, or “have to” behaviours. In this instance, players may feel an obligation to participate in a particular activity. Controlled regulatory styles have been linked to indices of ill-being in sport such as antisocial moral attitudes (Pelletier, Fornier, Vallerand, Tuson & Blais, 1995). Under the controlled extrinsic motivation category are introjected and external regulations. Introjected regulation relates to behaviours that are performed to enhance self-worth or avoid feelings of shame or guilt. External regulation is considered to be the least

self-determined form of extrinsic motivation and occurs when an athlete participates to obtain external rewards or avoid punishment. At the furthest end of the low self-determination continuum is amotivation. According to Deci and Ryan (2002), amotivated people lack a sense of intention to participate and are said to merely go through the motions (Lonsdale, Hodge & Rose, 2008).

It is believed that children participate in deliberate play activities because they have an inherent interest or enjoyment in the activity, as opposed to being driven by external reasons such as improving performance or winning medals (Soberlak & Côté, 2003). Unsurprisingly, deliberate play activities are viewed as being enjoyable. The pleasure gained by children in play activities is congruent with intrinsic motivation as defined in SDT. Furthermore the sense of freedom in choosing when, where and who they want to play with, provides participants with a sense of volition encompassed within autonomous extrinsic motivation. Deliberate play is performed for its own sake and not for any external contingencies such as parental pressure or monetary rewards, differing from deliberate practice, whereby the primary intention is to improve performance which is considered as an external reward. Consequently, young players are unlikely to participate in deliberate play type activities to avoid negative affect such as shame, guilt or punishments associated with more controlled behaviors,(i.e. deliberate practice), but are more likely to participate for the sake of enjoyment. Similarly, due its volitional nature, amotivated individuals are unlikely to participate in play when they do not want to. It could be assumed that this may not be the case in some organized soccer practice situations, whereby participants may not be intrinsically motivated, or participate for external or controlled reasons such as parental or peer-pressure (Baker & Horton, 2004).

1.2.2 Harmonious passion.

Deliberate play might also foster harmonious passion (Côté et al, 2012). This may be beneficial to players since harmonious passion has been linked with both performance attainment in sport (Vallerand et al., 2007) and positive sport experiences (Vallerand, 2006). Passion has been defined as a strong inclination towards an activity that individuals like or even love, that they value, and in which they invest time and energy (Vallerand & Miquelon, 2007). Based upon how an activity is internalized and incorporated into personal identity, either a harmonious or obsessive passion is said to result. Harmonious passion (HP) is developed when the activity is believed to be parsimonious with the individual's sense of self and highly valued in the absence of any external contingencies. The degree to which an activity is internalized by autonomous means, such as enjoyment or satisfaction, will result in a greater degree of HP. Harmoniously passionate individuals have a strong yet not overwhelming connection to the activity. In this case, the activity does not conflict with other aspects of their life and is engaged in a flexible, positive manner. Harmonious passion has been positively correlated with general positive affect (Vallerand, 2010) level of musical expertise (Mageu et al., 2009, Study 3) mastery goal pursuits, subjective athlete well-being (Vallerand et al., 2008) and the quality of the coach-athlete relationship (Lafreniere, Jowett, Vallerand, Donahue & Lorimer, 2008).

Obsessive passion (OP) originates from intra and/or interpersonal pressure, through either contingencies related to the activity (self-worth) and/or via often overpowering sense of excitement from the activity which may be difficult to regulate (Vallerand et al., 2008).

Controlled internalization does not necessarily result in the activity being fully representative of the individuals' sense of self. Consequently, it may be difficult for obsessively passionate individuals to control their desire to engage in the activity, even if the outcomes of engagement

are negative. Corollaries between obsessive passion and a number of maladaptive outcomes have been reported (Vallerand, 2010). Despite the differences between harmonious and obsessive passion, recent empirical research showed both harmonious and obsessive passion to be positive predictors of deliberate practice amounts and consequently performance in the arts (Vallerand et al, 2007, Study 1) and in sport (Vallerand et al, 2008).

The postulate made by Côté and colleagues (2009) relating to the role of deliberate play during the sampling years in building a solid foundation of intrinsic motivation and harmonious passion, provides a testable hypothesis. In light of this postulate, and the breadth of the empirical evidence relating to the development of intrinsic motivation and harmonious passion (through autonomous internalization or enjoyment which are inherent in deliberate play activities such as street soccer), we predict that players that have accumulated a greater percentage of time in soccer play activities during the sampling years will display significantly higher levels of intrinsic motivation and harmonious passion, than players that have accumulated more time in organized soccer practice activities during the same time period.

***Hypothesis 1:** Players of the same skill level that have accumulated a greater percentage of time in soccer play activity during the sampling period (6-12 years), will exhibit enhanced levels of self-determined motivation and harmonious passion, than those players that have accumulated less time in soccer play and/or a greater relative percentage of time in organized soccer activity during the same time period.*

1.2.3 Soccer performance.

While the DMSP presents a well-developed framework of expertise development in a number of sports, the unique nature of soccer brings with it nuances that must be considered before it can be

considered a fully encompassing model of expert performance. As one of the largest participation sports in the world, it is important to the global validity of the model that soccer development is accounted for. As previously discussed, the DMSP consists of two pathways towards eventual expert performance; early sampling and early specialization. Debate exists as to which pathway is most beneficial to positive youth sport development, with some researchers purporting distinct benefits via early sampling (Baker et al., 2003, Côté, 1999, Côté et al., 2007, Côté et al., 2009) and others via early specialization (Ericsson et al., 1993, Ford et al., 2009., Helsen, Starkes & Hodges, 1998, Ward et al., 2007). Recently questions have been raised as to the types of visual-motor skills that can be developed through these different pathways of general sports versus soccer-specific activities during the sampling years (Baker et al., 2003).

1.2.3.1 Skill attainment.

Reaching an expert level of performance in soccer is multifaceted and includes several forms of activity. The largest predictors of future success are positively relate to accumulated time in team practice (Helsen et al., 1998, Ford et al., 2009, Ford & Williams, 2012) a combination of high amounts of practice and early soccer-specific play, (Ford et al., 2009, Ford & Williams, 2012), Koslowsky & Da Conceicao-Botelho, 2010) and a tendency towards minimal sporting diversity (Leite, Baker & Sampaio, 2009, Ford et al., 2009).

The earliest study of expert performance and practice histories in soccer was conducted by Helsen and colleagues (1998). In their study of elite Belgian soccer players, by 18 years of age, international players had accumulated significantly more time in team and individual practices than national and provincial players (with individual practice differentiating across skill level at the young ages, ~11yr and team practice differentiating at the older ages, ~19 yr). In a similar practice history study conducted with English youth soccer players, Ward et al. (2007)

also showed that for the under 18 year age group (U18), elite soccer players (playing for a professional club) had spent significantly more time in organized team practice (~6500 hr) than amateur players (~4990 hr). On a weekly basis, Hujigen and colleagues (2010) showed that those players who turned professional spent on average 1 hour per week more in practice, after age 14, than those that did not. Furthermore, in an analysis of players that eventually played for the Portuguese national team, by age 10 yr, 67 % of the players had invested over 240 minutes (4 hr) of soccer specific practice per week. This figure rose to 90 % by the age of 14 yrs (Leite et al., 2009). Considering the ‘world’ expert status of the current Portuguese national team (i.e., Ranked 5th in World, FIFA.com, Semi-finalists European Championship, 2012, 4th place finish in the 2010 World Cup finals), this provides some compelling support that early specialization is essential in reaching an elite level in soccer.

In contrast to the generally reported early specialization approach inherent in soccer development is the early sampling pathway. The early sampling pathway consists of two main elements 1) participation in deliberate play and 2) involvement in a wide variety of sports. Before this pathway can be considered in the context of soccer, a number of soccer specific nuances must be applied to the DMSP in relation to both of its elements. Deliberate play involves early developmental activities that are highly enjoyable versions of unstructured games, using rules adapted from the adult form that are monitored by themselves or an adult involved in the activity (Côté et al., 2007). In the soccer-related literature, there is support for the importance of soccer-related play in the development of expert players (Ford et al., 2009, Ford & Williams, 2012, Koslowsky & Da Conceicao-Botelho, 2010, Memmert & Roth, 2007). Anecdotally, former, three times, FIFA World Player of the Year, Zinedine Zidane, famously said “Everything I know about football (soccer), I learned in the street” (www.independent.co.uk).

In their investigation of the effects of various developmental activities engaged in during early childhood and their level of future soccer success, Ford and colleagues (2009) showed that the amount of accumulated time between age 6 and 12 spent in fun, unorganized soccer activities undertaken primarily for enjoyment (street soccer), differentiated between elite and sub-elite players. Elite players that received professional contracts at age 16 years had accumulated more hours of in soccer play activities from 6-12 years of age, than those that had been released or dropped out of their respective elite soccer academies in the UK. Interestingly, no significant differences were reported between the still elite and now sub-elite group, in terms of time accumulated in organized soccer practice (or participation in other sports). Significant differences were reported between recreational players and elite and sub-elite players in terms of organized soccer practice. This led the authors to conclude “that early engagement is reflected by minimal diversity in others sports and high levels of play and practice in the primary domain” (p.73).

Follow up research, has confirmed that high amounts of soccer specific play and practice are typically needed to attain high levels of success in soccer. In a study of British professional players, Ford and Williams (2012) found further evidence supporting the “early engagement hypothesis”. This time, the players had engaged in more sports early in their careers than originally reported in the 2009 study. Importantly, this variable was not correlated with performance which goes against the argument that it is a cultural phenomenon (i.e., soccer in the UK) that is responsible for a lack of sporting diversity and hence discriminability, in comparison to North American or Australian youth development in other sports (see below). Consequently, there is evidence that soccer specific play combined with organized soccer team practice enhances soccer expertise development and the attainment of success. Koslowsky and Da

Conceicao-Botelho (2010) measured soccer related play and organized practice in elite Brazilian and Portuguese youth soccer players. Both groups had accumulated a similar total time in practice activities (~4000 hrs.). However the Brazilian players had accumulated almost double the accumulated time in soccer play activity (1600 hr) than the Portuguese players (960 hrs.). Given the high standings of both Portuguese and Brazilian soccer it may be argued that total time in soccer activity, regardless of whether it is play or practice orientated is an important predictor of future success. Another comparative study, between elite French and English youth players provides further support that accumulated time spent in soccer play during early development is important in differentiating within players of an elite skill level (Ford, Le Gall, Carling & Williams, 2008). The comparatively more successful French youth team players had accumulated more time in soccer play activities between the ages of 7-10 years and more time in organized practice later in their careers (13-14 years) than their English counterparts. The above studies provide some tentative evidence that soccer play activities facilitate the attainment of success in soccer and that this activity is important during the early years of soccer development. However, it is important to remember that this play is soccer specific and consequently lends supports for both early specialized deliberate practice and deliberate play. Moreover an understanding of how soccer activity (play and practice) interacts with different components of skill (such as technical, physical or tactical development) is yet to be understood.

With respect to the issue of sporting diversity, future soccer players had reported participating in as little as 1 or 2 “other sports” (Ford et al., 2009, Leite et al., 2009, Ward et al., 2007) to 5 sports (Ford & Williams, 2012). This is in less than other sports such as ice-hockey, with 6 sports reported during the sampling years (Soberlak & Côté, 2003) and team ball sports, including netball, basketball and hockey, where this number is even higher (8.6, Baker et al., 2003). The

tendency of soccer players to specialize early is highlighted by Leite and colleagues (2009) in their study of Portuguese national team players. By 10 years of age, only 33 % of their sample participated in one sport outside of soccer and a mere 2.4 % participated in two sports. Furthermore, 64 % of future national team players had never participated in sports outside of soccer. Participation in one other sport decreased to 9.5 % at age 14, and dropped further to 2.4 % by 18 years of age. Despite the lack of support for involvement in a variety of sport from soccer and hence early sampling, support has accumulated for the importance of early sampling in future elite players in other sports, although primarily by just one group of researchers (Abernethy, Baker & Côté, 2005, Baker et al., 2003, Berry, Abernethy & Côté, 2008, Soberlak & Côté, 2003).

1.2.3.2 Perceptual-cognitive skills.

It has been hypothesized that certain perceptual-cognitive and motoric skills can be transferred from one sport to another (Côté et al., 2007). Involvement in a wide range of activities may elicit a form of “intellectual cross training” (Simonton, 2000) that alleviates the negative effects of excessive specialization thus, enhancing skill development. In a study of world class Australian national team athletes, Baker et al. (2003) studied the role of non-sport specific practice on the development of decision making. They found a negative correlation between early breadth of exposure to other sports and the amount of sport specific training required to obtain expert-level proficiency. Thus, their results suggested that during the sampling years, a wide breadth of exposure to sports, with similar tactics, reduced the amount of sport specific practice required to attain expert performance. Exposure to a number of sports during the sampling years can positively affect cognitive skills such as pattern recognition (Abernethy, Baker & Côté, 2005) and decision making (Berry, Abernethy & Côté, 2008). However, according to Ford, Williams

and Hodges (2012) the research used to support the early diversification pathway contains an important flaw. In much of the cited research, experts have been engaged in some form of activity in their main sport from an early age (Berry et al., 2008, Soberlak & Côté, 2003).

Tactical skills refer to the ability of a player to perform the right action at the right moment and quickly adapt to new configurations of play and the circulation of the ball (Elferink-Gemser, Visscher, Lemmink & Mulder, 2004). A large part of good tactical play is being able to recognize perceptual cues and produce an appropriate action. In this sense, the ability to read and interpret the actions of team mates and opposition is essential to top level soccer. Expert-novice differences in perceptual skills have been found in players as young as 9 years of age (Williams & Ford, 2003). Research has also shown that the perceptual accuracy of elite level soccer players was best developed through sport and even position-specific practice (Williams, Ward, Ward, & Smeeton, 2008). For example defensive players performed better than offensive players and novices in soccer related video anticipation task. These results along with the lack of transfer from other sports to soccer, has led Ford and Williams, (2008) to state that “expert performance in soccer is mainly developed through soccer-specific activities” (p. 719).

1.2.3.3 Creativity.

Studies investigating the transfer effects of participation in a wide number of sports and soccer performance are scarce. Several of the transfer studies have focused on specific skill aspects of soccer, such as, creativity (Memmert & Roth, 2007), tactical skill (Williams, Ward, Smeeton, & Ward, 2008) and physical skills (Young, 2006). Success in soccer is determined primarily by

technical, tactical, physiological and psychological expertise (Williams & Reilly, 2000).

Moreover creative players have been shown to be highly desirable by soccer coaches (Memmert, Baker & Bertsch, 2010).

According to Memmert and Roth (2007) creativity in sport is characterized by attentiveness, generation of tactical response patterns, seeking original solution ideas and an ability to perceive unexpected objects and incorporate them into their original game plan. Memmert and Roth, (2007) studied the transfer of tactical creativity between handball, soccer and field-hockey. Findings suggested a possible transfer effect independent of motor skill. However their results also showed the largest tactical creativity improvement in the primary sport that they practiced in, that is, the soccer-specific group improved significantly more in soccer than in the other activities.

1.2.3.4 Physical and technical skills.

Physical skills are referred to as the conditioning necessary to play effectively (Baker, Côté, & Abernethy, 2003). A basic level of physical conditioning incorporates all of the major components of fitness and is necessary for success in soccer (for a review see Reilly, 2007).

Recent reviews on physical development (Meylan, Cronin, Oliver & Hughes, 2010) acknowledge that general physical conditioning can facilitate soccer performance through improving physical skills during childhood and adolescence by reducing the incidence of injury and reducing the disadvantage of players that are less physically mature. However, researchers have consistently shown that the greatest physical skill performance benefits (specifically max. speed, acceleration and anaerobic endurance) are gained in conditions specifically related to the player's primary sport (Laia et al., 2009). The majority of the studies supporting soccer specific conditioning as a means of developing physical skills involve players beyond the early stage of development (e.g.

Hill-Haas, Coutts, Dawson & Boswell 2009, Hoff & Helgerud 2004, Impelizzeri et al., 2006, McMillan, Helgerud, McDonald & Hoff 2005, Rampini, et al., 2007). One way in which early diversification may facilitate the development of physical skills is through the development of general physical conditioning which may impact soccer performance. As yet it is yet unclear whether physical skill development benefits more from diversity (general conditioning) or specialization (soccer-specific conditioning) activities.

Technical skills have been defined as having the ability to carry out the motor aspect of the task (McMorris, 2004). Unsurprisingly, a greater level of technical skill is said to positively impact tactical responses and game performance (Holt, Ward, Wallhead, 2006). In their field study, Holt et al., (2006) found that players judged as displaying higher levels of technical proficiency in overload practices (e.g. 2v1, 3v2 situations) were more likely to achieve higher levels of success in subsequent game related situations (4v4 small sided games) than their less able counterparts. Due to the complex and unique motoric demands involved in using the foot to strike the ball, it is not surprising that few studies have investigated transfer of motor skills from other sports to soccer. Moreover, it is well established that accumulated time spent in specialized soccer training (Ford et al., 2007, 2009, Helsen et al., 1998, Ward et al., 2007) and play (Ford et al., 2007, 2009, Koslowsky & Da Conceicao Botelho, 2010) is related to level of expertise. Within soccer, empirical evidence exists that supports the notion that enhanced levels of technical proficiency displayed in practice has a positive impact on tactical responses and importantly on overall game performance.

In summary, there is significant evidence supporting the role of sport-specific, specialized practice for the development of soccer skills and only some, inconsistent evidence, supporting the importance of diversity in experiences for later transfer benefits. Although these data lead to

speculations about the differential roles of early diversification and specialization (and play and practice) in the development of technical, tactical, creative and physical skill, it is still unclear what the relationships are between these various skills and early play/practice/sporting experiences. Deliberate play type activity is said to afford the learner with opportunities to experiment with new ideas and practice different techniques that may not ordinarily be included in a typical structured/coach led practice session (Côté et al., 2007). For this reason, there may be a positive association between soccer play and creative skill. Moreover, general physical conditioning in childhood is likely to be facilitated as much from participation in a variety of different sports, especially those with similar predominating energy systems (e.g., Vo2max, cardiac output) as from specialized practice. However, soccer is unique in that the primary technique used to manipulate the ball is with the foot. Consequently we are unlikely to see much in the way of motoric transfer from other sports to soccer. Allied to this, the research of perceptual-cognitive skill in soccer (Williams et al., 2008), leads to the suggestion that expert players are faster and more accurate than novices in anticipation tests and also that there may be a position specific advantage for perceptual-cognitive skill in defenders, further signifying the importance of soccer-specific practice in the development of expertise. Despite researchers advocating greater sporting diversity during the sampling years as an underlying factor in the development of perceptual-cognitive expertise, (Abernethy et al., 2005, Baker et al., 2003, Berry et al., 2008), the soccer-specific findings of Williams et al., (2008) lead us to predict that specialized, soccer-specific, organized practice activity will be most related to measures (i.e., coach ratings) of technical and tactical skill. However, we expect that activities related to play and diversity will be more related to measures of creative and physical skill.

Hypothesis 2: *Players that have accumulated a greater percentage of time in organized soccer practice, during the sampling period, will receive enhanced coach ratings of technical and tactical skills than those players that have accumulated a greater percentage of time in play type activities. Further, players that have accumulated a greater percentage of time in soccer play activities or participate in a greater number of sports during the same period, will receive enhanced coach ratings of creative and physical skill.*

2. Methods.

Participating clubs were initially contacted by letter (Appendix A) detailing the purpose, basic methods and introduction to the study. Follow up contact was made via email and telephone to confirm participation and dates for data collection. Three weeks before data collection, letters/emails were distributed to parents, players (Appendix B) and coaches (Appendix C) detailing consent procedures. Parents were given three weeks to object from their child participating in the study, otherwise passive consent was assumed. To ensure maximum participation, passive consent was used as there is strong evidence that 40-50% of parents typically fail to return parental consent forms whether they are distributed by mail or student delivered (Dent, Sussman, & Stacy, 1997). Players, coaches and parents provided written consent before completing the questionnaires.

2.1 Participants.

2.2.1 Players.

Male, elite youth soccer players (N = 148) aged between 11 and 16 years of age were recruited from five member clubs of the Scottish Football Association's performance tier. This is the highest level of performance for youth soccer players in Scotland. Four participants from this sample were excluded from the study as their questionnaires were incomplete (final N = 144). The players were representative of 3 age groups; Under 13 years (U13) (12.0 – 12.9 yr., n = 46), U15 (14.0 – 14.9 yr., n = 50) and U17 (15.0 – 16.9 yr., n = 48). Parents provided passive consent before players' gave written assent through completion of the questionnaires.

2.1.2 Coaches.

Twelve youth coaches participated in the study. Coaches had been involved in coaching youth soccer for 10.9 ± 5.8 yr., had been employed at their current club for 4.5 ± 6.8 yr, and accrued 3.2 ± 1.2 yr. coaching at their current age group level. All participating Scottish coaches were qualified at or above the Scottish F.A.'s youth level 4 award, 6 were qualified at the Youth License level, (the highest youth coaching award in Scotland), 4 held a UEFA-A license and 2 were UEFA Pro-License holders. All coaches had played at a level beyond recreational soccer. The sample included former full international (n= 3), ex-professional (n= 9), and semi-professional (n= 3) players. Informed consent was provided through completion of the questionnaires.

2.2 Procedure.

All questionnaires were completed on site at the clubs under the supervision of the coach, some parents and a team of trained research assistants. Any questions were dealt with by the research team and participants were instructed to ask for help if they had difficulty understanding any of the questions, but not to consult with others about what to enter into the questionnaires (either parents or other players).

2.2.1 Players.

There were four procedural components to the study; firstly participants provided basic demographic data, secondly a retrospective questionnaire adapted from previous research (Helsen et al., 1998; Hodges & Starkes, 1996; Hodges et al., 2004; Ward, Hodges, Williams & Starkes, 2007) was used to gain sport and soccer specific activity data. Participants then completed the Behavioral Regulation in Sport Questionnaire (Lonsdale, Hodge & Rose, 2008) and Passion Scale (Vallerand et al, 2003) before finally providing ratings of their own technical,

tactical, creative and physical skill in comparison to those in their team and others of the same age. Copies of all player questionnaires can be found in Appendix D.

2.2.1.1 Demographic information.

Basic demographic data such as name, age, date of birth, name of professional club, international experience and number of years at current club were recorded in the questionnaire. Players were also able to record if they had made their full first-team (professional) debut, international experience and if they were signed as a professional player.

2.2.1.2 Retrospective questionnaires.

Players listed all of the sports that they had participated in, before ranking a top five of these sports in relation to those that they had participated in most. Further biographical information was then recorded for each of the top five sports regarding the age of entry into the activity, the number of hours per week spent in that activity during their first year, when organized practice began, if participation took place outside of regular physical education classes and when participation ceased (where applicable). The number of days per week and hours spent in practice per day were then recorded across each of the top five activities at three distinct age categories; 5-8 years, 9-12 years, and 12 to present time.

Soccer specific biographical information was then collected by recording the total number of organized soccer practice sessions per week and the average length of each training session.

Participants also recorded the accumulated time spent in soccer play activities and the total amount of time spent in match play per week. Significant breaks from soccer, due to illness or injury were recorded. These breaks did not include vacation periods or off season. To aid the accuracy of the data collection process, accumulated time spent in organized practice, play and breaks from soccer were subdivided into two-year intervals from 5 years of age to the present

(i.e. 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17 yr, for a 17 year old player). Participants recalled how much time they accumulated on average during each age category. Linear interpolation was used to fill in data from any intervening years (Ward et al., 2007).

Total time spent in organized soccer practice was calculated by multiplying the average number of hours per session by the average number of sessions per week. This figure was then multiplied by the number of weeks that they practiced per year (~40 weeks), by subtracting any weeks lost through illness or injury and off-season periods. This procedure was then repeated for each of the age categories. Average time spent in soccer play per week was then multiplied by the total number of weeks, using the same process as before. A percentage of total-time spent in either soccer play or practice was calculated by dividing the number of hours spent in each activity by the total time in play and practice, before multiplying by 100. This procedure was used to provide a percentage of accumulated time spent in both soccer activities during the sampling period (5-12 years) and across participants' careers.

To assist with the validity and reliability of the data collected a sample of parents/guardians (n=23) also completed the soccer specific and "participation in other sports" components of the questionnaire (see Appendix E). The coaches were also asked to record how much time players typically spent in soccer practice at their respective clubs.

Operational definitions of organized practice, play and match-play were provided and explained verbally to all participants. In the interest of clarity all future reference to "play" or "practice", unless explicitly defined as otherwise, will relate to these operational definitions.

Soccer practice: Practice activities that are conducted with a coach/teacher/adult that are used mainly to improve skills. This is typically team-led practice and could include things such as

football drills, technical skills, conditioned games, tactical skills, strategic skills, set-play practices, and football-related fitness work.

Soccer play: Unstructured activities that are not conducted with a coach or teacher. These types of activities include fun games, general kick around, football games with friends, individual play/practice, keep-ups etc.

Match-play: Playing competitive matches against another team or playing uninterrupted matches against other players in your team/club (bounce game).

2.2.1.3 Self-determined motivation.

Motivation was measured using the 24- item Behavioral Regulation in Sport Questionnaire (BRSQ) (Lonsdale, Hodge & Rose, 2008). Previous research using the BRSQ has shown internal consistency, test–retest reliability and factorial validity in sport settings (Lonsdale et al., 2008). It has also been shown to provide valid and reliable measure scores of self-determined motivation among youth rugby players in an elite sport setting (Lonsdale & Hodge, 2011). This questionnaire is used to measure reasons for participation in sport that fall along a continuum of self-determined motivation. Participants responded to the following stem; “I participate in football because” before responding to each item (n = 28) using a 7-point Likert scale where **1 = Not at all true, 4 = somewhat true and 7 = very true**, by circling one number per item. All participants had to answer each item on their own.

The BRSQ includes four items used to measure each behavioral regulation included in Self-Determination Theory. These have been detailed in Table 1. The BRSQ was used to measure self-determined motivations at three distinct levels. Firstly, a process of item-aggregation (Mullan, Markaland & Ingledew, 1997, Ryan & Connell, 1989) took place whereby participant responses were summarized by averaging from the four items for each individual behavioural

regulation subscale. This allowed us to determine the predominant behavioral regulation(s) from the sample. At the next level, scores of autonomous motivation were determined through the following formula (see also Table 1): $2 \times IM + IG + ID$. Controlled motivation was calculated using $2 \times IJ + 2 \times EX$ (see Lonsdale & Hodge, 2011). A global score of self-determination was also calculated by applying a coefficient from the subscales used to represent the different types of behavioral regulations (Ng, Lonsdale & Hodge, 2011). In accordance with Lonsdale and Hodge (2011), we applied the following formula to provide an index of self-determination (SDI); $(-2 \times EM, -2 \times IJ, 1 \times ID, 1 \times It, 2 \times IM)$.

Table 1: An outline of the components of SDI along with formulas used to calculate the various subscale dependent measures.

Behavioral regulations	abbreviation	example
Intrinsic motivation	IM	“...I find it pleasurable”
Extrinsic motivation (Autonomous):	EM	
Integrated regulation	IG	“...it’s an opportunity to be who I am”
Identified regulation	ID	“...I value the benefits of football”
<i>Autonomous motivation</i>	<i>Autonomous EM = 2 x IM + IG + ID</i>	
Extrinsic motivation (Controlled):		
Introjected regulation	IJ	“...I would feel ashamed if I quit”
External regulation	EX	“...I feel pressure from others to play”
<i>Controlled motivation</i>	<i>Controlled EM = 2 x IJ + 2 x EX</i>	
Amotivation	AM	“but I wonder what’s the point”.
<i>Self-determination index</i>	<i>SDI = -2 x EX, -2 x IJ, 1 x ID, 1 x IG, 2 x IM</i>	

Amotivation differs from other forms of behavioral regulation on the self-determination continuum as this sub-component lacks an intention to act (Deci & Ryan, 2002) while others offer reasons for action. Since SDI was used as a measure of quality of motivation, and amotivation measures quantity of motivation, amotivation was excluded from the SDI calculation (Ng, Lonsdale & Hodge, 2011). This rationale has been advocating in previous studies employing SDI as a global indicator of self-determined motivation (Ryan & Connell, 1989, Lonsdale, Hodge & Rose, 2008, Lonsdale & Hodge, 2011, Ng, Lonsdale & Hodge, 2011).

2.2.1.4 Passion scale.

Player passion towards soccer was determined using the Passion Scale (Vallerand et al., 2003) which is comprised of two 7-item subscales of harmonious passion (HP) (e.g. “Football is in harmony with other activities in my life”) and obsessive passion (OP) (e.g. “I have an almost obsessive feeling for playing football”). Participants responded to each statement using a 7-point Likert scale anchored at 1 (*not agree at all*) and 7 (*very strongly agree*). Previous studies have shown the Passion Scale to have high levels of validity and reliability (Ratelle et al., 2004, Vallerand et al, 2003, Study 1) including within sport settings (Vallerand et al., 2003, Study 2 and 3, Lafreniere, Jowett, Vallerand, Donahue & Lorimer, 2008, Vallerand, Mageau, Elliot, Dumais, Demers, Rousseau, 2008)

2.2.2 Coaches.

Coaches also completed three procedural elements. They provided basic demographic information on themselves and provided estimates of practice session durations of their players using a questionnaire based upon previous research (Ford, Yates & Williams, 2010). They were also asked to provide technical, tactical, creative and physical skill ratings of players from within their team. A copy of the coach questionnaire can be found in Appendix F.

2.2.2.1 Demographic information.

Basic coaching demographic data was obtained by questionnaire. Coaches were asked to detail the number of years; involved in youth soccer coaching, coaching at their current club, and coaching at their current age group. Coach participants also provided information relating to their soccer playing career (highest level & position).

2.2.2.2 Skill ratings.

Coaches were instructed to provide individual player ratings of technical, tactical, creative and physical skills using a 5 point rating scale ranging from 1 (poor) to 5 (excellent). All ratings were made relative to other players within the age and skill-appropriate team. Operational definitions, based upon previous research (Baker, Cote, & Abernethy, 2003, Elferink-Gemser, Visscher, Lemmink & Mulder, 2004, McMorris, 2004, Memmert & Roth, 2007), were included on individual skill rating forms to facilitate accurate coach rating decisions:

Tactical skills were defined by the player's ability to make fast and accurate decisions with respect to picking out open players, reading the game well, smart playing, good pass selection/decisions.

Technical skills were defined by skills such as the ability of the player to pass accurately, dribble well with the ball, shoot, perform accurate and effective throw-ins/free-kicks etc.

Physical skills were defined by a person's overall physical condition

Creativity skills were defined by a person's overall flair and originality in making decisions and displaying unusual skills and effective creative plays.

2.3 Data analysis.

2.3.1 Demographics.

Demographic information was analyzed using separate One-way ANOVA's to establish age group differences in start age in soccer activities, start age in organized soccer practice, start age in current soccer academy, start age in academy system and total number of sports engaged. A series of three-way repeated measures ANOVAs; 3 (Group; U13, U15, U17) x 2(Soccer Activity; Play, Practice) x 8 (Age) were used to analyze between group differences in accumulated and hours per week data from the sampling years. Soccer activity and age were the within subjects variables, while age-group was the between subjects variable. Tukey HSD post hoc comparison tests were used to follow up any significant effects involving more than 2 means ($p < .05$).

2.3.2 Relationships between sport activities, motivation, passion and skill.

In order to test our main hypotheses a number of Pearson r correlations were performed between percentage and accumulated time spent in either soccer practice or play and indices of motivation, passion type, behavioral regulations and skill. Percentage values were calculated by dividing hours in play by the total amount of hours in soccer activities (i.e., play and practice) and multiplying by 100. Correlations were performed for the sample as a whole and for each individual age group. Percent or accumulated time in soccer play and practice were the independent (or predictor) variables and indices of motivation, passion and skill were the dependent (or outcome) variables.

2.3.3 Reliability.

Pearson's r correlations were calculated based on soccer-related activity estimates from each parent-youth athlete pair. Differences in the ratings were tested using one way ANOVA and correlations were also conducted. One sample t -tests were used to compare the coaches'

estimates of hours per week currently spent in organized soccer practice with those of the coach's respective player group. Because there were 12 coaches this resulted in 12 comparisons. Finally, inter-item reliability was assessed within the questionnaire by comparing answers across two components of the designed to measure current estimates of weekly practice.

3. Results.

3.1 Demographics.

Descriptive statistics pertaining to players' current age, start age in soccer activities, start age in organized soccer practice, start age in current soccer academy, start age in academy system and total number of sports engaged in for each age group can be found in Table 2. On average, the players started participating in soccer activities around 5 years, started organized soccer practice approximately 1 year later and entered the youth "Academy System" around 10 years of age. These players reported participating in organized practice in 5-6 sports other than soccer during their soccer careers. Despite these similarities, there were significant differences between the different age groups with respect to the ages they began; general soccer activities $F(2,145) = 4.75, p=.01$, organized practice $F(2,145) = 6.67, p<.01$, joined their current academy $F(2,145) = 21.23, p=<.001$ and the academy system, $F(2,145) = 29.21, p< .001$. Follow up analysis showed that the U13 age group commenced all soccer related activities earlier than the older U15 and U17 players.

Table 2: Demographics related to current age and start age in soccer related activities (Means, SDs, and range in yr.)

	U13	U15	U17	All
n	46	54	48	148
Current age	12.02 (0.25) 11.0 - 13.83	14.33 (0.43) 12.91 - 14.91	15.35 (0.62) 14.9 - 16.91	15.35 (.84) 11.8 - 16.91
Start Age Soccer Activities (Play or Practice)	4.64 (1.44)* 2.0 – 10.0	5.55 (1.51) 2.0 – 8.0	5.38 (1.59) 3.0 – 10.0	5.21 (1.57) 3.0 – 9.0
Start Age Organized Practice	5.55 (1.68) ** 3.0 – 9.0	6.74 (1.75) 3.0 – 11.0	6.61 (1.74) 4.0 – 11.0	6.33 (1.81) 3.0 – 11.0
Start Age Current Academy	9.37 (1.40) ** 6.0 – 12.0	11.74 (2.14) 7.0 – 15.0	12.56 (2.52) 8.0 – 16.0	11.27 (2.46) 6.0 – 16.0
Start Age in Academy System	8.63 (1.19) ** 6.0 – 11.0	10.91 (2.20) 7.0 – 14.0	10.96 (2.27) 6.0 – 15.0	10.22 (2.24) 6.0 – 15.0
Number of Other Sports	5.83 (2.20) 1.0 – 11.0	5.18 (2.63) 1.0 – 14.0	4.38 (2.15) 1.0 – 9.0	5.35 (2.44) 1.0 – 14.0

* = significantly different from one of the other groups, ** = significantly different from both groups ($p < .05$).

3.1.1 Hours per week in soccer activities.

In order to ascertain relative amounts of time spent in soccer related activities (i.e., practice and play) during the sampling years, comparisons were made across ages 5 -12 yrs for all 3 age groups in a 3 (Age Group) x 8 (Age, 5- 12 yr inclusive) x 2 (Activity, practice and play) ANOVA with RM on the last two factors. Data pertaining to hours per week in soccer related activities is displayed in Figure 3. There were main effects for activity, $F(1,144) = 18.39, p < .001, \eta_p^2 = .11$, and age, $F(2.92, 330.06) = 208.86, p < .001, \eta_p^2 = .59$. Generally more hours per week were spent in play than organized practice during the sampling years. There was a linear increase in hours spent in organized soccer practice and play with age until 11 years. During the first year of soccer activity (age 5) players reported spending double the amount of hours per week in play ($M = 3.08, SD = 3.01$) than practice ($M = 1.52, SD = 1.33$). This general pattern continued at age 10, with players still spending more time in soccer play ($M = 5.66, SD = 3.5$) than practice ($M = 4.75, SD = 2.16$). By age 12 yr, players were spending a similar number of hours/week in play ($M = 6.00, SD = 3.66$) and practice ($M = 6.06, SD = 3.66$). This pattern of data was confirmed statistically by an interaction between Activity and Age, $F(2.14, 308.37) = 11.81, p < .001, \eta_p^2 = .07$, with hours per week in organized practice increasing as players got older. There was also an interaction between Age group and age, $F(4.58, 330.06) = 4.87, p < .001, \eta_p^2 = .06$. This can be attributed to the similar quantity of time spent per week in play and practice by the U13 age group across the years in comparison to the early and continued differences in practice activities for the U17 age group during the sampling years.

3.1.2 Accumulated hours in soccer activities.

These data are plotted in Figure 4. As with hours per week, there were main effects for both age, $F(1.10, 159.67) = 779.17, p < .001, \eta_p^2 = .84$, and activity, $F(1,145) = 9.70, p < .001, \eta_p^2 = .17$, but not age group, $F(2,144) = 2.15, p > .05, \eta_p^2 = .017$. Not surprisingly, there was a linear increase in accumulated hours as a function of age ($p < .001$) and players had accumulated more hours in soccer play ($M = 1867.29, SD = 1191$) than practice ($M = 1452.63, SD = 651$) by age 12 yr. There were a number of interactions (Group x Age, $p < .05$, Activity x Age, $p < .001$, Group x Activity, $p = .05$), as well as a 3-way interaction that approached conventional levels of significance, $F(2.18, 158.17) = 2.78, p = .06, \eta_p^2 = .04$. As can be seen from Figure 4, up until 12 yrs, more hours were accumulated in play type activities than practice for the U15 ($M_{\text{play}} = 1699.26, SD = 1180, M_{\text{practice}} = 1356.52, SD = 580$) and U17 ($M_{\text{play}} = 1961.72, SD = 1208, M_{\text{practice}} = 1236.35, SD = 4672$) age groups. The youngest age group, however, showed similar practice/play profiles across the ages, most notably different from the other groups at age 11 and 12 years, where the overall practice and play amounts were high ($M_{\text{play}} = 1966.41, SD = 1190, M_{\text{practice}} = 1791.86, SD = 764$) for this group relative to the other groups. Tukey post hoc testing did not yield significant differences for any of these comparisons.

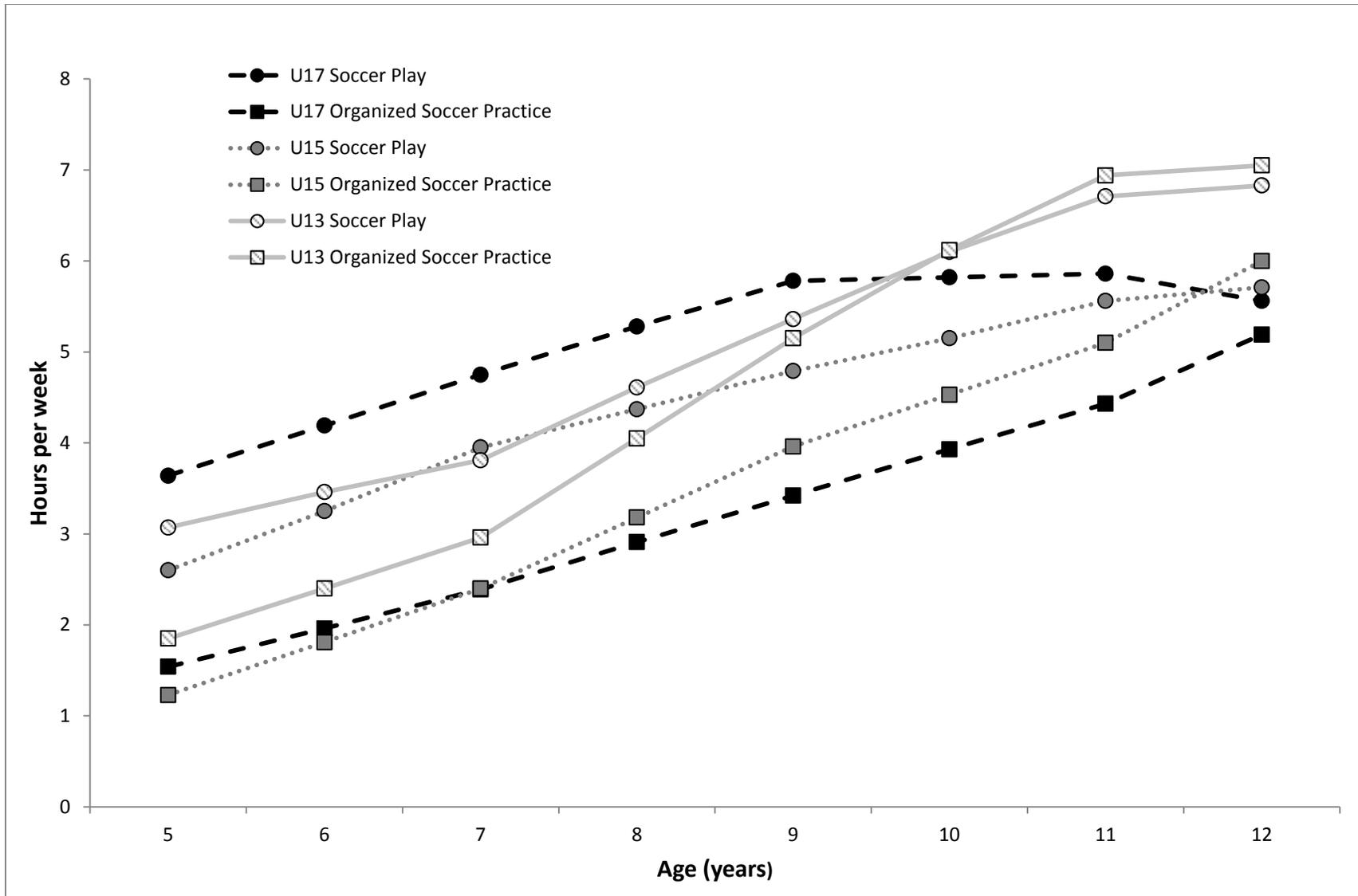


Figure 3. Mean hours per week in practice and play as a function of age and age group.

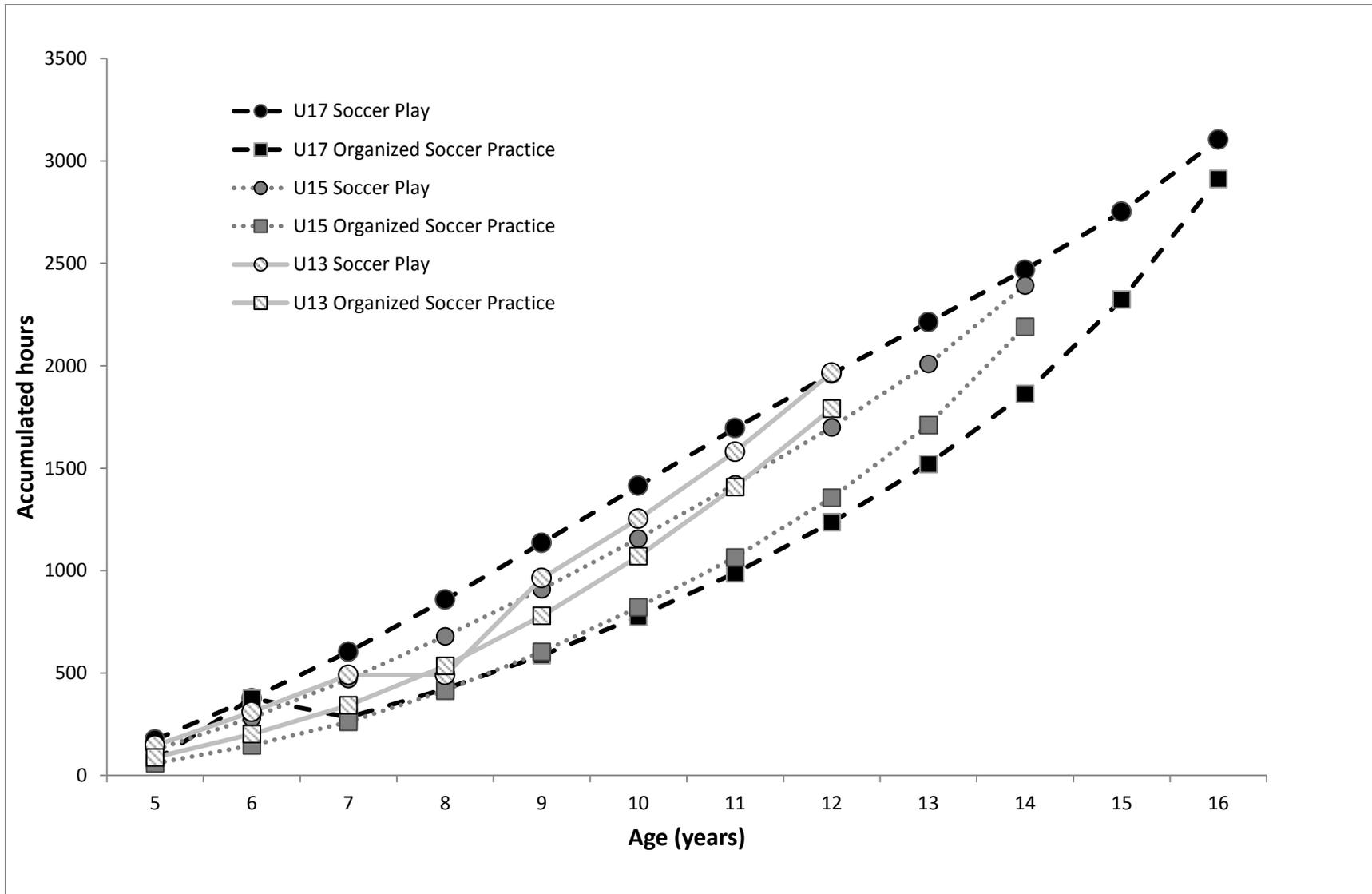


Figure 4. Mean accumulated hours in practice and play as a function of age group and career age.

3.2 Reliability and validity of the practice estimates.

In order to demonstrate reliability and validity in the estimates, the player estimates were cross validated with estimates from a sample of the parents ($n = 23$). Although parents' estimates for soccer activity during the sampling years ($M_{practice} = 1838.67$, $SD = 1214$, $M_{play} = 2025.91$, $SD = 1002$) were generally greater than that of the players', ($M_{practice} = 1700.73$, $SD = 884$, $M_{play} = 1880.57$, $SD = 1354$), they were not significantly different either in the sampling years or across the player's full career (both $F_s < 1$). A breakdown of the hours into play and practice also failed to yield significant differences (both $F_s < 1$). Medium sized, significant correlations between parent and players estimates of time accumulated in soccer play during the sampling years ($r = .44$) and across participants full careers ($r = .45$) were observed. However, Parent/player correlations failed to reach significance for % time ($r = .07$), and total accumulated time ($r = .32$) in organized soccer practice.

Current estimates of hours per week in organized soccer practice from the players were cross validated with a sample of coaches' estimates ($n = 12$). For each coach and their respective age group players we compared the estimates of weekly practice using one sample, t-tests (as detailed in Table 3). Only two out of twelve coaches gave estimates of weekly hours in practice that were significantly different from the players. In one case the coach's estimate was higher than the players and in the other case it was lower. This would support the validity of the current practice estimates at least and suggest that there was no tendency to inflate hours of practice as a function of increasing age.

Within the questionnaires, a reliability check was included to enable measures of within subject reliability (or inter-item reliability). These data were derived across age groups from two separate components measuring soccer practice in the original questionnaire. The reliability of

these retrospective estimates improved as recall of soccer activities became more recent.

Pearson's r correlation for the youngest age range (5-8yrs) was small ($r=.30$) yet became larger for the 9-12yr ($r=.36$) and 12+yrs ($r=.37$) respectively. All correlations were significant at $p<.01$ level.

Table 3: Student t-test comparisons between Mean (SD) coach and player hours per week (HPW) estimates of current years practice.

Age Group	Coach #	Coach estimate	Players M (SD)	N
U17	1	12.00	13.21 (1.41)*	7
	2	10.00	10.00 (0)	8
	3	10.00	9.62 (1.50)	13
U15	4	8.00	8.53 (2.23)	18
	5	8.00	7.89 (.73)	18
	6	6.00	5.18 (1.03)*	11
	7	6.00	6.19 (1.45)	13
U13	8	6.00	6.00 (.64)	12
	9	6.00	4.38 (.43)	12
	10	4.50	4.5 (0)	7
	11	4.50	4.31 (.58)	13
	12	6.00	5.95 (.797)	16

* = significant difference at $p<.05$ level.

3.3 Descriptive statistics for self-determined motivation and passion.

We compared the 3 age groups with respect to scores for each behavioural regulation measure (IM to AM, i.e., 6 levels) and for the three indices of motivation (Self-Determined Index (SDI), Autonomous and Controlled Motivation) in two, mixed design ANOVAs.

Mean scores for more self-determined regulations (e.g. IM, and IG) were higher than scores for less self-determined motivations. Table 4 shows the mean scores of each behavioural regulation, highlighting the relatively small range of high scores recorded for intrinsic motivation and Integrated regulation. Larger variances in responses were recorded for Identified, Introjected and External Motivation and a small range of low scores were recorded for amotivation. There was a main effect for age group $F(2,145) = 7.026, p=.01, \eta_p^2=.089$, and an interaction between Age group and Behavioural regulation, $F(5.69, 413.18) = 253.0, p<.05, \eta_p^2=.03$. The youngest group (U13) exhibited higher scores for Identified Regulation (ID) and Introjected Regulation (IJ) than the U17 age group.

With respect to the indices of motivation, there was a main of effect age group, $F(2,145) = 9.04, , p<.001, \eta_p^2=.11$, with post hoc Tukey HSD analysis showing that the U17 group reported lower scores than the U13 and U15 age groups for controlled and autonomous extrinsic motivation but not for SDI. In general mean scores for autonomous motivation and SDI were significantly higher than for controlled motivation as confirmed by a significant effect of index, $F(1.03, 149.54) = 405.62, p<.001, \eta_p^2=.74$ and post hoc testing.

With respect to the sport Passion scale, there was a main effect for age group, $F(2,145) = .416, p<.001, \eta_p^2=.74$, post hoc Tukey HSD showed that the oldest group (U17) scored lower for harmonious passion than the youngest group (U13). Similarly, the oldest group scored lower for obsessive passion than the two younger groups. Overall mean scores for Harmonious passion

were higher than for Obsessive passion, $F(1,145) = 42.48, p < .001, \eta_p^2 = .23$, although both were still above the mid-point (see Table 4). Although reported standard deviations were small, there was a high range of scores reported for both passion types.

Table 4: Descriptive statistics for measures of self-determined motivation and passion.

	M	SD	Range (and max)
Behavioural Regulations			
Intrinsic Motivation (IM)	6.72	0.49	4.25 – 7.00 (7.00)
Integrated Regulation (IG)	6.31	0.77	4.00 – 7.00 (7.00)
Identified Regulation (ID)	5.75	1.04	2.50 – 7.00 (7.00)
Introjected Regulation (IJ)	3.02	1.78	1.00 – 7.00 (7.00)
External Regulation (EX)	1.74	1.04	1.00 – 6.25 (7.00)
Amotivation (AM)	1.29	0.59	1.00 – 3.75 (7.00)
Indices of Motivation			
Self-Determination Index (2x IM + 1 x IG + 1x ID +(-1) x IJ +(-2) x EX)	15.98	4.84	-1.50 – 24.00 (25.00)
Autonomous Motivation (2x IM + 1 x IG + 1 x ID)	25.51	2.20	19.25 – 28.00 (28.00)
Controlled Motivation ((-1) x IJ + (-2) x EX)	9.53	5.02	4.00 – 25.00 (21.00)
Indices of Passion			
Harmonious Passion	6.13	0.92	1.00 – 7.00 (7.00)
Obsessive Passion	5.60	1.16	1.00 – 7.00 (7.00)

3.4 Relationships between soccer activities and indices of motivation and passion.

In order to test the main predictions of this thesis we tested for possible relationships between hours of practice in the two types of soccer activities (practice and play), number of other sports (i.e., non-soccer activities) and measures of motivation and passion. We calculated overall hours in soccer play and practice for each individual player from 5-12 yrs of age (i.e., during the sampling years) and over their full careers, as well as the % of accumulated hours in play as a function of accumulated time in total soccer activities (i.e., practice + play). We also summed the number of other sports engaged in during this time period as a measure of diversity. These indices were compared to global measures of self-determined motivation (i.e., Self-Determination Index, Autonomous & Controlled Motivation), the individual sub-components (i.e. behavioural regulations) of Self-Determination Theory and passion.

The Pearson correlation r values are shown in Table 5. As can be seen, these correlations were generally low and non-significant (with the exception of total accumulated hours in organized soccer practice and Integrated Regulation, where a small positive relationship was noted). There was no evidence that accumulated hours in play, expressed either as a percentage relative to organized soccer practice or summed as a total value, were related to measures of motivation or passion.

We also looked at the correlations as a function of age group with the expectation that only at the older age groups (e.g. U15 & U17) would we start to see negative correlations between practice amounts and motivation (or positive correlations between play and diversity during the sampling years and current motivation). In addition to looking at these correlations between practice and play in the sampling years, we also calculated practice and play estimates over the player's entire

career (for the U15 and U17 age groups this resulted in 2-4 years of additional practice data respectively).

For the oldest players (U17), the only significant, yet negative correlation was seen for accumulated hours in organized soccer practice and harmonious passion (-.41, see Table 6 and Figure 5). For the U15 age group (Table 7), again there was a negative correlation between total hours in soccer practice across their careers and Intrinsic Motivation ($r = -.35$, Figure 6).

Significant positive associations were seen between Amotivation and time in organized soccer practice during the sampling years (.27), and over their career (.34). At the youngest age group (U13, Table 8) no significant correlations between soccer activity and motivation or passion were found.

Table 5: Pearson's r correlations between accumulated hours (and % hours) in soccer play and practice, number of sports and indices of motivation, passion and skill ratings during the sampling years.

	% Accum. Hrs. Soccer Play	Accum. Hrs. Soccer Play	Accum. Hrs. Organized Soccer Practice	#.Other Sports
Behavioral Regulations				
Intrinsic Motivation	.123	.102	-.038	-.006
Integrated Regulation	-.133	.006	.179 *	.031
Identified Regulation	-.114	-.034	.094	.081
Introjected Regulation	-.070	.021	.094	.079
External Regulation	.053	.121	.019	.026
Amotivation	-.061	.062	.016	.083
Indices of Motivation				
Self-Determination Index	.009	-.053	-.036	-.048
Autonomous Motivation	-.045	.032	.091	-.047
Controlled Motivation	-.028	.065	.075	.066

	% Accum. Hrs. Soccer Play	Accum. Hrs. Soccer Play	Accum. Hrs. Organized Soccer Practice	#.Other Sports
Indices of Passion				
Harmonious Passion	-.012	.086	.128	-.080
Obsessive Passion	-.010	.089	.119	.015
Coach Rating of Skill				
Tactical Skill	-.016	.009	.074	.099
Technical Skill	.009	.043	.055	-.017
Physical Skill	-.064	-.093	-.020	-.017
Creative Skill	.055	.105	.031	.023
Overall Skill	-.005	.021	.045	.027

* = significant correlation at $p < .05$ level.

Table 6: Pearson's r correlations between percent and total accumulated time in soccer activities during the sampling years and across players' career and indices of motivation, passion and coach ratings of skill for the U17 age group.

	% Hrs. Soccer Play (5-12 yr)	Hrs. Soccer Play (5-12 yr)	Hrs. Soccer Practice (5-12 yr)	Total % Hrs. Soccer Play	Total Hrs. Soccer Practice	Total Hrs. Soccer Play
Behavioral Regulations						
Intrinsic Motivation	.235	.116	-.195	.209	-.122	.098
Integrated Regulation	-.215	-.241	-.037	-.175	-.163	-.273
Identified Regulation	-.072	-.152	-.101	-.075	-.165	-.164
Introjected Regulation	-.067	-.053	.023	-.007	-.053	-.015
External Regulation	.023	.016	-.116	.006	-.062	-.008
Amotivation	-.032	.185	.040	-.103	.118	.154
Indices of Motivation						
Self-Determination Index	.041	-.023	-.053	.004	-.041	-.056
Autonomous Motivation	.001	-.103	-.155	.002	-.196	-.129
Controlled Motivation	-.041	-.034	-.031	-.003	-.066	-.014

	% Hrs. Soccer Play (5-12 yr)	Hrs. Soccer Play (5-12 yr)	Hrs. Soccer Practice (5-12 yr)	Total % Hrs. Soccer Play	Total Hrs. Soccer Practice	Total Hrs. Soccer Play
Indices of Passion						
Harmonious Passion	-.055	-.205	-.256	.039	-.414 **	-.196
Obsessive Passion	-.119	-.065	.097	.044	-.096	-.024
Coach Rating of Skill						
Tactical Skill	-.306	-.249	.256	-.286	.276	-.196
Technical Skill	-.243	-.195	.173	-.305	.290	-.214
Physical Skill	-.166	-.135	.057	-.212	.208	-.078
Creative Skill	-.210	-.009	.366 *	-.210	.392 *	-.034
Overall Skill	-.298	-.189	.276	-.327 *	.377 *	-.168

* = significant correlation at p<.05 level, ** = significant correlation at p<.01 level

Table 7: Pearson's r correlations between percent and total accumulated time in soccer activities during the sampling years and across players' careers and indices of motivation, passion and coach ratings of skill for the U15 age group.

	% Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Practice (5-12 yrs)	Total % Hrs. Soccer Play	Total Hrs. Soccer Practice	Total Hrs. Soccer Play
Behavioral Regulations						
Intrinsic Motivation	.222	.044	-.320*	.038	-.202	.198
Integrated Regulation	.035	.170	.116	.130	.033	.053
Identified Regulation	.033	.050	-.144	.039	-.084	.002
Introjected Regulation	.059	.241	.156	.172	-.062	.126
External Regulation	.092	.242	.117	.216	.024	.157
Amotivation	-.193	.020	.310 *	-.012	.281 *	-.174
Indices of Motivation						
Self-Determination Index	-.029	-.219	-.214	-.173	-.094	-.107
Autonomous Motivation	.133	.104	-.177	.082	-.12	.111
Controlled Motivation	.077	.256	.149	.202	.049	.148

	% Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Practice (5-12 yrs)	Total % Hrs. Soccer Play	Total Hrs. Soccer Practice	Total Hrs. Soccer Play
Indices of Passion						
Harmonious Passion	.052	.206	.226	.133	.072	.063
Obsessive Passion	.086	.254	.182	.254	.136	.115
Coach Rating of Skill						
Tactical Skill	.129	-.011	.145	.089	.006	.107
Technical Skill	.033	.114	.171	.195	.300*	.019
Physical Skill	.015	-.057	-.125	-.022	.045	-.045
Creative Skill	.020	.010	.027	.089	.167	.021
Overall Skill	.064	.017	-.027	.114	.189	.032

* = significant correlation at p<.05 level, ** = significant correlation at p<.01 level

Table 8: Pearson's r correlations between percent and total accumulated time in soccer activities and indices of motivation, passion and coach ratings of skill for the U13 age group..

	% Hrs. Soccer Play (5-12 yrs)	Total Hrs. Soccer Play (5-12 yrs)	Total Hrs. Soccer Practice (5-12 yrs)
Behavioral Regulations			
Intrinsic Motivation	-.005	.204	.206
Integrated Regulation	-.021	.103	.159
Identified Regulation	-.104	.007	.163
Introjected Regulation	-.088	-.155	-.045
External Regulation	.051	-.144	.041
Amotivation	.089	-.013	-.231
Indices of Motivation			
Self-Determination Index	.032	.150	.122
Autonomous Motivation	-.062	.132	.231
Controlled Motivation	.053	-.086	-.022

	% Hrs. Soccer Play (5-12 yrs)	Total Hrs. Soccer Play (5-12 yrs)	Total Hrs. Soccer Practice (5-12 yrs)
Indices of Passion			
Harmonious Passion	.108	.201	.066
Obsessive Passion	.106	.162	.070
Coach Rating of Skill			
Tactical Skill	.021	.293	.237
Technical Skill	.153	.114	.102
Physical Skill	-.146	-.102	.119
Creative Skill	.280	.314 *	-.055
Overall Skill	.114	.208	.054

* = significant correlation at $p < .05$ level

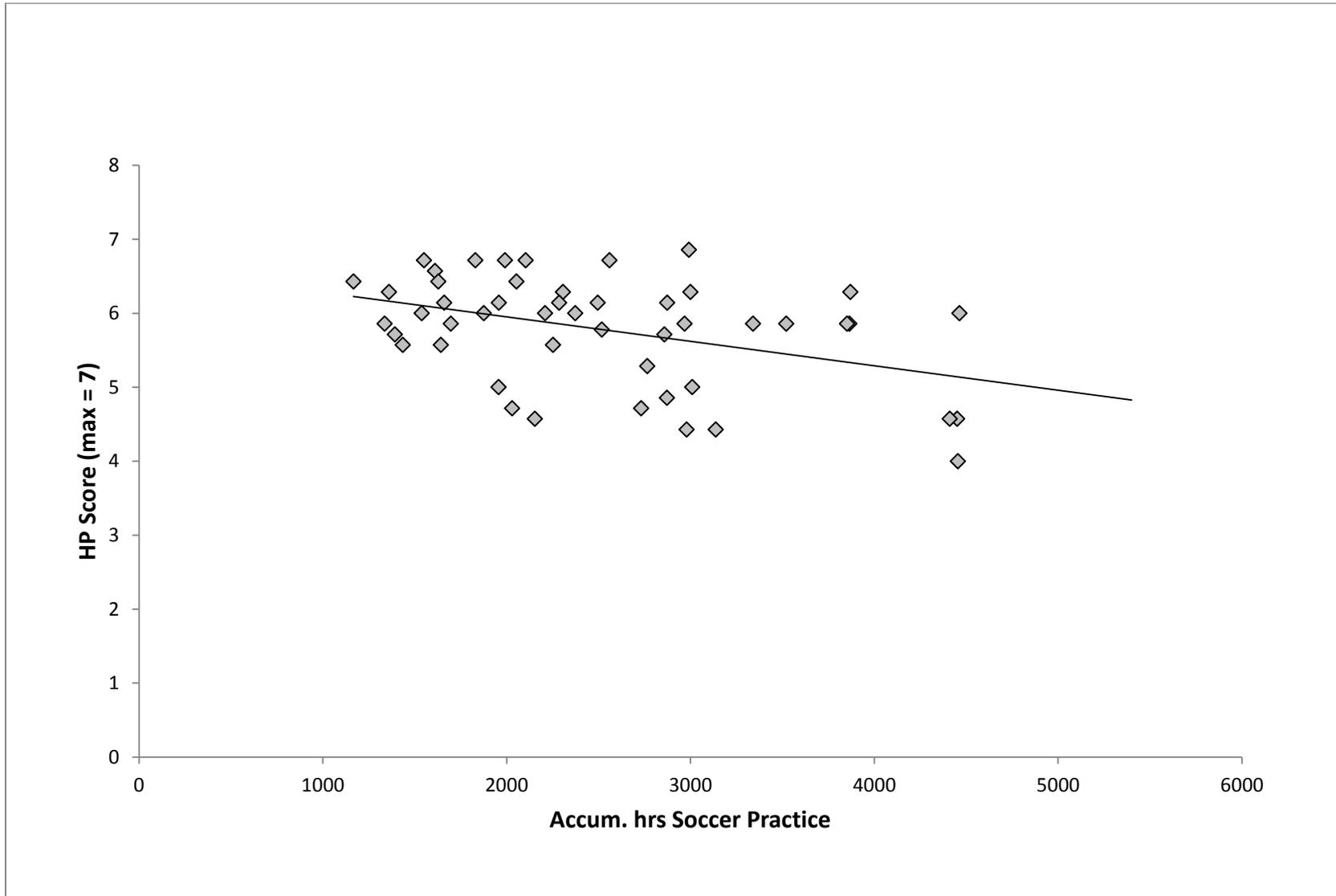


Figure 5. Relationship between accumulated hours in organized practice and harmonious passion (HP) for U17 group. 54

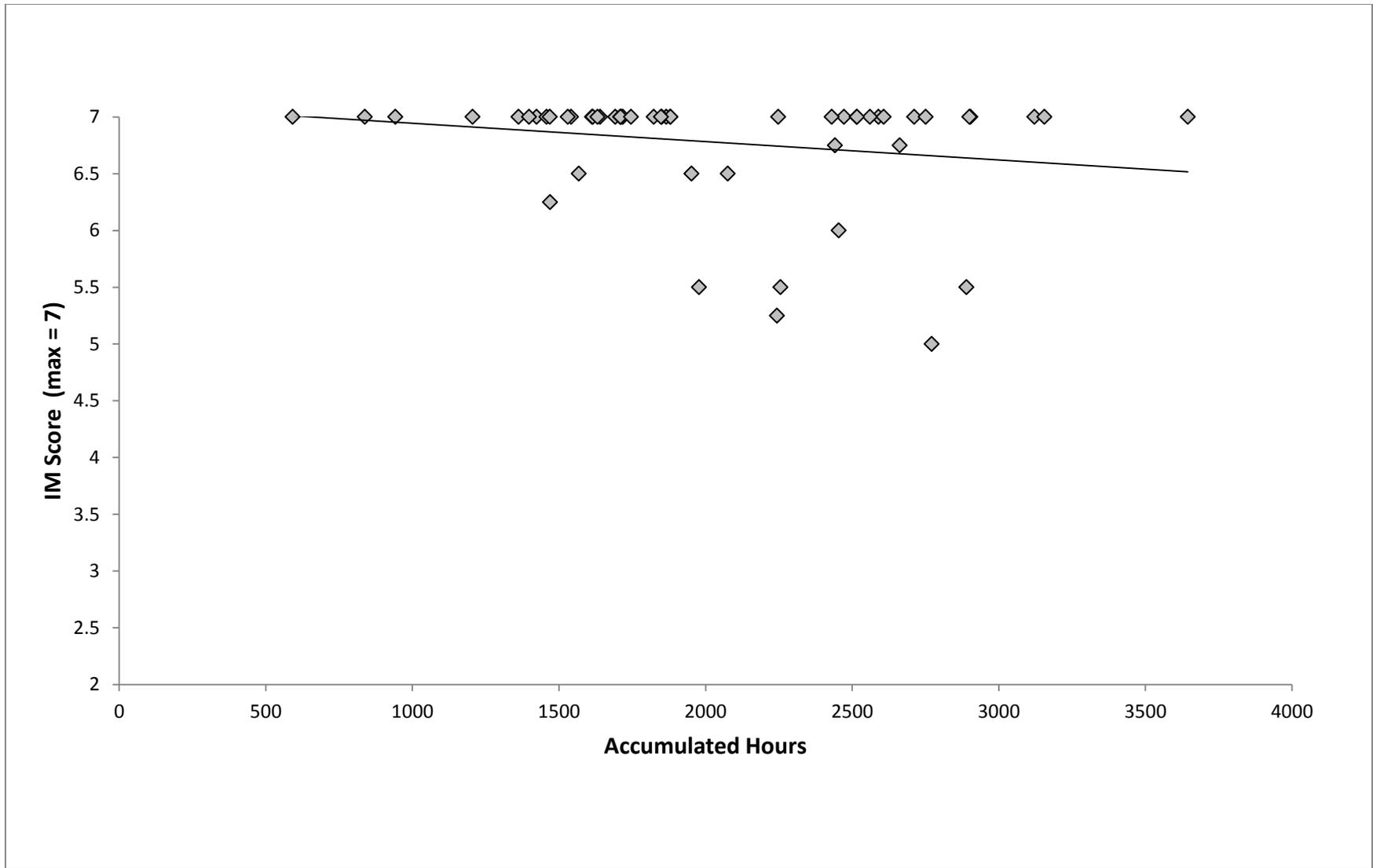


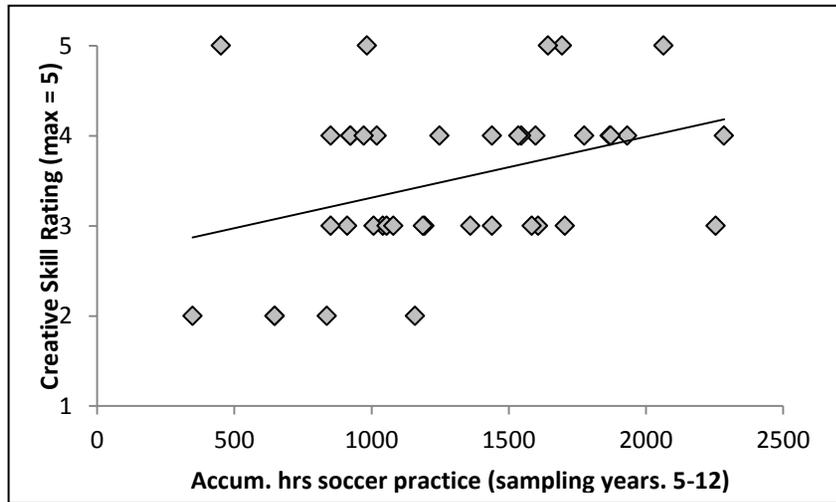
Figure 6. Relationship between accumulated hours in organized soccer practice and intrinsic motivation (IM) for U15 group.

3.5 Relationships between soccer activities and coaches' assessment of skill.

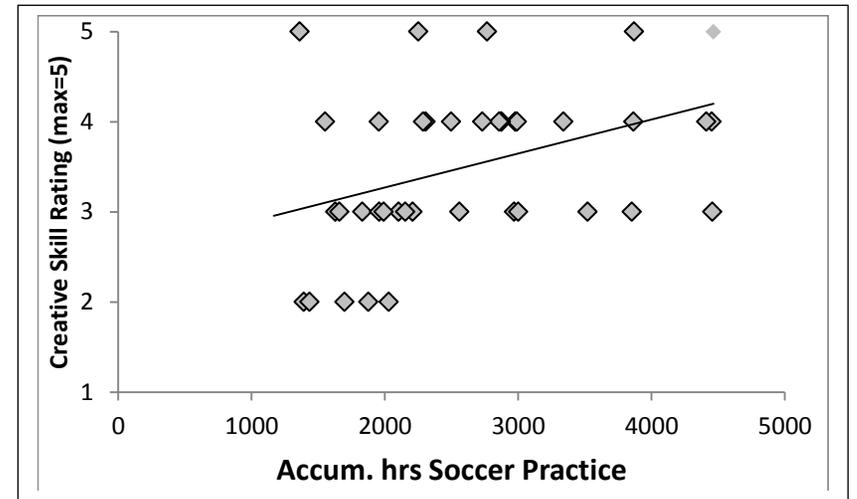
The coaches rated these elite youth players as relatively high in all aspects of performance skill, even though the ratings were based on comparisons to other players in their current Academy team and age group. On a scale of 1-5 the mean rating was 3.40, with technical skill receiving the highest mean rating ($M = 3.52$, $SD = 0.91$, range = 2-5) and tactical skill receiving the lowest rating ($M = 3.23$, $SD = 0.85$, range = 2-5).

For the U17 players (see Figure 7), percentage hours accumulated in soccer play across their whole career showed a negative relationship with technical ($r = -.31$, $p = .059$) and overall skill ratings ($r = -.33$, $p = .042$). This would suggest that more play than practice, or just more play in general as players got beyond the sampling years had a negative impact on skill (or at least, coaches' perceptions of skill). Interestingly, positive correlations were noted between total hours in organized soccer practice and ratings of creative skill (i.e., flair and originality), both in the sampling years, $r = .36$, $p = .02$ and across the players' careers, $r = .39$, $p = .01$. For the U15 players (see table 7), the correlation between accumulated hours in organized soccer practice during the sampling years and technical skill approached significance ($r = .26$, $p = .06$).

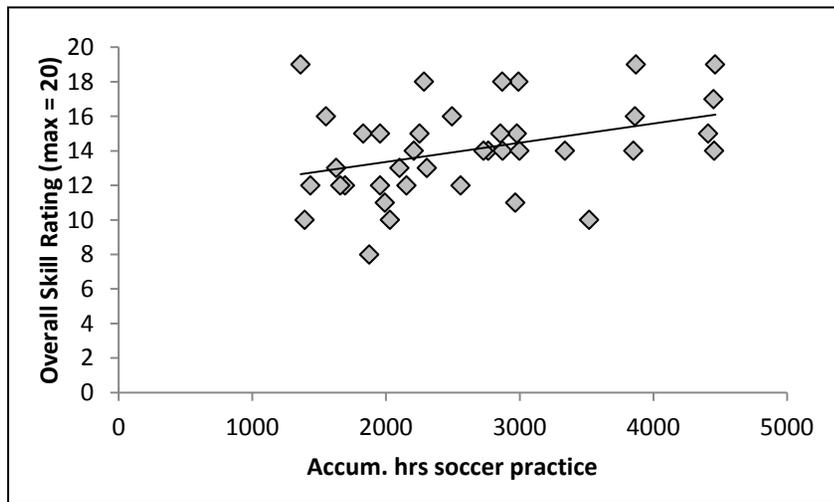
Conversely to the older age groups, for the U13 players (table 8), % hours of accumulated play positively correlated with tactical ($p = .054$) and creative skill ($p < .05$) and total accumulated hours in soccer play also showed a positive (yet non-significant) correlation with creative skill ($p = .066$).



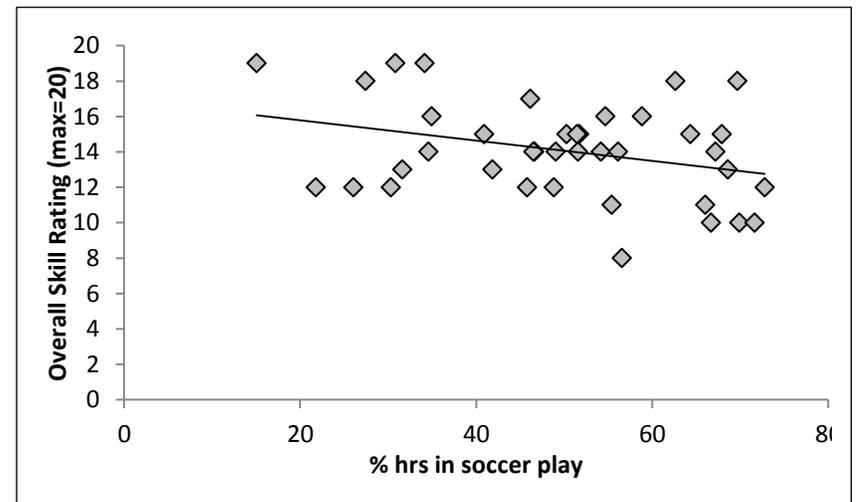
(a)



(b)



(c)



(d)

Figure 7. (a, b, c, d). Relationships between accumulated hours in soccer practice during the sampling years for the U17 players with creative skill (a), across participant's career's with creative (b) and overall skill (c) and between % hours in soccer play and overall skill (d).

3.6 Correlations within the practice and play measures.

In Tables 9, 10, and 11 we have shown the correlations between the various measures of practice and play for each of the age groups. Given that the practice and play profiles looked so similar for the U13 age groups in comparison to the older age groups we were interested to see whether these practice/play estimates were highly correlated and hence could potentially explain some of the variation in our data as a function of age group. There was no significant relationship between play and practice for the U13 group (table 9) ($r=.12$). Yet there were positive correlations between play and practice during the sampling years for the U15 age group (table 10) ($r=.38$). For the U17 players (table 11), total accumulated time in soccer practice correlated with play ($r=.30$) and there was a significant association between soccer play during the sampling years and total time spent in soccer practice ($r=.31$).

Table 9: Pearson's r correlations between total accumulated and percent accumulated hours in soccer activities for the U13 age group during the sampling years.

	% Hrs. Soccer Play (5-12 yrs)	Total Hrs. Soccer Play (5-12 yrs)	Total Hrs. Soccer Practice (5-12 yrs)
% Hrs. Soccer Play (5-12yrs)		.73**	-.60**
Total Hrs. Soccer Play (5-12yrs)	.		.12
Total Hrs. Soccer Practice (5-12yrs)			

Table 10: Pearson's r correlations between total accumulated and percent accumulated hours in soccer activities for the U15 age group during the sampling years and across their careers.

	% Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Practice (5-12 yrs)	Total % Hrs. Soccer Play	Total Hrs. Soccer Play	Total Hrs. Soccer Practice
% Hrs. Soccer Play (5-12yrs)		.73**	-.19	.96**	.77**	-.20
Hrs. Soccer Play (5-12yrs)			.38**	.73**	.96**	.33*
Hrs. Soccer Practice (5-12yrs)				-.16	.28*	.86**
Total % Hrs. Soccer Play					.80**	-.21
Total Hrs. Soccer Play						.27*
Total Hrs. Soccer Practice						

Table 11: Pearson's r correlations between total accumulated and percent accumulated hours in soccer activities for the U17 age groups during the sampling years and across their careers.

	% Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Play (5-12 yrs)	Hrs. Soccer Practice (5-12 yrs)	Total % Hrs. Soccer Play	Total Hrs. Soccer Play	Total Hrs. Soccer Practice
% Hrs. Soccer Play (5-12yrs)		.77**	-.32*	.91**	.72**	-.21
Total Hrs. Soccer Play (5-12yrs)			.31*	.73**	.94**	.30*
Total Hrs. Soccer Practice (5-12yrs)				-.20	.26	.86**
% Hrs. Soccer Play					.782**	-.251
Total Hrs. Soccer Play						.300*
Total Hrs. Soccer Practice						

4. Discussion.

The main purpose of this study was to evaluate the effects that domain specific play and practice, as well as sporting diversity, during the sampling years has on the development of motivation, passion and ratings of skill. To do this our study consisted of two major components. The first part of the study was conducted to evaluate the prediction that play and diversity during the sampling years (age 5-12) are positively correlated with an individual's intrinsic motivation and passion. We tested this hypothesis with youth level soccer players in the UK, who were on the pathway to elite performance at the adult level (i.e. professional status). Overall, we did not observe any significant correlations between practice, play and diversity during the sampling years with current reported levels of motivation or passion. However, independent analysis of each age group yielded negative correlations between hours in soccer practice and measures of intrinsic motivation (U15) and harmonious passion (U17). No significant correlations were seen for the U13 players. Early sporting diversity showed no relation to motivation and passion for any of the age groups.

In the second part of our study we investigated associations between time spent in soccer activities (play and practice) both during the sampling years and across participants' full careers as well as sporting diversity with coach ratings of skill. For the two oldest age groups (U17 and U15), there were positive correlations between organized soccer practice and skill. For the U17 age group, organized practice was related to creative skill, whereas for the U15 group, accumulated hours in soccer practice was related to technical skill. Moreover, for the U17 group, % accumulated hours in play negatively correlated with skill ratings (technical and overall skill).

The youngest players (U13) showed a somewhat different pattern of results than the older players, with more time in play (% and total) related to tactical and creative skill.

4.1. Play and diversity in sport and their relation to motivation.

The primary reason for this study was to evaluate one of the postulates that have arisen from the Developmental Model of Sports Participation (DMSP) (Côté et al., 2012, pp. 278-279). Postulate number 4 states that: *“High amounts of deliberate play during the sampling years (5-12 yr) builds a solid foundation of intrinsic motivation ...and promotes intrinsic regulation...deliberate play is an activity that may help promote the development of children’s harmonious passion towards sport”*. Our results do not support the hypothesis that accumulating more time in soccer play (what we defined as non-organized, soccer-related activities) during the sampling years, results in higher levels of intrinsic motivation and harmonious passion. Expressed either as an absolute value or as a percentage, relative to time in organized soccer activity, hours in soccer play were not generally positively related to measures of motivation or passion. Even when the data were analyzed across players’ careers (rather than just the sampling years), similar results were obtained. Consequently we reject our original hypothesis that play will be related to motivation and passion (cf., Côté et al., 2012) and conclude that among elite youth soccer players who are at or have just passed the sampling stage, time in non-organized, informal soccer-type activities (i.e., play), does not lead to increased motivation and passion. We did, however, see some indication that hours in soccer practice were negatively related to harmonious passion and intrinsic motivation for the U15 and U17 players (as detailed below), but it doesn’t

appear that play inoculates against any potential negative effects of significant amounts of formal practice.

4.1.1 Assessment of motivation.

During the sampling years the general lack of significant findings between practice and play with motivation were consistent using both global self-determined motivation (SDI) and more refined measures of each of the behavioral regulations. The SDI has been used to measure self-determined motivation in previous studies using high level (national and international) sport's performers (Ng et al., 2011, Lonsdale & Hodge, 2011). The methodology of applying a coefficient to each of the behavioral regulation scores derived from the BRSQ employs a "quasi simplex pattern" (Deci & Ryan, 2002) which assumes there to be stronger correlations between adjacent (i.e. IM, IG) over distal motives (i.e. IM, EM). Despite the large scoring differences at distal ends of the SDT continuum (see Table 3) there were still no statistically significant differences across age groups or relationships between soccer activity and SDI.

Similarly, global measures of autonomous and controlled motivation also failed to show any significant correlation with soccer play and practice. Central to Côté and colleagues (2012) postulate, is that children become involved in deliberate play activities for autonomously motivating factors such as their own interest in the activity, as opposed to external factors such as winning or improving performance (Soberlak & Côté, 2003). As such, you would expect to see greater levels of intrinsic motivation from engagement in greater amounts (or proportions) of soccer play. This contention, firmly rooted within Self-Determination Theory (SDT) holds the assumption that autonomous motives regulate behaviour through volition and an internal locus of causality, whereas engaging in an activity to placate others, acquire rewards, or because of

pressure to avoid negative emotions linked with non-participation, are characteristic of controlled motivation (Deci & Ryan, 2002). The lack of positive correlations between soccer play and the measure of autonomous motivation question the validity of the assumption that the volitional and self-directed nature of deliberate play activities enhances enjoyment (Lester & Russell, 2008) and consequently the development of intrinsic motivation and harmonious passion over time (Côté et al., 2012).

Irrespective of early practice experiences, overall our participants were highly intrinsically motivated individuals (see Table 2). The mean score of intrinsic motivation derived from the item aggregation technique was 6.72 out of a possible score of seven. The other high mean scores for more self-determined (autonomous & extrinsic) motivations, (Integrated (IT) & Identified (ID) Regulation) versus less self-determined (controlled extrinsic) motives for participation support this notion. High levels of enjoyment and motivation were also reported by elite youth soccer players who had specialized from an early age in a previous study (Ward, Hodges, Starkes & Williams, 2007). These results were evident irrespective of current age and years of involvement in soccer. Thus, like Ward and colleagues, the youth players analyzed in these studies gained enjoyment purely from participating in soccer and that the mode of activity itself (practice or play) bore little to no relationship with the development of motivation or harmonious passion. Considering that all of the participants had been involved in some form of organized practice from an early age, are still actively involved in such an environment and are still recording high scores for IM generally, this could be viewed as further evidence against postulate 4.

4.1.2 Age and experience as moderators of play-motivation relationships.

Côté and colleagues (2012) predicted that high amounts of deliberate play during the sampling years will have positive effect, over time, on an individual's overall motivation, development of harmonious passion and future participation in sport. Although the results from the sampling years do little to support postulate 4, it could be rationalized that any such effects on motivation may manifest themselves over a period of time beyond the sampling years. For this reason we carried out further correlational analysis to investigate the effects of involvement in soccer play and practice on the development of motivation and passion across participant's full soccer careers. Moreover, we expected that the older players (i.e., U17) would be more likely to show positive correlations between play (during the sampling years or across their careers and motivation), if the effects of relative time in play and practice take time to become evident.

According to Côté (1999) deliberate play may foster a greater sense of autonomy through players being able to choose how, what, where and when to practice. Autonomy, along with competence and social relatedness, are three major components of basic needs theory (Deci & Ryan, 2000) that underpins SDT. However, across the different age groups for their whole careers (beyond the sampling years) there were no relationships for either play or practice with global indices of motivation (SDI, Autonomous and Controlled), and passion (Harmonious & Obsessive).

When we looked at the individual behavioral regulation sub-components of SDT as a function of the total number of accumulated hours in soccer activities across participant's full careers, we did find a small, yet significant correlation between total time spent in organized soccer practice and Integrated Regulation ($r = .18$). Integrated regulation is the most self-determined form of extrinsic motivation and is present when an athlete views sport as being congruent with deeply

held values and their sense of self (Deci & Ryan, 2002). This association suggests that accumulating more hours in organized soccer practice begins to shape the athlete's sense of self as they begin to define themselves as soccer players and see soccer as a symbol of their identity. The formation of an athletic identity is hardly surprising based upon the commitment to practice required to maintain performance at the elite youth level. Moreover, the age of adolescence represents a crucial period of identity construction (Erikson, 1968, Maria, 1967 cited in Vallerand, 2010) and accordingly our data, derived from adolescents participating in high amounts of soccer specific practice, and in a country in which soccer is highly revered, is somewhat unsurprising. How integrated regulation is eventually viewed, either as a positive or a negative, will largely be dependent upon whether or not the individual makes the professional grade of soccer. For instance, people that exhibit high scores for athletic identity tend to show greater involvement in sport and participate at enhanced levels of competition than those low in athletic identity (Brewer, Van Raalte & Linder, 1993). For players that remain involved in soccer, this is clearly a benefit and may act as an important underlying factor in dedicating the time and energy to practice and competition necessary for eventual success. However, for those that are prevented from playing soccer through illness, injury or de-selection, the integration of soccer into one's identity may result in several associated negative cognitive, behavioural and emotional outcomes (Sparkes, 1998; Alferman & Stambulova, 2007). Essentially, the integration of soccer into the players' sense of self may be a 'necessary evil' for those pursuing a professional career in soccer. The attrition rate at most modern soccer academies is large and only a select few will become professional players. For this reason it is important that professional clubs adopt an athlete centered coaching environment that fosters social and

emotional development as well as highlighting the importance of living life beyond their primary sporting domain. This should ensure that young players do not become overly emotionally dependent on their involvement in soccer (i.e., high in integrated regulation).

Analysis of data from individual age groups provided the opportunity to explore when associations with individual behavioural regulations started to take place. As the U13 age group primarily included players that were 12 years of age, and hence still technically part of the sampling years, this data allowed for near real time analysis of the motivational and passion consequences of participation as an elite soccer player at the end of the sampling years.

The lack of directional associations between both soccer activities (practice and play) with indices of self-determined motivation and passion for the youngest (U13) group corroborates our previous findings and also shows that any proposed effects on motivation and passion are not immediate. As pointed out by Côté and colleagues (2012) the type of activities engaged in by performers during the sampling years lays the foundations for the development of self-determined motivation and harmonious passion which may not manifest until players get older. Therefore, investigation of the U15 and U17 data were expected to be more revealing with respect to these play-motivation relationships. Examination of the U15 data highlighted a negative relationship between hours in organized soccer practice and intrinsic motivation. Significant positive correlations between amotivation and the total hours accumulated in organized practice in the sampling years and across their full careers, and negative associations between total hours in organized soccer practice and intrinsic motivation further showed that there might be some costs associated with significant investments in organized practice from an early age (rather than motivational benefits associated with more time in play). However, these

data trends between practice and motivation were not seen in the U17 players and as such it is difficult to make generalizable conclusions about positive or negative consequences of high amounts of organized early practice experiences. In terms of amotivation, it is important to note that mean scores were generally low, and as such the association between hours in organized soccer practice is not representative of an amotivated group of players. Amotivation refers to a “lack of intention to act” (Deci & Ryan, 2002, p.17), yet participants were engaging in vast quantities of soccer practice. The U15 age group is an extremely important time in the career of an elite youth soccer player, as many players will be in the position to receive an offer of a professional contract at the end of their playing season. As a result, the demands placed upon young players by coaches at this age are increased. The increased demands and concomitant pressures that come with this may explain the decreased intrinsic motivation and enhanced amotivation associated with greater amounts of organized practice.

Our null findings across age groups, coupled with the outcomes from previous soccer research, (Ford et al., 2009, Ford & Williams 2012) whereby engagement in high amounts of soccer-specific play alone, without high levels of deliberate practice did not lead to attainment of a professional status, leads us to suggest that any recommendation made towards enhancing intrinsic motivation through increasing the amount of hours in deliberate play, at the expense of deliberate practice, would be ill advised. The lack of consistent findings from each of the three age groups highlights the need for a longitudinal research design to fully understand if these results are particular to specific age groups or unique to this sample of players. Follow up study of players from within the U15 age group may also allow us to study if players that scored higher

for amotivation and lower for intrinsic motivation continued within the elite development program or whether they were de-selected or dropped out from the sport.

In summary, our results show that there is no distinct trend towards less self-determined motivations developing as players' progress through the age levels. This was somewhat unexpected based upon the greater proximity to external rewards such as payment for professional players and other external pressures (e.g. familial and societal) occurring as age increases. With the oldest age group (U17) there was a medium sized, negative correlation between time in organized soccer practice and Harmonious Passion. According to Vallerand, (2010), the development of a harmonious passion empowers an individual with the ability to engage in an activity in a flexible and mindful manner. Harmonious passion results from autonomous internalization of an activity into one's identity. This autonomous internalization occurs when an individual accepts this activity as important without reliance on external contingencies (Sheldon & Kasser, 1995). Consequently the internalization process engenders the individual with a sense of volition over when to engage in the activity. The largely institutionalized and generally inflexible nature of elite youth soccer development in the UK, whereby practice times, games and tournaments are regulated by the clubs and coaches, reduces the ability of the individual to choose when to engage in soccer. With the oldest age group this appears to reduce the sense of autonomy, expressed through the reduction in harmonious passion. Moreover, at this age (U17), soccer is likely to conflict with other aspects of a teenagers life and aspiring youth soccer players have to "sacrifice" certain normal teenage behaviors at the expense of their prospective careers (Holt & Dunn, 2004). As such young players may experience some conflict between soccer and other aspects of life, potentially leading to the

reported negative relationship with harmonious passion. At this point, it is important to note that mean score for both passion types were high, which is congruent with previous research of expert performance from a variety of domains. (Vallerand et al., 2007, 2008). Such research suggests that being highly passionate (both harmonious and obsessive) is necessary to go through the often demanding training regimes required of expert performers. This research also shows that both types of passion are directly linked to engagement in deliberate practice behaviours and as such there is an indirect link between passion and performance via deliberate practice (Vallerand, 2010).

While previous research normally points towards positive effects associated with harmonious compared to obsessive passion (e.g., Vallerand et al., 2003), this can be moderated by the passion environment (Amiot, Vallerand & Blanchard, 2006). In a study of Canadian ice-hockey players, obsessively passionate players were better able to psychologically adjust when matched to higher level competition than harmoniously passionate players. Converse results were reported for harmonious passion and lower levels of competition (Amiot et al., 2006). One potential conclusion is that higher levels of competition are characterized by more obsessively passionate environments and vice-versa for lower levels of competition. Soccer practice is a necessary requirement for team selection and consequently attainment of professional status (e.g. Ford et al., 2009). Players that choose not to attend practice are likely to be de-selected and may succumb to a loss of physical fitness and or other concomitant skill deteriorations. Based upon the passion environment rationale, the high practice and game demands inherent in elite youth development is likely to stimulate a more obsessively passionate environment and reduce harmonious passion. This may explain the significant negative correlation between total time in

organized soccer practice and harmonious passion and the lack of any correlation with obsessive passion as players at the elite level are more likely to be obsessively passionate and thus more equipped to the survive in obsessively passionate environments.

4.1.3 Diversity.

Although not explicitly outlined by Côté and colleagues in postulate number 4, we also investigated correlations between the number of other sports (diversity) that the participants had taken part in during the sampling years and measures of motivation and passion. As with time spent in soccer play, we found there to be no significant correlation between the number of other sports and any measure of motivation or passion. Previous research has shown favourable social and emotional outcomes from diversified sport experience during childhood (Wright & Côté, 2003) and adolescence (Fredericks & Eccles, 2006). We found no advantage for diversification over specialization through involvement in a variety of different sports. Based upon the null findings relating to both percent time spent in soccer play activities and number of other sports, we conclude that there is no evidence to suggest that the early diversification pathway of the DMSP is less likely to lead to (negative) motivational issues than the early specialization pathway.

4.1.4 Conclusion.

The findings from the first part of this study are vital to the advancement of sport expertise theory and practical applications of talent development models. Recent literature, derived from the DMSP has painted early specialized, formal practice as the villain of athlete development. While studies of elite gymnastics and ice-skating have reported maladaptive outcomes from early specialization such as increased likelihood of burnout, and decreased motivation (see Baker et

al., 2007 for a review), the results from this study show that this is not necessarily the case in all sports, particularly when expert performance is achieved at a later age or in team-based environments. As such, any recommendation away from early specialized practice towards greater sporting diversity and more time in deliberate play type activities may be ill advised, especially when you consider the series of studies advocating early specialization as a prerequisite of reaching expert performance in many sports including soccer (Helsen et al., 1998, Ward et al., 2007, Ford et al., 2009, Ford & Williams, 2012). The overall lack of differentiation between time spent in soccer play or practice with levels of intrinsic motivation and harmonious passion suggests that soccer activity in itself does not necessarily result in increased motivation and or harmonious passion. Potential lines of further research might involve study of the relationships between the environmental conditions surrounding youth development such as perceptions of challenge (i.e. Guadagnoli & Lee, 2004; Hendry & Hodges, 2012), instructional methods (i.e. Memmert, 2006) and coaching style (i.e. Hodge & Lonsdale, 2011) with motivation development. For instance, athletes whose coaches displayed greater autonomy and supportive coaching styles also reported high levels of autonomous motivation (Hodge & Lonsdale, 2011).

4.2 Play and diversity in sport and their relation to skill.

We also investigated potential associations between accumulated time spent in soccer specific play, practice and diversity and coach ratings of various soccer specific skills. According to Williams and Reilly (2000), success in soccer is determined primarily by technical, tactical, physiological and psychological expertise. Creativity has also been identified as a highly desirable quality coveted by soccer coaches (Memmert, Baker & Bertsch, 2010). Based upon

previous soccer specific research (Williams, Ward, Smeeton, & Ward, 2008, Ford et al., 2009, Ford et al., 2007, Ford & Williams, 2012), we predicted that ratings of technical and tactical skill would be higher for players who had accumulated more time in organized soccer practice than play during the sampling years. Conversely, yet in line with research and predictions of Côté et al. (2007), Abernethy et al., (2005) and Baker et al., (2003), we predicted that those players that had participated in a greater number of sports or more time in soccer play during the sampling years would receive higher coach ratings for physical and creative skill.

Ratings for all skills were generally high, in particular for technical skills. For the U17 players, total hours in organized soccer practice were related to ratings of creative skill, but not to technical and tactical skill as predicted. Although correlations between hours in soccer practice and technical ($p=.05$) and tactical skill ($p=.07$) approached significance. For the U15 players, accumulated practice hours were related to ratings of technical skill only, but no correlations between practice and skill were seen in the youngest age group. Indirect evidence in support of these relationships between practice and skill were shown through negative correlations between accumulated and % hours in play and overall skill ratings and tactical skill for the U17 group. Play during the sampling years, potentially at the expense of formal practice time, had a negative impact on ratings of skill for the oldest players.

It was only for the youngest players that we found any positive correlations between play and skill. Percentage of hours in accumulated play positively correlated with tactical ($p=.054$) and creative skill ($p<.05$). Actual hours accumulated in soccer play also showed a non-significant correlation with creative skill ($p=.07$). There were no significant correlations seen between measures of diversity (i.e., number of other sports engaged during the sampling years) and skill.

The significant findings from the U13 age group reflects our practice history data in that this group had spent proportionally a greater amount of time in play activities than the older age groups. As such, time in soccer play is likely to have a greater influence on skill development in the youngest age group compared to the older age groups when the proportion of play was significantly reduced (especially as age increased)..

The general lack of consistency in any findings across age groups and lack of significant and consistent correlations between ratings of skill and the various measures of practice and play makes it difficult to make firm conclusions or recommendations about how to practice. There is significant evidence to support a relationship between practice and performance across many sporting domains, although typically these associations are seen between skill classes, rather than necessarily within a skill class (for a review see Ward et al., 2004). Given the high ratings assigned to the players by the coaches and potential lack of diversity in skill ratings, then it will of course be more challenging to find predictive measures within skill groups. However, the fact that there were some trends, particularly for the older players, makes for important discussion.

4.2.1 Soccer practice and soccer play.

From a practical perspective, coach ratings for the oldest players (i.e., U17) are extremely important as they are a primary resource for deciding whether a professional contract is offered to a player. As such, an understanding of the developmental activities that young players engage in, up to this point, is important to players, clubs and coaches as it offers predictive value in the development of skill. For the U17 group, accumulating more time in soccer play than soccer practice over the course of their full careers resulted in a negative relationship with overall skill

ratings. Overall skill ratings were positively associated with accumulated time in organized soccer practice throughout the player's careers. These results support previous soccer expertise research in that those players that accumulated more time in play after the sampling years tended to achieve lower levels of expertise than their more successful counterparts (Ford et al., 2009). Moreover, the positive correlation between hours in organized soccer practice with creative skill also supports the benefits of an early specialization pathway involving high amount of organized practice.

In a sporting context, creativity has been characterized by attentiveness, generation of tactical response patterns, seeking original solution ideas and an ability to perceive unexpected objects and incorporate them into their original game plan (Memmert & Roth, 2007). The findings that spending more time in organized practice during the sampling years, and less time in soccer play across one's full career leads to enhanced ratings of creativity, is in line with Ericsson's (1998) assertion that engagement in deliberate practice is necessary to reach expert performance, and creative innovations can only be achieved once one has mastered the relevant aspects of their domain through deliberate practice. The negative trends ($p=.05$), between % time in soccer play during the sampling years with tactical skill ($r=.31$) and % time in soccer play over participant's careers with technical skill (.31) exhibited by the oldest age group, stand in contrast to ideas that more time in soccer play at the expense of practice is beneficial for skill development (cf., Côté et al., 2012). However before any definitive claims can be made about play and practice activities, it is important to point out that the results from the oldest group were not seen among the younger players. Only technical skill was significantly associated with soccer practice within

the U15 group, whereas creativity was positively correlated with % time in soccer play during the sampling years for the youngest (U13) group.

One potential explanation for this discrepancy could be that players included in the U13 sample are more likely to represent a greater proportion of players that will be de-selected in comparison to the older age groups. By the time players reach the U17 age levels, these players will have survived many occasions to be cut from their respective academies and as such should exhibit practice histories indicative of elite levels. Follow up analysis will determine whether the higher amounts of time spent in play reported by the U13 group is indicative of a sample containing a greater proportion of players that will be subsequently deselected or a change in the practice history of future elite players. It is plausible that the U13 age group represent a change in the practice history of future elite performers. In the last 5 years there has been a greater emphasis placed upon elite youth development programs in Scottish football. This has led to most clubs investing more effort into producing their own players. In response to this the Scottish F.A. has set out a series of guidelines relating to coaching standards and minimum and maximum amounts of training sessions per week for youth players. Consequently there may be a certain degree of homogeneity in the amount and quality of the weekly practice sessions that young players can engage in. For this reason, it is plausible that the those that spend more time in what we have defined as play (non-coach led, unstructured soccer activity) will distinguish between those players that reach the professional status and those that do not, as outlined in the early engagement hypothesis (Ford et al., 2009, Ford & Williams, 2012).

Overall, these age dependent results show the importance of providing opportunities for all types of soccer activities in the development of elite youth soccer players. This echoes previous

research (Ford & Williams, 2012), showing that hours spent in play during the sampling years influences attainment of professional status in later years, but importantly, not at the expense of hours in formal practice. However, it is important to consider further what our measures of “play” and “practice” actually represent. Our definition of play was based around the notion of unstructured/non-coach-led/street soccer type activities suggested to define ‘deliberate play’ by Côté et al. (1999). Despite this definition, certain aspects of what we have termed play could be considered individual practice.

In previous studies of expertise development, hours spent in individual practice distinguished between expert and novices (e.g., Ericsson et al., 1993). In soccer and other sports, although individual practice hours have distinguished later elite soccer players at younger ages, hours in team practice or a combination of individual and team practice, typically distinguishes recreational from elite players. (e.g., Hodges & Starkes, 1996; Helsen et al., 1998., Ward et al., 2007). The element of individual practice incorporated within our definition of soccer play may provide the learner with a greater sense of autonomy over their learning environment which has been shown to have distinct learning benefits (for a review see Lewthwaite & Wulf, 2012). Individual practice provides opportunity for learners to determine when they wish to switch between practicing different tasks (skills), which has been shown to facilitate learning (Keetch & Lee, 2007, Hodges, Edwards, Luttin, & Bowcock, 2011). Similarly individual practice may also afford the learner with the opportunity to control the degree of difficulty within their individual practice session. According to the challenge point framework optimal practice occurs when the demands of a task are optimally balanced with the capabilities of the individual performer (Guadagnoli & Lee, 2004).

In previous research, distinctions have been made between play and practice based on measurement of “fun” or “enjoyment” (i.e., play), versus activities done for improvement (i.e., practice). Distinguishing between play and practice based upon perception of fun is appears to be problematic and stems from a misunderstanding of the Ericsson’s et al’s (1993) original definition of deliberate practice as not being inherently enjoyable. What Ericsson and colleagues reported was that deliberate practice, although generally more enjoyable than not, does not have to be enjoyable to improve performance. The interview techniques used in the original study deliberately differentiated between enjoyment gained from participation and enjoyment gained from the results of performance (satisfaction). These findings are mirrored by Ward et al, (2007) who reported that perception of enjoyment derived from practice (and hence intrinsically motivating) are largely contingent upon skill level and age. In general, the perception of enjoyment of elite youth soccer players shifted from merely participating in the activity to becoming biased by the outcomes related to participation (i.e. winning, playing well, score) as age increased, whereas novice players reported deriving enjoyment purely from participation in the activity itself. Furthermore, the intricacies of differentiating between play, done for the sake of fun/enjoyment, with individual practice is extremely difficult, especially using retrospective recall techniques. Whether individuals are truly able to remember 4 or 5 years earlier whether they were playing or practicing for fun or improvement is quite unlikely, hence our decision not to include these descriptors in our definitions of play and practice.

4.2.2 Diversity.

Central to the argument supporting the early diversification pathway is the argument that there is a transfer of cognitive, perceptual and motor skill from one sport to another (Côté et al., 2007,

Abernethy, Baker & Côté, 2005) that can offset the necessity of early specialization (Baker et al., 2003). Similarly, non-domain specific physical conditioning training is thought to facilitate overall soccer performance (Meylan, 2010). The results from our data do not support these previous studies as no significant correlations were found between diversity with coach ratings of skill (Table 4). The lack of significant findings is in line with the traditional notion that motoric transfer between two tasks is thought to be small unless the tasks share almost identical features (Schmidt & Young, 1987). Whilst early learning and development of fundamental movement skills can provide the foundations for learning in one sport (e.g. striking a ball in baseball), which is the assumption from the “sampling” pathway, it is unlikely to have much transfer value in other sports (e.g. badminton, hockey or other stick-wielding games). Soccer is unique in that the primary method of striking the ball is with the foot, with very few other sports utilizing this technique to manoeuvre the ball around the field. It is therefore unsurprising that there was a lack of support for technical skill transfer from other sports to soccer.

Our results are congruent with previous soccer research, showing little support for transfer from other sports to soccer (Memmert & Roth, 2007, Williams, Ward, Smeeton, & Ward, 2008, Ford et al., 2009, Ford et al., 2007, Ford & Williams, 2012). This was despite the fact that our sample of players participated in around 5 sports other than soccer, which is similar to that reported by Ford and Williams (2012) yet still less than figures reported from other sports (e.g. team ball sport = 9, Baker, Côté & Abernethy, 2003). Perhaps we may have been able to learn more about the issue of transfer between sports had we been able to accurately record accumulated hours in ‘other sports’. Originally we had intended to record such information in order to provide a more refined method to measure the potential associates between our psychological and skill related

dependent variables. However, our participants had particular difficulty completing this component of the questionnaire and consequently we could not reliably include this data in this study. This may be due to the format that we used to elicit this information and/or due the high amounts of information that was included in this component of the questionnaire. In any subsequent study we will need to address this issue potentially by simplifying the format of the questionnaire or allocating data collection sessions across separate days.

Like other researchers, we conclude that expert performance in soccer is best brought about by soccer-specific practice or play (Ford & Williams, 2008). Our findings are in line with the specificity of practice principle which dictates that the learning environment should be specific to the desired action environment (Khan & Franks, 2004). We investigated within a skill class how soccer-specific activities (play & practice) influenced later development of specific types of soccer skill (technical, tactical, physical, creative skill). At arguably the more important older age groups, spending more time in organized soccer practice resulted in significant associations with creative and overall skill as well as strong trends with ratings of technical and tactical skill. These results support those advocating a specialized pathway to expert performance (i.e. Ericsson et al., 1993) and oppose the more generalist approach (i.e. Côté et al., 2012). However, there is a clear need for follow up research to be conducted. The multifaceted nature of soccer dictates that individual players gain specific skills related to their position and while many of these skills may be influenced by anthropometrics and genetics, our results show that practice history has a significant role to play. Any subsequent research should further explore the antecedents of skill, to further understand how practice history influences technical, tactical, creative and physical skill development using more refined measures. This might involve a

battery of more controlled field or laboratory based tests, rather than relying on subjective measures such as coach ratings. The inclusion of more objective measures of skill could allow for more direct comparison across age groups and may elucidate some more significant correlations with soccer activity. Moreover comparison between coach ratings and more controlled test data may also enhance the talent development process as it could potentially validate (or not) coach ratings of skill.

4.3 Overall conclusions and points of discussion.

4.3.1 Was our sample representative of future elite soccer players?

A start age in soccer between 5-6 years of age falls in line with previous research investigating the start age at which elite youth soccer players began participating in soccer (Ford et al., 2009, Ward et al., 2007, Helsen et al., 1995). The slightly earlier start of the U13 ($M = 4.64$, $SD = 1.44$) group is also mirrored in results of a similar sample of English youth players that later achieved professional status ($M = 4.2$, $SD = 1.2$, Ford & Williams, 2012). Similarly the mean age at which players began participating in organized soccer activities ($M = 6.33$) is also congruent with previous analysis of professional English soccer player ($M = 5.9$, $SD = 1.1$, Ford & Williams, 2012). These demographic similarities between our sample participants and those from previous studies conducted with adult elite players validates the level of expertise of the participants and shows that they are on a trajectory to achieve the highest levels of success in this sport.

After approximately 10 years of involvement in soccer (~ 15 years) the total number of hours accumulated in soccer activities by our sample group (~4590hr) was similar to previous studies of elite youth soccer players at a similar same age, who had accumulated approximately 5000 hours by this landmark (Ward et al., 2007, Ford & Williams, 2012, Helsen et al., 1998).

Moreover, in terms of hours per week (Figure 3) in soccer-specific deliberate practice, mean numbers provided at age 14 yr ($M = 6.75$ hr) and 15 yr ($M = 7.75$ hr) were similar to a study of elite youth soccer players in Holland (Hujigen et al., 2009) but less than elite youth French players whom at 13 and 14 years (i.e. specializing years) participated in ~10 hours per week of organized soccer practice. Evaluation of the number of hours per week in soccer activities (Figure 3) demonstrates a clear picture of the greater accumulation of time spent in soccer-specific play during early development, subsequent convergence of both soccer activities and later emergence of deliberate practice as the primary mode of soccer activity as age increases. This profile does not reflect the pathways outlined in the DMSP in that our sample were involved in high volumes of domain specific practice and play during the sampling years, although they were involved in a relatively high number of other sports. These basic developmental elements are in accordance with the early-engagement hypothesis (Ford et al., 2009, see also Ford, Williams & Hodges, 2012). According to this hypothesis, many of the variables outlined as being essential components towards future expertise (e.g. participation in a wide variety of sports and accumulated hours in a primary sport) can be viewed along a continuum so that the pathway towards future expert performance is not necessarily as dichotomous as literature on the DMSP predicts. Essentially, these variables can co-exist (e.g. involvement in a high number of sports and many hours of soccer-specific practice) and are likely to be influenced by a number of different factors including the type of sport, country and culture, resulting in a variety of different pathways towards elite performance. Our results reflect this model in that participants were involved early in high amounts of soccer specific practice and play, while they also engaged in a relatively high number of other sports. This brings into question the validity of the

DMSP as a predictive model of sports' expertise, especially when you consider that it does not reflect early participation histories of athletes in the world's most popular sport. Based upon the DMSP and research emanating from this model, National Governing Bodies, including Soccer Canada, are pushing a diversified approach to long term player development. As is evident from this thesis, there is little to no evidence that this diversified/play approach is beneficial for the development of future national team players, both in terms of their skills and their affective well-being.

4.3.2 Why were the U13 players different to the older players?

The U13 group started soccer related activities at a younger age than the U15 and U17 age groups. This may be indicative of the greater emphasis and necessity for professional clubs to produce home grown players. The current economic climate has resulted in most Scottish professional clubs becoming unable to afford expensive imported players. Furthermore recent rule changes regarding the transfer of youth players between professional clubs have resulted in greater emphasis on earlier recruitment strategies. Any players transferred between professional clubs after 10 years of age requires the purchasing club to pay compensation to the developing club for their efforts developing that particular player. Consequently professional clubs are now spending more time recruiting potential players at younger age levels. The U13 group amassed higher amounts of play and practice from age 10-12 years relative to the older groups, which might be indicative of a shift in the practice history of future elite players. The high amounts of reported play and practice hours during the sampling years could result in a higher proportion of players that reach professional status. Alternatively, it may be there is a large proportion of players in this age group that will quickly exit the elite level, which may also explain the high

amounts of play recorded by this group. Follow-up, longitudinal research using more refined measures of skill is required to determine whether the practice profile of the youngest players indicates an improvement in skill or if this merely indicates a sample of more recreational players. If the tenets of the early-engagement hypothesis (Ford et al., 2009) hold true (high amounts of soccer specific play and practice results in attainment of professional status) then follow up research should show that a higher proportion of the U13 players achieved professional status.

4.3.3 Generalizability.

There are a number of factors that need to be considered when attempting to generalize our main findings. First, our data was representative only of elite youth soccer players on the developmental pathway towards expert performance in Scotland and as such the developmental activities engaged in by our sample may not necessarily be representative of other cultures/ contexts. Moreover, we only studied youth players and as such, of the players involved in the study many will not reach professional status and as such would not be considered elite.

However, as remarked above, this potential attrition provides an interesting opportunity for follow up research to be conducted into ascertaining the predictive abilities of our measures of motivation, passion or ratings of skill in determining future achievement of expertise in soccer.

4.3.4 Retrospective recall.

We know that this manner of collecting practice data through questionnaires in a retrospective manner is subject to poor recall and potential interference from team mates and parents. For these youth players, although we tried to write the questionnaire in an age appropriate manner, some of the items might have presented challenge to the younger players. Precautions were taken

to minimize such interference and challenge, via the use of trained student assistants who were on hand to aid with any questions regarding the definitions of soccer play and practice, as well as being available when the questionnaires were completed to aid with any problematic questions or sections. Completion of all of the players' questionnaires were conducted under supervision of the experimenter and his student associates which also helped to minimize any potential interference from other players, parents or coaches.

4.3.5 Operational definitions of play and practice.

Previous researchers have used different operational definitions for play and practice. In this study we made the distinction between organized soccer practice (formal, coach-led, structured practice with intention to improve performance) and soccer play (unstructured, non-coach led activities such as street soccer individual play/practice and 'kick around'). In this regard our operational definition of play differs slightly from that of Côté et al., (2012), in that we include what is often referred to as self-regulated practice within our definition of play. Self-regulated practice is defined by activities that are controlled by the individual, contrasting with the most practical settings whereby the coach has primary control over the learning environment (Lewthwaite & Wulf, 2012). Methodologically speaking, the distinction between what is considered 'play' and individual 'practice' is based upon one's perception of fun/enjoyment and whether a person's primary reason for engagement in the activity was to improve performance. This distinction is extremely difficult to capture accurately through methods that rely on retrospective recall of practice and play (e.g., recalling how much time has been spent playing soccer purely for fun, 5 years earlier). Therefore, we chose to obtain measurements of organized and non-organized soccer activities, which can be more reliably recalled, and as such what we

call “play” has in the past been defined as individual “practice” (e.g., Ericsson et al., 1993; Helsen et al., 1998). For the purposes of this thesis we aimed to distinguish between two potential routes to success (specialized pathway) and the diversity/play pathway. With respect to these distinctions, we are able to make conclusions about the value of specializing in a sport early (whether this is for fun, or primarily to improve performance), rather than gaining diverse experiences in other sports. Moreover, within this specialized pathway we were also able to make conclusions about the relative values of self-regulated practice and/or play versus organized, coach led practice. These are important comparisons to make in terms of motivational related factors and predictors of later success. Effectively, spending more time in soccer practice during the sampling years resulted in higher overall ratings of skill and creativity with the older age group players, potentially at a cost of becoming more obsessively passionate about soccer.

4.4 Overall summary and conclusions.

Based upon a series of postulates made by Côté and colleagues (2012), we directly tested the effects that different types of developmental soccer activities (play and practice) had on current measures of passion, motivation and skill among elite youth soccer players. Players that had accumulated more hours in organized soccer practice during the sampling years exhibited a positive association with ‘integrated regulation’, meaning that they had assumed soccer to be a part of their identity and were participating in soccer as it was congruent with their beliefs and values. This is likely to facilitate attainment of expert performance but be debilitating if players are deselected for any particular reason. These generally null findings, particularly with respect to play, motivation and passion suggest that it is not necessarily the modality of soccer activity

which influences the development of intrinsic motivation (i.e., whether or not soccer activities are coached or self-led), but other factors such as whether the coaching is “autonomy supportive” (e.g., Mallett, 2005) and practice is “athlete-centered” (Hendry & Hodges, in press). An “athlete-centered” approach to practice places the learner/athlete at the forefront of the learning process by engaging them cognitively and affectively in the designing of practice and associated error-detection and correction processes. This is achieved through tailoring to the needs of the individual the precision, frequency and specificity of how feedback, demonstration and instructions are presented. The athlete is afforded a greater sense of control over how practice is organized and subsequently the degree of challenge of practice, as a means of heightening cognitive engagement.

Although the findings across all of the age groups were not necessarily consistent, analysis of the oldest age level (U17) provides the most reliable expert data, (as they are closest to reaching the professional status). Within this age category, those players that had spent more time in organized soccer practice showed higher ratings of technical, tactical, creative and overall skill. These players did not show positive correlations between play amounts and motivation or passion, although they did show a negative relationship between harmonious passion and accumulated practice hours. Achieving the top level in soccer demands extreme dedication and sacrifices in other aspects of an athlete’s life (Holt & Dunn, 2004) and hence finding such relationships between practice and obsessive passion might not be too surprising.

Overall, the lack of support for Côté et al.’s (2012) postulate of enhanced intrinsic motivation and harmonious passion through play, allied to the positive association with the oldest age group players for ratings of skill, question the efficacy of recommending aspiring expert performers to

participate in a greater number of sports and higher amounts of deliberate play during the sampling years, especially at the expense of time in specialized practice.

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Appendices

Appendix A – Club letter

Developmental Football Activities, Skill and Motivation Questionnaires *A Prospective Study*

Principal Investigator:

Nicola Hodges, Ph.D.

School of Kinesiology

University of British Columbia

████████████████████

Co-Investigator:

David T Hendry

School of Kinesiology

University of British Columbia

████████████████████

Dear Coach,

By way of introduction, my name is David Hendry, a Master's degree student currently studying 'Skill Acquisition' at the University of British Columbia (UBC) in Vancouver, Canada. Whilst living in Scotland I was heavily involved in Football Development as an employee of the Scottish F.A., Rangers F.C., Falkirk F.C. and Stirling Albion F.C. for over 10 years, and I hope to continue my contribution to the game through research. In particular, I am interested in career progressions of youth soccer players and the factors that make highly skilled, creative and passionate players and successful teams. These aspects of skill development have been identified as important to success in sport and hence I wish to study the relationships between these variables and the practice environments of individuals involved in football.

I am working with Dr Nicola Hodges, who runs the 'Motor Skills Lab' (████████████████████) at UBC and who has been studying expert performance and motor learning for the past 15 years. Dr Hodges has conducted research related to soccer skills and she has both worked with professional soccer players (Tottenham Hotspur FC) and conducted research with professional clubs in the UK (Liverpool, Everton, Tottenham Hotspur and Sheffield United), with a primary focus on youth development.

For this reason, I am writing to enquire about the possibility of administering questionnaires to your U13, U15 & U17 coaches, players and a number of parents. These questionnaires have been designed to take approximately 30 minutes to complete and they can be completed either before or after practice or competition. A brief rationale for the proposed study can be found below. By consenting to allow us to administer questionnaires does not mean that you consent for all parties to participate. Individual consent will be sought from the players, parents and coaches as evidenced by their willingness to complete a questionnaire.



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Study proposal:

We aim to assess how early sport activity experiences affect the development of football related skills (technical, tactical, creative) and psychological skills related to passion, desire and motivation. Through specifically designed, validated questionnaires, we will investigate the relationships between early sport experiences in general, engagement in football-specific activities, (i.e. street soccer and organized practice) and current levels of passion and motivation. These analyses will form part of a wider understanding of optimal youth sport development and the benefits and costs of early sport-specific specialisation. Because we aim to be collecting data from players and coaches, in the UK and in Canada, we will be able to study cross-cultural differences as well as differences in perceptions of ability across players and coaches. Although not part of this study, we hope to validate our questionnaire methods with specific skill tests (tactical and technical) and relate these to psychological indices of desire and passion. We expect that the results of our study will contribute to the existing body of literature on the development of expertise in soccer. In a practical sense, we hope that the findings will help foster successful and positive youth sport development in soccer, with research-based evidence serving to guide the design of effective practice environments. All proposed measurement scales have been verified and deemed appropriate by the research ethics' board at the University of British Columbia. Moreover any information collected will also be held in the strictest of confidence and no specific details will be included in subsequent publication or presentation. General results will be made available to interested persons, but no information will be provided that will serve to identify individual coaches, parents or players.

If your club is willing to participate in the study please confirm by emailing me at

██████████ Data collection will take place from October 1st -14th and specific times/dates can be negotiated in due course.

Please do not hesitate to contact me via email if you require any further information.

Kind Regards

David Hendry



Addendum

It is widely recognized that practice is the most important variable in becoming an elite youth soccer player. Recent research has also shown that time spent in playful activities (i.e. street soccer) during early development is also an important factor in the development of expert soccer players. This has led top European clubs including F.C. Porto and Bayern Munich F.C. to recreate soccer play activities as part of their sessions. Moreover Long Term Athlete Development models advocate involvement in a variety of sports during the early years (5-12 years) as being beneficial to skill acquisition. Finally, key psychological variables such as passion and motivation have been shown to be correlated with greater persistence and adherence in sport as well as investing more time in relevant practice activities.

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Appendix B - Parent/Guardian Information Letter

Developmental Football Activities, Skill and Motivation Questionnaires

Principal Investigator:	Co-Investigator:
Nicola Hodges, Ph.D.	David T Hendry
School of Kinesiology	School of Kinesiology
University of British Columbia	University of British Columbia

Dear Parent/Guardian,

We are a group of researchers at the University of British Columbia in Vancouver, Canada, interested in career progressions of youth soccer players and the factors that make highly skilled, creative and passionate players and successful teams. These aspects of skill development have been identified as important to success in sport and hence we wish to study the relationships between these variables and the practice environments of individuals involved in football. In 3 weeks' time we will be going in to your child's club and will be inviting players to complete a number of short questionnaires. The questionnaires will ask players a number of questions about the types of football activities that they have engaged in, how they rate their skill levels and also information about their passion and desire for football. A copy of the questionnaires can be forwarded to you via email by contacting David Hendry using the address above.

It will take participants approximately 30 minutes to complete the questionnaires. None of the questions that we ask are of a delicate or intrusive nature and there are no known risks associated with a child's involvement in this study. Player participation is entirely voluntary, and even if players initially choose to take part in this study they may subsequently withdraw at any time without having to give any reason and without experiencing any negative consequences.

All answers that your child provides will be combined with those of other players who are taking part in this research and any information players provide will remain completely confidential. All completed questionnaires will be kept in a locked cabinet at the University of British Columbia and shall not be made available to anyone other than the researchers involved in this study.



If you **DO NOT** wish for your child to take part in this research, all we ask you to do is complete this form and return it to your child’s coach. Alternatively, you can email David Hendry using the contact details identified above and we will ensure that your son does not take part in this study. Also, even if you have consented for your child to take part in this study, we also require his own consent as well before he can be invited to take part. If you have any questions or want further information about the study please contact the researchers. Alternatively, if you have any concerns about your rights or treatment as a research subject please contact the UBC Office of Research Services via email [REDACTED].

IF YOU **DO NOT** WANT YOUR CHILD TO TAKE PART PLEASE SIGN THIS FORM AND RETURN THIS TO YOUR CHILD’S COACH:

I.....
(Parent/Guardian Name)

DO NOT wish for my child
(Child’s Name)
to take part in this research.

Signed..... Date.....
(Parent/Guardian Name)

Yours sincerely,

Nicola Hodges, PhD David T Hendry
(Principal Investigator(Co-Investigator))



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Appendix C - Coach Information Letter

Developmental Football Activities, Skill and Motivation Questionnaires

Principal Investigator:

Nicola Hodges, Ph.D.

Co-Investigator:

David T Hendry

Dear Coach,

We are a group of researchers at the University of British Columbia in Vancouver, Canada, interested in how the types of football activities, like street football and organized practice sessions, may make highly skilled, creative and passionate players and successful teams. These aspects of skill development have been identified as important to success in sport and we wish to learn more about these relationships. In 3 weeks' time we will visit your club and would like you to complete a number of short questionnaires. The purpose of the questionnaires is to provide some information on your football coaching background as well as information relating to typical practice sessions and passion for coaching.

It will take you approximately 20-25 minutes to complete the questionnaires. None of the questions that we ask are of a delicate or intrusive nature and there are no known risks associated with your involvement in this study. Participation is entirely voluntary, and even if you initially choose to take part in this study you may leave at any time without having to give any reason and without experiencing any negative consequences.

All answers that you provide will be combined with those of other coaches who are taking part in this research and any information you provide will remain completely confidential. All completed questionnaires will be kept in a locked cabinet at the University of British Columbia and shall not be made available to anyone other than the researchers involved in this study.

Your consent will be provided by completing the questionnaire. Please note that you are not obligated to participate in the study and are free, at any time, to discontinue completing the questionnaires. If you have any questions or want further information about the study please contact David Hendry.

Yours sincerely,

David T Hendry



Appendix D - Player questionnaire

FOR PLAYERS: Career Practice and Motivation Questionnaire

“The Role of Developmental Activities on Motivation, Passion and Skill in Youth Soccer Players”

The purpose of this questionnaire is to find out information on sporting participation, motivation, and passion from elite youth football players and coaches ranging from 12 to 17 years of age. Other parts of the questionnaire relate to passion and desire as well as technical, tactical, creative and physical skill level. Questions are asked about match—play, organised practice and play—related activities, and the amount of football specific practice in comparison to other sports.

Organised Practice includes: Practice activities that are conducted with a coach/teacher/adult that are used mainly to improve skills (formal practice). This is typically team—led practice and could include things such as football drills, technical skills, conditioned games, tactical skills, strategic skills, set— play practices, and football—related fitness work.

There are 6 sections in total (A—E), you can answer them in any order. You do not have to complete the questionnaire if you do not want to and may take a questionnaire and return it blank. If you decide to take part then please complete the questionnaire to the best of your ability. It will take around 30 minutes to complete. By completing the questionnaire you are agreeing to take part in the study. If you need help answering or understanding the questions please ask one of the assistants. Try to answer as best as you can remember or as best as you think (not someone else). Please note that all information will be treated in strictest confidence. Only those directly involved in the study (that is, the researchers and not the coaches) will have access to the information that you give in this questionnaire. The coaches will only have access to general information that does not identify you or any other players. If you have any question about this questionnaire please contact David, the researcher running the study.

Appendix D - Player questionnaire

Section A: GENERAL INFORMATION

Please fill in the details below:1.

1. Name:-----Today's date-----

2. Your age:

3. Date of birth (day, month, year):

4. Name of current Football Club/Academy:

5. What age group do you currently play in?:

6. Have you ever played for the first team/seniors (if yes, what age)?

7. What age group were you in when you joined this Club/Academy?

8. Have you played for any previous Clubs/Academy (Yes / No, please circle)?

9. If YES, please give the name and the age group when you joined.

SECTION B: Participation in All Sports

Start by listing all the sports /physical activities you have ever played/taken part in (any order) and as many as you like, include football.

From this list, pick out your top 5 sports and number them 1 — 5, with the sport you've played the most as number 1 (football), second most as number 2 etc.

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Appendix D – Player questionnaire
Practice History in all Sports

Please answer all of the following questions as accurately as possible. Start by entering the names of the top 5 sports you have played in the boxes which read ‘**Sport X =**’. We have included Football for you under ‘**Sport 1 =**’. Enter the sport that you play the most, or used to play a lot, next to ‘**Sport 2 =**’. Write your answers in the boxes directly below the name of each sport. See the **EXAMPLE** in grey for help with your answers.

START HERE ↓

Questions	EXAMPLE	Sport 1 = FOOTBALL	Sport 2 =	Sport 3 =	Sport 4 =	Sport 5 =
How old were you when you first started this	8					
During your first year , typically how many hours per week did you play/practice?	2½					
How old were you when you first received organised practice (formal coaching)	10					
Apart from in P.E., do you still take part in this sport? If you do not play anymore, enter the age you stopped.	Yes / No Age Stopped = ____.	Yes / No Age Stopped = ____.	Yes/ No Age Stopped	Yes/ No Age Stopped = ____.	Yes/ No Age Stopped = ____.	Yes/ No Age Stopped = ____.
On average, how many days per week did you practice at: 5 – 8 years old = 9 – 12 years old =	Number of days per week = 2 3	Number of days per week =				
Typically, how long did you practice each day at: 5 – 8 years old = 9 – 12 years old = 12 years to now =	Number of hours per day = 1½ 2½ 0	Number of hours per day =				

SECTION C: Practice History in Football

As accurately as possible, try to recall and write down an average of how often (sessions per week) and how much time (hours per week) you spent in organised football practice, play (i.e. street football) and playing matches. Write down each number underneath each of the age categories. An example, in grey, can be found in the table below. If you have taken a significant break from football at some point in your career (e.g., due to injury, long-term illness, etc.) then please enter the number of weeks that you took off in that year.

Organised Practice includes: Practice activities that are conducted with a coach/teacher/adult and that are primarily designed to improve skills (formal coaching). This is typically team-led practice and could include things such as football drills, technical skills, tactical skills, strategic skills, coached small-sided games, conditioned games, set-play practices, football-related fitness work etc.

Play (non — organised practice) includes: Unstructured activities that are not conducted with a coach or teacher. This includes fun games, general kick around, pick-up games, individual play/practice, keep-ups etc.

Match — play includes: Playing competitive matches against another team or playing uninterrupted matches against other players in your team/club (bounce game)

Appendix D – Player questionnaire

EXAMPLE:

Sport Name		Football						
Age (years) =		5-6	7-8	9-10	11-12	13-14	15-16	17
Organised Practice	Number of sessions per week =	1	2	3	4	4	6	10
	Average length of session (hours) =	1	1 ½	2	1 ¾	2	2	2
Play	Number of hours per week =	6	10	10	6	6	4	3
Match play	Number of hours per week =	1	1	1	1 ½	1 ½	2	3
Significant breaks from football (through injury, or long term illness, exclude holiday & off season) Number of weeks off =		0	0	6	0	12	2	0

Appendix D - Player questionnaire

START HERE ↓

Sport Name		Football						
Age (years) =		5-6	7-8	9-10	11-12	13-14	15-16	17
Organised Practice	Number of sessions per week =							
	Average length of sessions (hours) =							
Play	Number of hours per week =							
Match play	Number of hours per week =							
Significant breaks from football (through injury, or long term illness, exclude holiday & off season) Number of weeks off =								

Appendix D - Player questionnaire

SECTION D: Football Enjoyment Questionnaire (part a)

Please complete the following questionnaire by circling the appropriate number using a rating scale from 1—7, where 1 = Not at all true, 4 = somewhat true and 7 = very true. For each of the statements circle only ONE of the numbers in each row. Please make sure you answer this on your own.

1= Not at all true, 4 = Somewhat true, 7 = Very True

1 2 3 4 5 6 7

I participate in football because I enjoy it.	1	2	3	4	5	6	7
I participate in football because it's part of who I am.	1	2	3	4	5	6	7
I participate in football because the benefits of football are important to me	1	2	3	4	5	6	7
I participate in football because I would feel ashamed if I quit	1	2	3	4	5	6	7
I participate in football because if I don't other people will not be pleased with me	1	2	3	4	5	6	7
I participate in football but I wonder what's the point	1	2	3	4	5	6	7
I participate in football because I like it	1	2	3	4	5	6	7
I participate in football because it is an opportunity to just be who I am	1	2	3	4	5	6	7
I participate in football because it teaches me self- discipline	1	2	3	4	5	6	7
I participate in football because I would feel like a failure if I quit	1	2	3	4	5	6	7
I participate in football because I feel pressure from other people to play	1	2	3	4	5	6	7

Appendix D – Player questionnaire

I participate in football but I question why I continue	1	2	3	4	5	6	7
I participate in football because it's fun	1	2	3	4	5	6	7
I participate in football because what I do in football is an expression of who I am	1	2	3	4	5	6	7
I participate in football because I value the benefits of football	1	2	3	4	5	6	7
I participate in football because I feel obligated to continue	1	2	3	4	5	6	7
I participate in football because people push me to play	1	2	3	4	5	6	7
I participate in football but the reasons why are not clear to me anymore	1	2	3	4	5	6	7
I participate in football because I find it pleasurable.	1	2	3	4	5	6	7
I participate in football because it allows me to live in a way that is true to my values	1	2	3	4	5	6	7
I participate in football because it is a good way to learn things which could be useful to me in my life	1	2	3	4	5	6	7
I participate in football because I would feel guilty if I quit	1	2	3	4	5	6	7
I participate in football to satisfy people who want me to play	1	2	3	4	5	6	7
I participate in football but I question why I am putting myself through this	1	2	3	4	5	6	7

1=Not at all true 4 = Somewhat true, 7 = Very True

1 2 3 4 5 6 7

Appendix D – Player questionnaire

Football Enjoyment Questionnaire (part b)

Read each statement carefully. For each statement indicate by circling the degree to which you agree with it on a scale of 1–7, where 1 = not agree at all to 7 = very strongly agree. Please only circle ONE of the numbers in each row.

1 = Not at all true, 4 = Somewhat true, 7 = Very True

	1	2	3	4	5	6	7
1. Playing football allows me to have a variety of experiences.	1	2	3	4	5	6	7
2. The new things that I discover with football allow me to appreciate it even more.	1	2	3	4	5	6	7
3. Playing football allows me to live memorable experiences	1	2	3	4	5	6	7
4. Playing football reflects the qualities I like about myself.	1	2	3	4	5	6	7
5. Playing football is in harmony (works well) with the other activities in my life.	1	2	3	4	5	6	7
6. For me playing football is a passion that I still manage to control.	1	2	3	4	5	6	7
7. I am completely taken with playing football.	1	2	3	4	5	6	7
8. I cannot live without playing football.	1	2	3	4	5	6	7
9. The urge is so strong. I can't help myself from playing football.	1	2	3	4	5	6	7
10. I have difficulty imagining my life without playing football.	1	2	3	4	5	6	7
11. I am emotionally dependent on playing football.	1	2	3	4	5	6	7
12. I have a tough time controlling my need to play football.	1	2	3	4	5	6	7
13. I have almost an obsessive feeling for playing football.	1	2	3	4	5	6	7
14. My mood depends on me being able to play football.	1	2	3	4	5	6	7

Appendix D – Player questionnaire

SECTION E: My Skill Ratings

1. In comparison to other players **in your team**, rate your current **tactical, technical, creative** and **physical** skill by circling the appropriate number (1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent).

1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent.

Tactical Skill (i.e. decision making/pass selection)	1	2	3	4	5
Technical Skill (i.e. passing, shooting, dribbling,)	1	2	3	4	5
Physical Skill (i.e. endurance, physical condition)	1	2	3	4	5
Creative Skill (i.e. unexpected, original and useful)	1	2	3	4	5

2. In comparison to other players of **your age (e.g. school mates, relatives) who play football**, rate your current **tactical, technical, physical** and **creative skill** by circling the appropriate number (1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent).

1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent

Tactical Skill (i.e. decision making/pass selection)	1	2	3	4	5
Technical Skill (i.e. passing, shooting, dribbling,)	1	2	3	4	5
Physical Skill (i.e. endurance and physical condition)	1	2	3	4	5
Creative Skill (i.e. unexpected, original and useful)	1	2	3	4	5

Thank you very much for completing this questionnaire!



FOR PARENTS: Career Practice and Motivation Questionnaire

“The Role of Developmental Activities on Motivation, Passion and Skill in Youth Soccer Players”

The purpose of this parental questionnaire is to find out information on sporting participation, and developmental activities of elite youth football players, ranging from 12 to 17 years of age. We would like you to provide this information on your own (or with your spouse/partner), but not in consultation with your son. Questions are asked about match—play, organised practice and play—related activities, and the amount of football specific practice in comparison to other sports.

Organised Practice includes:

Practice activities that are conducted with a coach/teacher/adult that are used mainly to improve skills (formal practice). This is typically team—led practice and could include things such as football drills, technical skills, conditioned games, tactical skills, strategic skills, set— play practices, and football—related fitness work.

You do not have to complete the questionnaire and may stop filling out the questionnaire at any point. The questionnaire will take approximately 20 minutes to complete and by completing the questionnaire you are providing your consent. Your answers will provide information about the roles of key practice behaviours useful to the development of skilled youth football players as well as the reliability of this information. Please note that all information will be treated in strictest confidence. Only those directly involved in the study (that is, the researchers and not the coaches) will have access to the information that you give in this questionnaire. The coaches will only have access to general information that does not identify you, your son or any other player. If you have any question about this questionnaire please contact David Hendry, the researcher running the study.

PLAYER NAME: _____ **AGE GROUP:** _____

CLUB:

Appendix E – Parent questionnaire

SECTION A: Practice History in Sport

Start by entering the names of all sports your son has played in the boxes which read ‘Sport 1 – 5 = ’ (up to a max of 5, if there are more just list these over the page). We have included ‘Football’ for you in ‘Sport 1’. Enter the sport that your son plays the most, or used to play a lot, next to ‘Sport 2 =’ etc. Write your answers in the boxes directly below each sport. See the **EXAMPLE** in grey for help.

START HERE ↓

Questions	EXAMPLE	Sport 1 = FOOTBALL	Sport 2 =	Sport 3 =	Sport 4 =	Sport 5 =
How old were you when you first started this	8					
During your first year , typically how many hours per week did you play/practice?	2½					
How old were you when you first received organised practice (formal coaching)	10					
Apart from in P.E., do you still take part in this sport? If you do not play anymore, enter the age you stopped.	Yes / No Age Stopped = ____.	Yes / No Age Stopped = ____	Yes/ No Age Stopped	Yes/ No Age Stopped = ____	Yes/ No Age Stopped = ____	Yes/ No Age Stopped = ____
On average, how many days per week did you practice at: 5 – 8 years old = 9 – 12 years old =	Number of days per week = <u>2</u> <u>3</u>	Number of days per week =				
Typically, how long did you practice each day at: 5 – 8 years old = 9 – 12 years old = 12 years to now =	Number of hours per day = <u>1½</u> <u>2½</u> <u>0</u>	Number of hours per day =				

SECTION B: Practice History in Football

As accurately as possible, try to recall and write down an average of how often (sessions per week) and how much time (hours per week) your son spent in organised football practice, play (i.e. street football) and playing matches. Write down each number underneath each of the age categories. An example, in grey, can be found in the table below. If your son has taken a significant break from football at some point in his career (e.g., due to injury, long-term illness, etc.) then please enter the number of weeks that he took off in that year.

Organised Practice includes:

Practice activities that are conducted with a coach/teacher/adult that are used mainly to improve skills (formal coaching). This is typically team-led practice and could include things such as football drills, technical skills, conditioned games, tactical skills, strategic skills, set-play practices, and football-related fitness work

Play (non – organised practice) includes:

Unstructured activities that are not conducted with a coach or teacher. This includes fun games, general kick around, football games with friends, individual play/practice, keep-ups etc.

Match – play includes:

Playing competitive matches against another team or playing uninterrupted matches against other players in the team/club (bounce game)

Appendix E - Parent questionnaire

EXAMPLE:

Sport Name		Football						
Age (years) =		5-6	7-8	9-10	11-12	13-14	15-16	17
Organised Practice	Number of sessions per week =	1	2	3	4	4	6	10
	Average length of session (hours) =	1	1 ½	2	1 ¾	2	2	2
Play								
	Number of hours per week =	6	10	10	6	6	4	3
Match play								
	Number of hours per week =	1	1	1	1 ½	1 ½	2	3
Significant breaks from football (through injury, or long term illness, exclude holiday & off season) Number of weeks off =		0	0	6	0	12	2	0

Appendix E - Parent questionnaire

START HERE

Sport Name		Football						
Age (years) =		5-6	7-8	9-10	11-12	13-14	15-16	17
Organised Practice	Number of sessions per week =							
	Average length of sessions (hours) =							
Play	Number of hours per week =							
Match play	Number of hours per week =							
Significant breaks from football (through injury, or long term illness, exclude holiday & off season) Number of weeks off =								

If you helped your son complete his practice history questionnaire, please tick here:

Many thanks for your participation!



Career Practice and Motivation Questionnaire

“The Role of Developmental Activities on Self Determined Motivation, Passion and Skill in Youth Soccer Players”

The purpose of this questionnaire is to acquire information on sporting participation, skill, motivation, and passion from elite youth football players and coaches. Information will be collected from coaches and a number of different age groups players, ranging from 12 to 17 years of age. Many questions are asked about the type of activities that players are involved in during typical training sessions. Other aspects of the questionnaire relate to passion, motivation and a rating of each players technical, tactical, creative and physical skill level.

Please complete the questionnaire to the best of your ability. Your answers will provide information as to key psychological aspects and practice habits in the development of skilled performance. You do not have to complete the questionnaire and may stop filling out the questionnaire at any point. The questionnaire will take approximately 15 minutes to complete and by completing the questionnaire you are providing your consent. Please note that all information will be treated in strictest confidence. Only those directly involved in the study will have access to information given in this questionnaire and at no time will the information you provide be made available to any person in your Club. We will never disclose personnel or identifying information about individuals, only group-based, summary data will be made available to all interested persons. If you have any queries regarding this questionnaire please contact David Hendry from the Motor Skills Lab at the University of British Columbia via email at [REDACTED] or the Principal Investigator, Dr Nicola Hodges ([REDACTED]) <http://msl.kin.educ.ubc.ca/>). Many thanks for your participation.

SECTION A: Coaches Demographic Information

Name: _____

Email address: _____

Coaching Qualifications held:

Other relevant qualifications

Number of years involved in coaching youth football _____ years.

Number of years at your current club _____ years.

Number of years coaching current age group squad _____ years

Did you play professional soccer? (circle as appropriate) yes / no

As a player, what was the highest level of soccer play
that you reached (i.e. amateur, international) _____

As a player what position did you normally play? _____

Appendix F - Coach questionnaire

SECTION B: Typical Practice Sessions in Football

Please indicate as accurately as possible the amount of time spent in ONE WEEK of typical practice in each of the activities listed below (report your answers to the nearest ¼ hour/15 minutes).

How much time do you spend in each of the following activities?

Activity	Definition	Time	
		Hours	minutes
Training Form			
Fitness activity	Improving fitness aspects of the game without a ball (e.g. warm-up, cool-down, conditioning, rest.		
Technical	Isolated technical skills unopposed alone or in a group		
Skills	Re-enacting isolated simulated game incidents with or without focus on particular technical skills		
Playing Form			
Small-sided games	Match-play with reduced number of players and two goals.		
Free play games	Small-sided games with no coaching or interruption		
Conditioned games	Small-sided games with altered rules, goals & or areas of play (e.g. possession, limited touches, zone games)		
11v11 training games	Coached 11v11 games on a full size pitch during training sessions.		
Phase of play	Uni-directional match-play towards one goal		
Other (please specify)			

Appendix F - Coach questionnaire

SECTION C: Technical, Tactical, Physical Skill Ratings

We would like you to rate the players who you are currently coaching in terms of their current tactical, technical, physical and creativity skill level. To do this, please first list all the players names in the Table below under the heading “tactical skill” with their initials in brackets in the first table (you can list them in any order). In subsequent tables, all you need to do is enter the players in the same order, but this time, just give their initials.

Please use a 5 point scale to rate each player with respect to each of these 4 “skills”.

When rating a player, **please rate them in comparison to other players in the team**, where 1 = Poor, 2= Below average, 3 = Average, 4 = Above average and 5 = excellent.

Appendix F - Coach questionnaire

1. Tactical Skill

Tactical skills are defined by the player’s ability to make fast and accurate decisions with respect to picking out open players, reading the game well, smart playing, good pass selection/decisions.

When rating a player TACTICAL skill ask yourself “in comparison to his team mates, how well is this player able to read the game and make good decisions?”

1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent

Player Name and Initials	1	2	3	4	5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

Appendix F - Coach questionnaire

2. Technical Skill

Technical skills are defined by skills such as the ability of the player to pass accurately, dribble well with the ball, shoot, perform accurate and effective throw-ins/free-kicks etc.

When rating a player in terms of their TECHNICAL skill ask yourself “in comparison to his team mates, how technically skilled is this player?”

1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent

Player Name and Initials	1	2	3	4	5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

Appendix F - Coach questionnaire

3. Physical Skill

Physical skills are defined by a person’s overall physical condition.

When rating a player in terms of their PHYSICAL skill ask yourself “in comparison to his team mates, how physical fit and/or fast is this player?”

1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent

Player Name and Initials	1	2	3	4	5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

Appendix F - Coach questionnaire

4. Creativity

Creativity is defined by a person’s overall flair and originality in making decisions and displaying unusual skills and effective creative plays

When rating a player in terms of their CREATIVE skill ask yourself “in comparison to his team mates, how creative is this player on the ball and in making original decisions?”

1 = Poor, 2 = Below average, 3 = Average, 4 = Above average, 5 = Excellent

Player Name and Initials	1	2	3	4	5
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

Appendix F - Coach questionnaire

SECTION D: Passion in Coaching Youth Football

Read each statement carefully. For each statement indicate by circling the degree to which you agree with it on a scale where 1 = *not agree at all* to 7 = *very strongly agree*. Please ensure that you only circle ONE of the numbers in each row.

1 = do not agree at all, 4 = somewhat agree, 7 = very strongly agree.

1. Coaching football allows me to live a variety of experiences.	1	2	3	4	5	6	7
2. The new things that I discover with coaching football allows me to appreciate it even more.	1	2	3	4	5	6	7
3. Coaching football allows me to live memorable experiences.	1	2	3	4	5	6	7
4. Coaching football reflects the qualities I like about myself.	1	2	3	4	5	6	7
5. Coaching football is in harmony with the other activities in my life.	1	2	3	4	5	6	7
6. For me coaching football is a passion that I still manage to control.	1	2	3	4	5	6	7
7. I am completely taken with coaching football.	1	2	3	4	5	6	7
8. I cannot live without coaching football.	1	2	3	4	5	6	7
9. The urge is so strong. I can't help myself from coaching football.	1	2	3	4	5	6	7
10. I have difficulty imagining my life without coaching football.	1	2	3	4	5	6	7
11. I am emotionally dependent on coaching football.	1	2	3	4	5	6	7
12. I have a tough time controlling my need to coach football.	1	2	3	4	5	6	7
13. I have almost an obsessive feeling for coaching football	1	2	3	4	5	6	7
14. My mood depends on me being able to coach football.	1	2	3	4	5	6	7

Thank you for your help!