DISSERTATION FROM THE
NORWEGIAN SCHOOL OF
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2017

Christian Thue Bjørndal

‘Muddling through’

The dynamics of talent development in Norwegian women’s handball

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Til M

Incrementalism is a planning methodology normally applied in instances in which a large strategic plan is either unnecessary or has failed to develop. It is an approach that has been described as ‘muddling through’. Incrementalism is the antithesis of intrusive central planning which creates rigid work systems and is unable to respond adequately to the problems faced by organisations and individuals at the grassroots level.

Summary

This thesis reports on talent development in Norwegian handball. The literature on elite sports describes normative systems that should be used for talent identification and development but which do not resemble the actual workings of Norwegian handball. Studies of athletic development have traditionally focused on development as an individual enterprise within physiological or psychological frameworks. Far less attention has been given to how development and performance are embedded within an organisational setting. The overall aim of this study is therefore to investigate how the organisational context of Norwegian handball shapes and influences youth national team athletes' experiences and development.

The research was conducted as an embedded case study, the purpose of which was to describe and examine individual development processes within Norwegian handball through four related empirical studies. The objective of the first study was to describe how talent development is organised in Norwegian handball, to identify how inherent organisational characteristics influence talent development processes, and to consider if contemporary normative talent development models provide an adequate conceptualisation of the actual model applied in Norwegian handball. In the second study, the aim was to investigate youth national team players' experiences of their developmental processes. Using a longitudinal design, the third study aimed to examine individual pathways to the adult elite level among a group of players with youth national team experience. Finally, the aim of the fourth study was to investigate the successful and unsuccessful transitions to the elite level made by a group of nine youth national team players. The findings from this study showed that the talent development model in Norwegian handball is heterarchical and consists of multiple key actors, namely: local clubs; sport schools; and regional and national athlete development initiatives provided by the Norwegian Handball Federation, hereunder referred to as the youth national teams. In this model, no organisational actor has the main responsibility for talent development, and no actor has any instructional authority over others. Successful athlete development is not only dependent on the individual significance of each actor but in how well each actor complements the others.

The organisational context of Norwegian handball creates multiple possible pathways to the adult elite level. Individual development was found to be nonlinear, and individuals varied both in terms of the number and nature of the activities undertaken, the sequence of activities, and the time athletes spent at different and multiple practice settings and competition levels over the course of their development. The costs of coordination are high within multi-centric systems. Unintended consequences arise, both positive and negative: incidents and decisions beyond an athlete's immediate context can facilitate or inhibit successful transitions to the adult elite level. The application of the talent development model used in Norwegian handball is frequently experienced as one which is exhausting for athletes.

This research has practical implications: those involved in talent development within heterarchical and multi-centric organisational settings must recognise the simultaneous, socially-situated and complex processes involved, and how these affect planning, monitoring, and coordination. Addressing the increased coordination challenges of talent development in Norwegian handball requires continuous attention to the mundane activities of athlete development across team settings. Effectively planning and coaching for talent development therefore becomes an act of noticing the changing needs of athletes, where strategies must be flexible and requires mutual adaption.

Christian Thue Bjørndal – May 2017

Sammendrag

Denne avhandlingen undersøker talentutvikling i norsk håndball. I litteraturen om organisering av eliteidrett beskrives normative systemer for å identifisere og utvikle talenter som ikke ligner på spillerutviklingsmodellen i norsk håndball. I tillegg til dette så har studier på spillerutvikling tradisjonelt fokusert på utvikling som en individuell virksomhet innenfor fysiologiske eller psykologiske rammeverk, og vesentlig mindre oppmerksomhet har blitt gitt til hvordan spillerutvikling finner sted innenfor rammene av en spesifikk organisering. Derfor var det overordnede målet for denne studien å undersøke hvordan organisasjonskonteksten i norsk håndball former og påvirker erfaringene og utviklingen til spillere med erfaring fra aldersbestemt landslagsaktivitet.

Studien ble designet som en casestudie i den hensikt å beskrive og undersøke individuelle utviklingsforløp i norsk håndball, og besto av fire relaterte empiriske studier. Målet med den første studien var å beskrive hvordan spillerutvikling er organisert i norsk håndball, å identifisere hvordan organiseringen påvirker talentutviklingsprosesser, og å vurdere om nåværende talentutviklingsmodeller gir rom for en tilstrekkelig konseptualisering av spillerutvikling norsk håndball. I den andre studien undersøkte vi ungdomslandslagsspillere sine erfaringer med sin egen utviklingsprosess. I den tredje studien brukte vi et longitudinelt design for å kartlegge individuelle utviklingsforløp til senior elitenivå blant spillere med ungdomslandslagserfaring. Målet med den fjerde studien var å undersøke suksessfulle og ikke-suksessfulle overgangsfaser fra junior til senior elitehåndball blant en gruppe med ni ungdomslandslagsspillere.

Funnene fra studien som helhet viser at talentutviklingsmodellen er heterarkisk og består av flere nøkkelaktører: klubber, videregående skoler med håndballinjer, og regionale og nasjonale spillerutviklingstiltak i forbundsregi, herunder også ungdomslandslagene. I denne modellen er det ingen nøkkelaktør som har hovedansvaret for talentutvikling og ingen har instruksjonsmyndighet over hverandre. God spillerutvikling er derfor ikke bare avhengig av det individuelle bidraget til hver enkelt aktør, men av hvor godt de kompletterer hverandre.

Denne organiseringen muliggjør mange veier til senior elitenivå. Individuell utvikling var ikke-lineær og utøverne hadde ulik bakgrunn med hensyn til hvor mange og hvilke aktiviteter og aktivitetsformer de har deltatt i, rekkefølgen på aktivitetene, og tiden de har brukt i forskjellige og samtidige trenings- og konkurransemiljøer gjennom utviklingsforløpet. Koordineringskostnadene økter i multi-sentriske systemer og både positive og negative uintenderte konsekvenser oppstår: hendelser som skjer og avgjørelser som tas utenfor en utøvers umiddelbare lagsmiljø muliggjør eller forhindrer suksessfulle overganger til senior elitenivå. Utøvere erfarer ofte talentutviklingsmodellen som omfattende og slitsom.

Den praktiske implikasjonen av studien som helhet er at de som er involvert i talentutviklingsvirksomhet må anerkjenne de samtidige, sosialt situerte og komplekse prosessene involvert, og hvordan disse påvirker mulighetene for å planlegge, monitorere og koordinere utviklingsprosesser. For å møte utfordringene i talentutvikling i norsk håndball kreves det tålmodighet og oppmerksomhet rundt de dagligdagse spillerutviklingsaktivitetene på tvers av ulike lag og treningsmiljøer. God planlegging og spillerutvikling handler derfor om å være oppmerksom på utøveres stadig skiftende behov, og dette krever fleksible strategier og gjensidig tilpasning.

Christian Thue Bjørndal – May 2017

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Oslo, January 1, 2017
Christian Thue Bjørndal

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Paper 2 Bjørndal, C.T., & Ronglan, L.T. (2017). Orchestrating talent development: Youth players' developmental experiences in Scandinavian team sports. *Sports Coaching Review,* published online, 1-22.

Paper 3 Bjørndal, C.T. Ronglan, L.T., & Andersen, S.A. (2017). The diversity of developmental paths among youth athletes: A 3-year longitudinal study of Norwegian handball players. *Talent development & Excellence, 8*(2), 20-32.

Paper 4 Bjørndal, C.T., Andersen, S.A., & Ronglan, L.T. (2017). The successful and unsuccessful transitions to the elite level: The youth national team pathways in Norwegian handball. Under second review in the *International Journal of Sports Science & Coaching.*

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Chapter 1| INTRODUCTION

Studies of athletic development have traditionally focused on development as an individual enterprise informed by physiological or psychological frameworks. Far less attention has been given to the wider sociocultural contexts shaping development and performance (Araújo et al., 2010). Sociocultural contexts consist of the wider cultural, institutional and historical influences that shape the norms, values and practices of organisations, groups and individuals (Scott & Palincsar, 2009). Situated within these broader cultural, institutional and historical contexts is the specific organisational settings in which an athlete's development occurs (Henriksen, Stambulova, & Roessler, 2010a).

This study investigates how the specific organisational context of Norwegian handball shapes and influences individual development towards the adult elite level. The core elements of this context are the interactions that take place between different teams and practice settings in which athletes train and compete. These team and practice settings are embedded within national (and international) competition structures and are shaped by specific team-based agendas and goals. Athletes are therefore influenced by many divergent agendas, goals and influences that place great demands on the coordination of their activities. The organisational context of Norwegian handball is characterised by a loosely-connected heterarchical structure of different team and school settings that are heavily influenced by the Scandinavian sports model. Athlete development is situated within this particular context and this study directs attention to the mundane and everyday processes governing the interactions between athletes and coaches, and between the different organisational actors.

Findings from team sport research show that an understanding of individual development in sport can be enhanced significantly by integrating sociological perspectives that focus on social relations in both face-to-face interactions (for example, coach-athlete relationships) and perspectives that focus on wider contexts (for example, how selection mechanisms in talent development[1] programmes are biased and create unequal opportunities)

[1] In this thesis, the terms 'talent development', 'athlete development' and 'player development' refer to individual development.

(Storm, 2015). More integrated perspectives can help to reveal how athlete development is shaped by multiple influences, including biological, psychological, and social factors[2].

Centralised and structured talent identification and development systems, it has been argued, are pivotal to the achievement of national success in Olympic sports (De Bosscher, De Knop, Van Bottenburg, & Shibli, 2006). However, the Scandinavian sports model deviates from the normative frameworks typically advocated by elite sports organisations and policy makers outside the region. In Scandinavia, talent development processes are embedded in the structures of voluntary sport federations. Compared to more state dominated systems, the model is heavily influenced by the values of volunteerism, egalitarianism and decentralisation (Andersen, Bjørndal, & Ronglan, 2015). In the Norwegian model, formal talent identification is almost non-existent and the initial developmental initiatives are broad-based (Ronglan, 2014). Hence, talent development in Norwegian handball could be described as a deviant case (Yin, 2013). Nevertheless, the model has reaped sustained international success over the last two decades.

Norwegian handball was of particular analytical interest to me because it is both different and successful. I therefore chose to develop an empirical analysis of talent development within this specific organisational setting, and formulated the aims of the study as discussed below.

1.1 Aims and perspectives

The overall aim of this study was to investigate how collective efforts to develop talented athletes influence the sports development of individuals in a Scandinavian team sport context. Handball is a major competitive team sport represented in all Scandinavian countries. This study explores talent development in the context of Norwegian handball – a sport characterised by the country's sustained international success and broad participation. The study sought to answer the following key question:

> How does the organisational context of Norwegian handball shape and influence youth national team athletes' experiences and development at the individual level?

[2] Examples of biological factors include the role of genes and/or biochemistry; psychological factors include mood, personality and/or behaviour; social factors include cultural, familial and/or socioeconomic influences.

Based on the research gaps identified and a lack of knowledge about how the specific organisational context of Norwegian handball facilitates and constrains individual development, I had two specific intentions. First, to develop more contextualised and empirical knowledge to be better able to meaningfully interpret the possibilities and limitations of the particular ways in which talent is developed in the Norwegian context. My key assumption about the consequences of the applied talent development model used in Norway, based on my review of the literature on talent development and my professional experience, was that it is neither 'good' nor 'bad'. Instead, its unique features both enable and constrain individual development in specific ways that researchers, policymakers and practitioners should be more aware of. Secondly, I recognised that more empirical knowledge is needed to understand how changes to the Norwegian model may have both intended and unintended consequences that could affect the competitiveness of, and participation in, Norwegian handball. It has been argued that the model of talent development in Norway may come under threat externally due to global trends toward increased professionalisation and early specialisation (Ronglan, 2014). Developing knowledge about such issues is important because doing so has the potential to inform policy and decision-making, and may help to facilitate the continued success of Norwegian women's handball. It may also be of potential relevance to other sports and sporting organisations.

To answer the research question, this research was constructed as an overarching case study, the purpose of which was to describe and examine individual developmental processes within the organisational context of Norwegian handball. This sport is located within the wider cultural context of Scandinavian team sports and is therefore influenced by the norms and values underpinning organised sport in Scandinavian countries. The research design draws on insights about the Scandinavian elite sport systems (Andersen & Ronglan, 2012b) because these systems form the context in which the processes of athlete development are analysed in detail.

The study focuses particularly on interactions within the context of Norwegian handball. The sociocultural perspective used here is one in which interactions are seen as fundamental and integral to individual learning processes. The particular organisational setting of Norwegian handball places specific demands on athletes that influence the interactions taking place within the organisational system as a whole, and between individuals. In this thesis, I therefore focus on two levels of analysis of interaction. Firstly, at the organisational level, I examine the interactions taking place between the Norwegian Handball Federation (NHF), clubs and sport schools. Secondly, I focus on the individual-level

interactions that athletes have in the different practice and competition settings in which they participate. I also examine their interactions with the coaches in these different team settings. The purpose of using both levels of analysis was to:

- Contribute to an empirically-based understanding of the organisation of talent development in a Scandinavian team sport.

- Contribute to a theoretical understanding of athlete development models and perspectives on talent development that considers the role of organisational context.

- Provide coaches and other practitioners with better insights into the influences and constraints placed on youth athletes throughout adolescence so that coaches can better accommodate the challenges faced by athletes within particular sporting contexts and help to promote long-term talent development.

I conducted four related empirical studies together with my co-authors. The aim of the first study was to analyse talent development at the organisational level. The other three studies focused on talent development at the individual level.

The objective of the first study was to describe how talent development is organised in Norwegian handball, to identify how inherent organisational characteristics influence talent development processes, and to consider if contemporary normative talent development models provide an adequate conceptualisation of the actual model applied in Norwegian handball. In the second study, the aim was to investigate youth national team players' experiences of their developmental processes. More specifically, the study explored what kinds of concerns they experienced, and how athletes attempted to manage these as part of their interactions with their coaches. Using a longitudinal design, the third study examined individual pathways to the adult elite level among a group of players with youth national team experience. Finally, the aim of the fourth study was to investigate the successful and unsuccessful transitions to the elite level made by a strategically selected group of nine youth national team athletes. Each of the four studies covers key elements related to athlete development and, collectively, offer a holistic analysis of Norway's handball talent development system.

To date, theoretical perspectives in talent development research have been influenced mainly by quantitative studies that have focused on individual physiological or psychological

perspectives, the correlations between specific variables and success and failure, and broad generalisations of the activity patterns that lead to success in sports (Storm, 2015). Through an in-depth comparison of successful and unsuccessful pathways among athletes who have followed 'the youth national team pathway' to the adult elite level in Norwegian handball, I have been able to examine the process of athlete development. Typically, athletes within this pathway have been: (a) key players in their youth teams, (b) among the best in their age group during their adolescence, (c) identified as talented by coaches in different team settings, (d) participated in talent development activities at the regional and national level, (e) selected to represent the national team from an early age, and (f) experienced at the international level of competition. Peterson's (2011) studies of Swedish football players showed that the youth national team pathway in Sweden was directly counterproductive to reaching the adult elite level. In comparison, Norwegian handball players who followed the Norwegian equivalent of this pathway are clearly overrepresented at the elite level. Unpublished data from Norwegian women's handball from 2011-2014, for example, show that two-thirds of the established elite players[3] during their adolescence had international experience from the youth national teams.

The interpretive approach of this study relied heavily on qualitative and naturalistic methods (except for the methods used in the third study) and these informed the dialogue and interactions which took place between me, in my capacity as a researcher, and the athletes in the study cohort. It is hoped that these approaches will deepen and widen the theoretical and empirical understanding of talent development.

In the first chapter of this thesis, I present an overview of research relevant to talent development. In the second chapter, I elaborate on the theoretical framework of the study. The design and method of the study is presented in the third chapter. The fourth chapter contains a summary of each of the four research articles and the key findings. In the fifth chapter, I discuss the overall findings of the study and their implications for the theory and practice of talent development. Finally, I present some recommendations for future research.

[3] To be classified as an established player in this study, athletes had to have played in more than half of the matches in the elite series over the course of three seasons. This ensured that players who had had long-term injuries could be included in the study analysis. It also ensured that players who had only played one season in the elite series would be excluded from the analysis.

1.2 Talent and expertise in sport

Research on talent and expertise has evolved in three distinct research phases (Feltovich, Prietula, & Ericsson, 2006). The first phase of talent research, which lasted until the second half of the twentieth century, was dominated by studies from the natural sciences, and focused on innate abilities, giftedness and genes. During the second phase, which began in the 1960s, studies from cognitive psychology introduced new perspectives and focused on acquired abilities, competencies and skills. Since 2010, there has been a new wave of interest in studies rooted in ecological, cultural, and sociological perspectives. These have tended to focus on the importance of environments, social relationships and the interactions shaping talent development.

I turn first in this thesis to a brief discussion of some of the key ways in which talent is defined. Secondly, I present a review of the three key approaches noted above to position this thesis in relation to the many ways that have been used to define and apply concepts related to talent and athlete development in sport. I examine findings from research, ranging from cognition-based approaches to skills acquisition and expertise. Further, I present findings from studies which have focused on the role of environment and culture in talent development. Finally, I review key findings from studies that have focused on the role of psychological skills in talent development. The final section examines contemporary models of athlete development in sport that are relevant to this study.

1.2.1 The definition and use of talent in sport

Early research on talent and expertise tended to focus on notions of innate potential, giftedness and the role of hereditary abilities. Sir Francis Galton's (1979) seminal study, 'Hereditary Genius', first published in 1869, was the first systematic attempt to investigate the effect of heredity on intellectual 'natural abilities'. In such research, it was presumed that 'talent' was due to innate abilities or inherited giftedness. Recent sport research has demonstrated that individual genetic performance capacity and responses to training in sports vary considerably (Hughes, Day, Ahmetov, & Williams, 2011; Tucker & Collins, 2012; A. G. Williams & Folland, 2008).

Talent is traditionally defined as the result of 'natural' gifts, dispositions or skills that enable people to perform activities well. However, in everyday discourse, the meaning of talent is ambiguous and, at times, borders on being an "empty concept" (Aggerholm, 2015).

Some researchers, such as Howe, Davidson, and Sloboda (1998), have even argued that so-called ‘innate talent’ can only be inferred rather than observed directly, and that individual differences can be accounted for by experiential influences, such as training and practice.

Baker (2012, p. 21) recognises that “both [nature and nurture] are inexorably bound together and [that] performers [such as athletes] are the product of their biological raw material and their developmental experiences”. Kimble (1993) wryly observes, too, that disputes and divisions in the nature versus nurture debate in human development can be likened to arguing about whether the area of a rectangle can be attributed either to its height or its width. Nature and nurture do not operate in isolation. Instead, there is a complex relationship between them over the course of development (Simonton, 2013). Studies of epigenetics show, for example, that external and environmental factors can switch genes on and off and can affect gene expression (Carey, 2012).

In common discourse, the notion that people possess ‘athletic talent’ typically means that they are performing better than their peers and competitors at: (a) a given age-level and/or (b) at an early stage of their athletic development. However, scientific literature on talent identification in sport suggests though that there is no indication that early performance is a useful predictor of future performance (see, for example Farrow, 2012; Howe et al., 1998; Renshaw, Davids, Phillips, & Kerhervé, 2012; Vaeyens, Gullich, Warr, & Philippaerts, 2009). This lack of predictive success in early talent identification can be explained, at least partly, by variations in the growth and maturation of youth athletes (Gonçalves, Rama, & Figueiredo, 2012), the absence of functional and ecologically valid sports performance tests (Seifert, Button, & Davids, 2013), and the difficulty of predicting long-term motivation (Vaeyens et al., 2009). Some have even suggested that the identification of talent in team sports is a matter of a ‘practical sense’, a qualitative and subjective assessment based on intuition and experience which always has an element of uncertainty (Christensen, 2009). Talent development in most domains is characterised by lifelong learning, but for athletes, talent development usually has an earlier, more specific finality caused by the effects of age and injury (Aggerholm, 2015).

The complexity and scope of debates about innate talent fall beyond the scope of this thesis. However, particular perspectives on the concept of talent in general are of fundamental importance to this doctoral thesis. Henriksen’s (Araújo et al., 2010, p. 28) theoretical understanding of talent, for example, as “a set of characteristics, competencies and skills developed based on innate potential and multiyear practice, competition and interactions with the environment” is one which underpins my work. This is because this definition

acknowledges both the importance of inherent abilities *and* practice as mediators of athletic potential. It suggests therefore that talent should be recognised as the result of the *interactional* relationship between athletes and their environment (Phillips, Davids, Renshaw, & Portus, 2010) – a relationship that shapes both the learning and developmental opportunities open to them, and the barriers they face when striving to achieve elite performance. Aggerholm (2015, p. 29) distinguishes between 'having' and 'being' a talent, and argues that "when talent is something you are [as opposed to something you have], the actual level of performance is always seen in its relation to a *potential*".

I refer to the term 'talent' in different contexts within this thesis, but I acknowledge that the concept of talent should be used judiciously because it is a term which is common in the everyday language of sports jargon and one which is not always clearly defined.

1.2.2 The expert performance approach to talent development

The expert performance approach to talent development has focused on the role of practice in the development of sports expertise. Building on perspectives from cognitive science and psychology, research on talent and expertise since the 1960s has challenged the dominant understanding of hereditary abilities as the main drivers of development in sport (Feltovich et al., 2006). Focusing on the practice of expert performers, these new approaches introduced a major shift in the understanding of talent and expertise by investigating the acquisition of abilities, competencies and skills. In their seminal studies of chess players, Simon and Chase (1973) utilised an experimental approach which focused on cognition and information processing, and claimed that extensive practice is the foundation of expert development. Similarly, Newell and Rosenblom's (1981) study of motor skill acquisition demonstrated that practice has a strong influence on movement skills. This behaviourist stance informed Ericsson & Smith's (1991) formulation of a general theory of expertise better known as the Expert Performance Framework. According to Ericsson, Roring, and Nandagopal (2007, p. 14), this approach "seeks methods for measuring and describing many types of expert performance and aptitudes by objective performance standards that are independent of the social and historical context of the studied expert performance".

The framework is also informed by Ericsson's et al.'s (1993, p. 368) concept of 'deliberate practice' which is defined as "a highly structured activity, the explicit goal of which is to improve performance" which "requires effort and is not inherently enjoyable". Deliberate practice is seen as the driver of expertise acquisition but, importantly, Ericsson et

al. (1993) distinguished between high-quality practice on one hand, and mere experience on the other. The undertaking of 'deliberate' activity, they argued, is what ultimately separates experts from novices, rather than genetic and inherited qualities (Ericsson, 2006). These findings indicate that the way people practice can strongly influence their skill development.

The popular interpretation of the theory of deliberate practice – namely, that expertise can be achieved if an individual undertakes 10,000 hours of deliberate practice over the course of 10 years – became well known because of popular science books, such as 'The Talent Code' (Coyle, 2010), 'Bounce' (Syed, 2011), and 'Outliers'(Gladwell, 2009). The concept has also had an important theoretical impact on talent development studies in sports, prompting researchers to investigate thoroughly the relationship between the amount of practice and different types of practice, and the impact this relationship has on performance, individual development and sports expertise.

Ericsson et al.'s (1993) initial studies focused on professional musicians who had varying levels of skill, but subsequent investigations have been undertaken in a range of other professional domains, including sport (for a review, see A. M. Williams & Ford, 2008). The first sports-focused Expert Performance studies were of athletes in individual sports (Hodges & Starkes, 1996). These revealed a clear monotonic relationship between accumulated practice and performance, regardless of the age at which a sporting activity is started. A more complex understanding of this relationship has emerged since the development of the Expert Performance Framework and the investigation of expert performance in team sports and performance in other professional settings (Baker, Bagats, Büsch, Strauss, & Schorer, 2012; Ford, Ward, Hodges, & Williams, 2009; Ward, Hodges, Starkes, & Williams, 2007). Helsen, Starkes, and Hodges (1998, p. 32) argue that the definition of deliberate practice should, in fact, be expanded to include both individual *and* team practice, "either by adapting the theory in general, or assuming that what constitutes deliberate practice may in fact be different across domains". More rigorous investigations have indicated that deliberate practice in sport is task-specific, can consist of activities undertaken by both individuals and teams, and that deliberate practice can be enjoyable to those involved (Helsen, Hodges, Van Winckel, & Starkes, 2000). These findings indicate that while deliberate practice might be thought of as a way of practising it is difficult to pin down as a specific activity.

More recent research has questioned the validity of the so-called '10,000-hour rule'. Tucker and Collins (2012) have argued that the empirical evidence presented by Ericsson et al. (Ericsson et al., 1993) failed to report measures of variance. Gobet and Campitelli (2007) study of chess players reported that an average of 11,000 training hours was required to

achieve expertise and noted that this corresponded closely to the expertise ‘rule’. However, variations were evident: some chess players reached the expert level of performance in far fewer training hours. Other players greatly exceeded the predicted number of training hours and still failed to achieve the performance improvement expected. The number of practice hours ranged from approximately 3,000 hours to 23,000 hours. Findings in sports research have revealed similarly high levels of variability and shown that, in some instances, expert-level performance can be reached in significantly less time (Baker, Côté, & Abernethy, 2003; Bullock et al., 2009; Vaeyens et al., 2009). Gobet and Campitelli rightly concluded that “domain-specific practice is not a sufficient condition for expert performance” (Gobet & Campitelli, 2007, p. 22).

Ericsson (2013) countered criticism of his claims by suggesting that his empirically-supported ‘rule’ was not intended to refer specifically to the *number* of hours practised. Rather, he argued, groups at different levels of performance may differ significantly in terms of the amount of time they need to spend in deliberate practice activities. Expertise acquisition, he claimed, can occur after different lengths of training and is dependent on a variety of factors, including the age of those involved, or how competitive a particular sport is (Ericsson, 2013). This theoretical counterargument is difficult to prove or disprove: an increase in either training quality or accumulated practice could explain the lack of the other, or vice versa (Tucker & Collins, 2012). It is unlikely that domain-specific practice alone is critical to human development.

The Expert Performance framework has also been criticised because of its failure to examine the role of the social environment of athletes, and the influence of their families and peers (Côté, 1999). The quality of parental support, for instance, has been shown to influence who is (and who is not) able to reach the elite senior levels of sport. Social support, too, has been shown to be essential to sustaining top-level performance (Bloom, 1985; Carlson, 1988; Durand-Bush & Salmela, 2002). Despite this, the widespread implementation of the Expert Performance framework in some sports, sport organisations and sport cultures has compelled many children and youth to undertake intensive and sport-specific practice from an early age to accumulate the requisite number of hours. Early specialisation has potentially positive effects for those wishing to excel, but it also has potentially negative consequences, such as increasing the risk of injuries caused by overuse, a lack of enjoyment, and dropout (Baker, 2003; Capranica & Millard-Stafford, 2011; Russell & Limle, 2013; Strachan, Côté, & Deakin, 2009).

The appropriateness of early specialisation and efforts to make athletes complete a specific number of practice hours to achieve expert-level performance is viewed with increasing scepticism (Baker & Horton, 2004). Some studies have shown that athletes do not necessarily need to specialise early to achieve expert-level performance as adults (Baker, Côté, & Deakin, 2005; Bullock et al., 2009; Soberlak & Côté, 2003). The potential variability in how athletes reach expert level performance in sport is better recognised in the Developmental Model for Sport Participation (Côté & Vierimaa, 2014). This model distinguishes between a specialisation pathway and an 'early diversification' pathway – the latter referring to a pathway followed by athletes who sample several sports early in their sporting lives but who only later choose to specialise in one sport. The Developmental Model of Sport Participation, which recognises that *either* type of pathway can lead to elite performance, is examined in more detail in the following sections.

1.2.3 The environmental and cultural approach to talent development

The role of the environment and culture in talent development has received increasing attention over the last decade. These influences are understood to include the social structure of practice settings (see, for example Henriksen, Stambulova, & Roessler, 2010b), wider cultural contexts (see, for example Storm, Henriksen, & Krogh, 2012), and performer-environment relationships (see, for example Davids, Araújo, Vilar, Renshaw, & Pinder, 2013). While these latter perspectives differ in their use of theory and methods, they share a common interest in how societal and environmental conditions constrain or enhance development.

Gaining a deeper understanding of context, as some have argued, is critical to obtaining insight into how to ensure the best sporting experiences for young people (Bengoechea, 2002). In environmental-based approaches, athletes are seen as active agents who are engaged in interactional transactions. Talent is seen "not [as] a possession acquired by an individual, nor a fixed property of a performer, but rather [as] a dynamically varying relationship captured by the constraints imposed by the environment and the resources of a performer" (Araújo & Davids, 2011, p. 24). A recognition of the influence of the environment on individual development should necessarily incorporate a recognition that influences *outside* particular behavioural settings can also shape a person's immediate environment. Environments could thus be more accurately described as the influences shaping the experiences of those who take part in sport: a series of nested, interacting, and self-regulating

structures at different levels of proximity to the athlete, ranging from the macro-level to the micro-level (Henriksen et al., 2010a).

Particular macro-level conditions help to shape developmental pathways differently across sports settings and within particular national cultural settings (Araújo et al., 2010). At the macro-level, the wider culture and subcultures of the Scandinavian sports model, for example, vary in terms of how they influence athletic development compared to the ways in which the school-based sport model in the United States of America influences development. The macro-level influences of cultural values and organisational structures also help to shape different types and levels of competition and training. Athletes in American school sports systems, for example, play a range of different sports (White & Oatman, 2009) and a similar diversity is evident in the sports club structures of Scandinavia (Moesch, Elbe, Hauge, & Wikman, 2011). Within football, however, greater cultural variations are evident: the professionalisation of European club football, for instance, facilitates early specialisation and formalised training because of the huge depth of available competition (for a review of football-specific expertise, see Haugaasen & Jordet, 2012). Findings from research on the developmental activities of Brazilian football players indicate that the pathways to expertise are characterised by a “diversification within specialization” (Araújo et al., 2010). Many Brazilian footballers take part in many hours of football activity early in their careers, but the key practice activities consist of diverse structured play activities which the athletes organise themselves (such as street football, beach football, and futsal) (Araújo et al., 2010).

Intermediate levels of influence also shape the developmental pathways of youth athletes by impacting on the interactions between their environments and the settings in which they participate. For example, the way a sports federation organises different talent development initiatives may affect the type, level and frequency of an athlete’s match activities or individual participation. Transitions from youth-level sport to senior elite-level sport, may have multiple and simultaneous impacts psychologically, psycho-socially, vocationally, and academically (Wylleman & Lavallee, 2004). As noted above, the sporting careers of youth athletes develop within a social context. To develop appropriately during their adolescence, athletes must balance and coordinate both their academic education at school and their sporting activities (Henriksen, Stambulova, & Roessler, 2011). Care is needed especially during transitional periods that co-occur with major educational and personal changes. On average, a sports person takes 2.1 years to transition from youth-level sport to adult-level sport, and only one in three sports men or women is able to establish themselves successfully in adult sports (Wylleman & Reints, 2010). More complex and

nuanced interpretations of the relation between practice and expertise development can be achieved by investigating how multiple, combined influences affect the transitions made by youth athletes (Stambulova, Franck, & Weibull, 2012).

At the micro-level, the development pathways of athletes are shaped by their immediate environments. An athlete's practice environment can be affected by different elements such as specific activities, social roles, and interpersonal relationships. A large body of research has demonstrated that the development of youth athletes is strongly influenced by their social relationships with their peers, families and coaches (see, for example Clarke & Harwood, 2014; Keegan, Spray, Harwood, & Lavallee, 2010; Lauer, Gould, Roman, & Pierce, 2010; Rhind, Jowett, & Yang, 2012; Wylleman, De Knop, Sloore, Auweele, & Ewing, 2002). Findings show that successful local talent development environments include peer support, exposure to athletes with different levels of skill, and the mentoring of novices by experienced athletes (Henriksen, Larsen, & Christensen, 2014; Henriksen et al., 2010b, 2011). Talent development practitioners, as Henriksen (2010) suggests, should focus more on developing what he refers to as 'intelligent' practice environments, rather than focusing solely on developing talented individuals. It is therefore vital to recognise that the facilitation of talent development and the diversification of the pathways leading to expertise in sport are influenced both by wider cultural contexts and athletes' more immediate micro-level environment(s).

1.2.4 The psychological skills approach to talent development

A growing body of evidence has highlighted the role of psychological skills in sports development. Cognitive and metacognitive behaviours, emotions and attitudes have been shown, for example, to strongly influence athlete development towards the adult elite level. Successful development is shaped by the mindset an individual brings to a new learning task (Dweck, 2011), the ability to self-regulate learning (Toering, Elferink-Gemser, Jordet, Pepping, & Visscher, 2012) and perseverance towards the achievement of long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007) . Youth elite sport contexts provide opportunities for the development of personal and social skills (Strachan, Côté, & Deakin, 2011). But, as MacNamara, Button, and Collins (2010a) argue, athletes must develop a specific set of psychological skills (known as the Psychological Characteristics of Developing Excellence), if they are to interact functionally with the developmental opportunities they are given. Success in developing these psychological skills depends on the stage of development,

the sporting domain, and the personal characteristics of individuals (MacNamara, Button, & Collins, 2010b).

Considerable effort is spent in most talent development systems in countering the impact of life stressors on talent pathways. Collins and MacNamara (2012) suggest that doing so could be potentially counterproductive if their removal hinders the development of the psychological skills needed to excel in elite sports. They argue that coaches and practitioners should place 'speed bumps' along the development pathways of athletes, and use these as an integrated part of the unique learning environment of a sport (MacNamara & Collins, 2015). Such 'bumps' might include asking a person to play in an older age-group, setting higher expectations and standards compared to an athlete's peers, periods 'on the bench', deselection from events and competitions, and taking on more responsibility for daily routines such as nutrition, equipment and planning. According to (MacNamara & Collins, 2015, p. 76), it is "how individuals respond under pressure, rather than their responses to day-to-day training and development [that] might be an even greater determinant of their developmental trajectory". As findings have indicated, more successful high-level adult performers are characterised by more proactive coping behaviours when experiencing trauma compared to their relatively less successful peers (Collins, Macnamara, & McCarthy, 2016).

Performing poorly can also have a profound positive influence on talent development because this is "often …. a turning point, resulting in a (self-reported) re-focusing or increasing effort" (Collins & MacNamara, 2012, p. 908). This intriguing interpretation of the importance of failure may explain the lack of consistent success in talent identification and development systems. It may also help to clarify why developmental pathways taken outside the confines of more formal talent development routes can be (perhaps unexpectedly) successful. To excel in sport, athletes must develop the psychological skills needed to sustain motivation, develop proactive coping behaviours, and be resilient.

1.3 Models of athlete and talent development in sport

Models of talent development and expertise in sport, as Bailey et al. (2011, p. 38) reason, "are attempts to understand the complex patterns of engagement, development and drop-out from sport". Cushion, Armour, and Jones (2006) distinguish between models *for* and *of* coaching. In the context of athlete development, the former represent idealistic representations of how to programme athlete development, while the latter refer to empirically-based models of how (successful) athlete development occurs. In their review of models of athlete development in

sport, Gulbin, Croser, Morley, and Weissensteiner (2013) identified eight key models that describe athlete development processes. Two of the most prominent of these – the Developmental Model of Sport Participation (Côté, 1999) and the Long-Term Athlete Development Model (Balyi & Hamilton, 2004) – are examined in this section[4]. I have selected these two models for discussion, each of which is influential in different and important ways. The Developmental Model of Sport Participation is a descriptive model which has heavily influenced sport policy in countries such as Canada; the Long-Term Athlete Development Model is a prescriptive and practical model currently advocated by numerous elite sports organisations internationally. The former model is, in Cushion et al.'s (2006) terms, a model *of* athlete development, and the latter is a model *for* athlete development. Both are distinctively different models which sport organisations and policy makers have attempted to 'apply' to the organisation of talent development within their specific domains.

Bloom's (1985) seminal study of 120 expert performers in sports, music and arts led to his formulation of the Stages of Talent Development model that describes the key features of the activities undertaken by expert performers and the role of significant others (parents, coaches, teachers and peers) over the course of a person's development. The developmental model of sport participation describes the key developmental experiences and social influences shaping the development of athletes. It also attempts to integrate the different outcomes of sport – performance, participation and personal development – as potential results of different pathways (Côté & Vierimaa, 2014). According to the developmental model of sport participation, development towards elite sports performance follows either a pathway of early specialisation or early diversification (Soberlak & Côté, 2003). In the developmental model of sport participation, the early diversification pathway consists of three phases: (1) the sampling years (6-12 years), (2) the specialising years (13-15 years), and (3) the investment years (16+ years). The sampling years are characterised by a high number of play activities, low amounts of deliberate practice, and involvement in several sports. The

[4] The others models include: The Stages of Talent Development (Bloom, 1985) model and the theory of deliberate practice (Ericsson et al., 1993) which are discussed in the Introduction to this thesis; the Differentiated Model of Giftedness and Talent (Gagné, 2004); the Psychological Characteristics of Developing Excellence (MacNamara et al., 2010a, 2010b); the Life-span Model of the Acquisition & Retention of Perceptual-Motor Expertise (Starkes, Cullen, & MacMahon, 2004); and the Athletic Talent Development Environment model (Henriksen et al., 2010a).

specialising years are characterised by a balance between deliberate practice and play activities, and a reduced involvement in other sports. Finally, the investment years are characterised by high amounts of deliberate practice, low amounts play activities, and a focus on one sport (Côté, Horton, MacDonald, & Wilkes, 2009). Although the framework is similar in its overall structure to Bloom's (1985) Stages of Talent Development, it is a more sport-specific model which is informed directly by the theoretical concepts of 'deliberate play' and 'deliberate practice'. Côté's model (1999) also incorporates the recognition that athletes may choose to stay involved in sport as a recreational activity or may drop out of sport altogether. The time span described in the model ranges from early childhood to late adolescence – a period that corresponds with the critical developmental years of athletes in careers that are relatively short compared to experts in other domains, such as business, music or the arts (Côté, Baker, & Abernethy, 2007).

The developmental model of sport participation integrates the Expert Performance framework and adapts it to a sports setting (Côté, Ericsson, & Law, 2005). Baker et al's (2003) study of expert decision making in team sports is seen as a crucial bridging text within talent development literature because it recognises both the psychosocial influences affecting athletic development and attempts to integrate these within the Expert Performance framework (Bruner, Erickson, McFadden, & Côté, 2009). Côté (1999) focuses not only on activities equivalent to the 'deliberate practice' needed, for example, by musicians. He suggests that *deliberate play* is a key component of children's early development in sport. Deliberate play, he writes, "involves the child's active participation, is voluntary and pleasurable, provides immediate gratification, and includes intrinsic motivation" (Côté, 1999, p. 403). As Baker et al. (2003, p. 22) argue, "sport expertise in team sports may be sufficiently multi-faceted to permit beneficial learning to occur through settings other than deliberate, task-specific practice". However, as Baker (2003, p. 92) concludes, the degree to which diversification in multiple sports benefits expertise development depends on whether the different sports "have similar underlying performance elements".

Research using the developmental model of sport participation framework has shown that: (a) development towards expertise in sports can be highly enjoyable, (b) important practice activities consist of more than the traditional deliberate practice activities (such as play), and that (c) these practice activities differ through different phases of an athlete's development (Côté et al., 2005). Memmert, Baker, and Bertsch (2010) demonstrated that more creative players spend significantly more time in unstructured play activities than their less creative peers. Studies of Danish elite athletes have also shown that successful athletes

specialise and/or intensify practice later, that both more successful and less unsuccessful athletes exhibit patterns of early diversification, and that there are more similarities than differences between the activity patterns of more and less successful athletes (Moesch et al., 2011; Moesch, Hauge, Wikman, & Elbe, 2013). By adopting an in-depth methodological approach, Storm et al. (2012) showed that the specialisation versus diversification dichotomy in the developmental model of sport participation is too general to accurately and analytically represent the nature of the different activity patterns among Danish elite athletes. Instead, they argue, sports participation histories are products of the wider cultural contexts in which they are embedded.

While the developmental model of sport participation is a descriptive model, the long-term athlete development model is a prescriptive model which focuses on the values and principles that are important to shaping successful athlete development. Rooted in physiological perspectives on adaption to training, the model proposes that optimal trainability during the required 10,000 hours of practice occurs during 'windows of opportunities'. As in most other models, development is understood as occurring in distinct stages. In this case, these are: the FUNdamental stage, Learning to Train, Training to Train, Learning to Compete, and Training to Win (Balyi & Hamilton, 2004). In the FUNdamental stage (age 6-9 years), the objective is to build overall motor skills; in the Learning to Train stage (age 8-12 years), the objective is to learn all fundamental sporting skills; in the Training to Train stage (age 11-16 years), the objective is to build an aerobic base and strength, and to further develop sport-specific skills; in the Training to Compete stage (age 15-18 years), the objective is to optimise fitness preparation as well as sport, individual, and position-specific skills, and performance. In the final stage – Training to Win (age 17+ years) – the objective is to maximise fitness preparation and sport-, individual- and position-specific skills (Balyi & Hamilton, 2004).

Although the long-term athlete development model has been adopted worldwide by many sporting federations and elite sport policy makers involved in talent development (Bailey et al., 2011), the model has been criticised for many reasons. Some have argued that the notion that motor skills must be learned between the ages of 8 and 12 years during crucial 'windows of opportunities' is contentious (Treffene, 2010). Others have argued that the model over-emphasises the importance of the volume of training at the expense of learning technique (Lang & Light, 2010). Though supporters of the model contend that it is evidence-based, Holt (2010) claims that supportive empirical evidence is, at best, scarce and anecdotal. The model has also been criticised for its neglect of individualisation as the most essential component of

effective training programmes (Ford et al., 2011), and its focus on linear rather than non-linear paths towards the elite level (Collins et al., 2012). Despite these counterarguments, the long-term athlete development model continues to be one of the most referenced models of athlete development used by elite sport organisations (Bailey et al., 2011).

These conceptual models offer a diversity of approaches and interpretations but can be problematic when applied to elite sports policy and talent development in national sporting contexts. The recommendations they provide tend to be very general and neglect important contextual differences between different sports, societies and cultures (Collins & Bailey, 2013). However, their categorisations and guiding principles are also broad and flexible enough to be adapted to widely different strategies and values in the implementation of talent development processes (Ford et al., 2011).

The Standard Model of Talent Development (Bailey & Collins, 2013) is a particularly useful conceptual tool because it does not represent a theoretical or applied model *per se*. Rather, it encapsulates contemporary perspectives within elite sports policy organisations and practitioners. It conceptualises and encapsulates elements of the most frequently-used athlete development models, problematises many of the implicit assumptions about how talent development is organised, and addresses some of the limitations of contemporary models of athlete development. I turn now to an evaluation of this model.

1.3.1 A critique of the Standard Model of Talent Development

In their paper, 'The Standard Model of Talent Development and Its Discontents', Bailey and Collins (2013) critique the underlying thinking that informs the implicit and normative models of talent development used by many elite sport organisations. Bailey and Collins (2013) refer to these normative assumptions as the Standard Model of Talent Development. This model, as they suggest, assumes that successful talent development can be achieved if talented athletes are detected early in their sporting careers, and suggests that if such athletes are given additional resources they will be able to ascend towards top-level adult performance (Bailey, 2007). Success in an adult sporting career is seen as critically dependent on whether systematic and disciplined practice is provided at an early stage, and support can be given by qualified instructors and coaches. Like the widely-accepted Sports Policy Factors Leading to International Sporting Success, the Standard Model of Talent Development suggests similarly that formal talent identification and development programmes are the organisational pillars of successful elite sports structures (De Bosscher et al., 2006).

In their critique of the Standard Model of Talent Development, Bailey and Collins (2013) note that the model's underlying assumption is that progress is pyramidal in form: athletes from the general population are gradually selected/de-selected, and rise through the hierarchy of higher-level practice and competitive settings towards top-level adult level competitions. This selection of talented athletes from a broad base of sport participants is similar to the selection processes described by the Sports Policy Factors Leading To International Sporting Success Model. But Bailey et al. (2011, p. 40) pinpoint a key flaw in the assumptions that underlie this pyramidal model, namely that it "leaves no account of individual choice, and presumes that players compete up to the level of their abilities". Further, the inherent logic of the model relies on the assumption that early performance is an indicator of future adult success. Its focus is solely on the development of those identified as talented. But the removal of large numbers of athletes *en route* in the talent pipeline presents practical problems because it makes it difficult for deselected, though still potentially talented, athletes to return to the talent pathway (Bailey & Collins, 2013).

Systematic attempts to identify and develop talent have shown that early performance is, in reality, a poor predictor of adult expertise (Howe et al., 1998). Attempts to identify sporting talent have been unable to find reliable and valid methods for the early diagnosis of talent (Schorer, Büsch, Fischer, & Pabst, 2012). Further, efforts to measure and evaluate talent in sport are often inadequate: elements such as anthropometrical measures, physical skills, and technical skills are often viewed and measured in isolation instead of recognising that there are interconnections between them. Seifert et al. (2013, p. 168) argue that "standardized evaluation tests often reduce a simulated performance context to static situations in a controlled setting instead of considering the dynamics of skill acquisition as a perpetually changing non-linear process". In team sports, excellence does not consist of a standard set of skills; instead, it can be acquired in different ways and take different forms. Such 'compensation phenomena' mean that deficiencies in one area of performance may be compensated for by strengths in others (Pinder, Renshaw, & Davids, 2013). Necessarily, this means that the Standard Model of Talent Development fails to predict successfully how skills-related factors (such as the transmission of skills to other players in football) and psychosocial factors (such as levels of motivation) may develop and change throughout the life-course of an athlete (Vaeyens et al., 2009).

The development of sporting talent is also affected by a systematic selection bias known as the relative age effect – the phenomenon of skewed birth date distributions in athletic populations and the overrepresentation of athletes born close to age cut-off dates in

particular sports. Variations in the biological age of male adolescents in a given age group in both individual and team sports have been shown to vary from 2-4 years, depending on their date of birth and pubertal development (Hirose & Hirano, 2012). Biologically mature children and youth may develop superior physical and cognitive skills compared to less biologically mature children (Crawford, Dearden, & Greaves, 2014). The effects of such bias have been observed at all levels of sporting life, ranging from initiation in sport, youth team selection, the selection of talent development initiatives, and even the drafting of individuals to the adult elite level (see, for example Baker, Schorer, Cobley, Bräutigam, & Büsch, 2009; Cobley, Baker, Wattie, & McKenna, 2009; Deaner, Lowen, & Cobley, 2013; Delorme, Boich, & Raspaud, 2010).

The relative age effect tends also to become stronger during the selection of people to talent development initiatives, such as youth national teams, even if such differences are only temporary (Hancock, Adler, & Côté, 2013). International youth sport competitions (for example, in handball) are organised in 2-year age-group categories during adolescence; the birth date effect tends to favour relatively older players born in even-numbered years (Aguilar, García, Marín, & Fernández Romero, 2012; Sánchez-Rodríguez, Grande, Sampedro, & Rivillagarcía, 2013). Formal selection mechanisms inevitably become self-fulfilling prophecies when resources, positive motivational influences (such as being selected to different teams or activities to develop talent, being offered formal prizes and better coaching resources, or having better-skilled teammates and positive feedback), and other incentives are distributed unequally across a population of developing athletes (Hancock et al., 2013). ‘Linear’ selection/de-selection methods are therefore likely to be biased and may even be directly counterproductive to talent identification and development (Peterson, 2011). Talent identification should therefore take place at a later stage in athlete development, as Renshaw et al. (2012) propose, and closer to a sports person’s expected peak performance in a given sport.

A ‘reverse relative age effect’ effect has also been reported among rugby union and cricket academy players (McCarthy, Collins, & Court, 2016). As studies have shown, players in such settings who were relatively younger when they were academy players were *less* likely to be selected to the national academy system but *more* likely to succeed in adult elite sports and/or national teams compared to their relatively older peers (McCarthy & Collins, 2014). Taken together, these findings clearly show some of the pitfalls of talent identification and selection mechanisms in sports. However, this might also indicate that youth players

benefit from facing and overcoming a degree of challenge, assuming they are provided with the opportunities needed.

The Standard Model of Talent Development's implicit assumption that talent development progression through a hierarchical organised competitive structure is linear in nature has also been challenged (Collins et al., 2016). Studies of both age-categorised and senior competition sports show that: (a) not all athletes start their development from the base of a talent pyramid, (b) some athletes transfer from one sport to another and are able to build on their training and competitive experience in other sports, and (c) most national team athletes have experienced at least one period in which their development trajectory has descended before it has returned to a higher competition level (Gulbin, Weissensteiner, Oldenziel, & Gagné, 2013).

The empirical and conceptual integrity of traditional talent development models need to be closely interrogated, particularly in the context of Scandinavian sports. Current sports policy research has added little to perspectives about the organisation of talent development and there is still little recognition of how organisational constraints influence talent development in different national settings and in different sports federations. Explanations for athletic success (or the lack of it) are limited largely to debates, for example, about expenditure per capita (De Bosscher, Bingham, Shibli, Van Bottenburg, & De Knop, 2008). Questioning such viewpoints is important because, as Gulbin, Weissensteiner, et al. (2013, p. 612) contend, "understanding [the] variability [of athletic pathways] based on a more detailed and broader range of environments can lead to a more nuanced assessment of the localised drivers and barriers to development". Furthermore, Bailey and Collins (2013, p. 249) argue that indications of apparent systemic success may, in fact, be illusory. As they contend: "there are no ways of knowing who might have succeeded through different systems, and who … [if] de-selected from the system … might have (under different circumstances) gone on to achieve high performance".

1.4 Talent development in the Scandinavian sports model

In Scandinavian countries, sport is organised largely within autonomous and voluntary sport associations which are characterised by democratic and egalitarian values (Bergsgard & Norberg, 2010). State involvement beyond the provision of infrastructure and crucial funding is minimal (Andersen, Bjørndal, et al., 2015). Organised sport activities are decentralised and based mostly in local voluntary-driven multi-sport clubs, and arranged and run by parents and

volunteers (Ibsen & Seippel, 2010), but regulations prohibit elite-oriented development and the formal ranking of teams and individuals before the age of 13 years. The effects of globalisation and increasing attempts to professionalise and commercialise the Scandinavian sports model have placed pressure upon its core values. Thus far, the changes attempted have complemented rather than radically changed the model's overall structure and practices (Andersen & Ronglan, 2012a). The introduction of several private Norwegian football academies over the last ten years are evidence of minor adjustments and variations within the Scandinavian system. However, it is likely that the integration of international trends towards early specialisation, professional coaches, and more centralised talent development will be achievable only to a limited degree within the current Scandinavian voluntary sport model (Ronglan, 2014).

According to Green, Thurston, Vaage, and Roberts (2013, p. 285), "Norway has particularly high levels of sports participation" across a diverse range of individual and team sports in Scandinavia. Studies indicate that a 'normal' athlete pathway to the adult elite level in this context entails broad exposure to many different sports during childhood (Moesch et al., 2011; Moesch et al., 2013). This "broad exposure to different sports is not intentional in the sense that it is an approach supposed to develop elite athletes", write Andersen, Houlihan, and Ronglan (2015, p. 54). As Storm et al. (2012) suggest, the pathways leading to the adult elite level are a product of the sports culture that is particular to this region.

Currently, as Andersen, Bjørndal, et al. (2015) note, each individual sport federation in Scandinavia is responsible for organising all aspects of a particular sport, including children and youth sport, mass sport, talent development, and elite sport. This means, as they observe, that "the close ties between elite and mass sport make it difficult to distinguish elite sports concerns from mass sports concerns in the Scandinavian countries" (p. 53). Most of the sport federations in Norway provide what can be understood as the same or similar organisational 'structures' for talent development through the facilitation of activities for identifying and developing talent at the regional and national levels. Nevertheless, it is difficult to describe this as a 'talent development system' in the sense of having distinct talent development structures which are separate from the standard organisation of club-based sport activities. Instead, in Scandinavia the talent development model is a complex composition of club-based practice and competitions, different regional and national talent development initiatives provided by sports federations, and specialised sport school programmes for athletes. Each of these 'initiatives' contributes to the facilitation of the experiences that influence development at the individual level and also lead to interaction effects (Andersen, Bjørndal, et al., 2015).

Most activities that influence talent development are club-based, and the more centralised efforts to organise and facilitate talent development initiatives at the federation level therefore have a weaker impact during early adolescence.

The absence of rigorous professionalisation may influence the competitiveness of Norwegian handball at the adult elite level in other ways. Neither the Norwegian woman's nor the men's handball league is ranked among the top leagues in European handball. This may be the reason why there is a narrower performance quality gap between the junior elite level and adult elite level compared to nations with better domestic leagues. The lower degree of professionalisation in Norwegian handball may also explain why there are fewer foreign players in the Norwegian leagues compared to the number of foreign players in the professional leagues of other countries. Between 2000-2011, for example, foreign players constituted 5-10% of those in the Norwegian woman's league compared to 25-40% in the Danish woman's league (Agergaard & Ronglan, 2015). Agergaard and Ronglan (2015, p. 22) argue, "it is not the high number of migrant players in elite teams, *per se*, that blocks the development of young talent, but first and foremost the structuring of the practices as well as the ability and willingness of the clubs to tailor a developmental plan for the individual players". The development of domestic talent may not be hindered when leagues are 'weaker' in the international rankings if opportunities are given to players to transfer to a professional league abroad after the final domestic step. Although successful talent development is related to the competitiveness of the domestic adult elite level, it is not necessarily determined by it.

Chapter 2| THEORETICAL FRAMEWORK

The primary focus of this thesis is how the organisational context of Norwegian women's handball facilitates and shapes the individual development youth national team athletes'. Norwegian handball is influenced by the wider sociocultural context of the Scandinavian sports model – one which is characterised by mass participation, volunteerism, egalitarianism and decentralisation (Ibsen & Seippel, 2010).

In this thesis, talent development is examined using an overarching sociocultural perspective on learning and development. More specifically, the process of talent development is investigated in the organisational context of Norwegian handball. The thesis focuses on how individual athletes are influenced by their experiences in different team and school settings embedded within the organisational context of Norwegian handball. These different development arenas expose individual players to different priorities and demands. Although these arenas form part of the national system for talent development in handball, they are only loosely coordinated. As such, the Norwegian system corresponds to what Long (1958) terms an Ecology of Games.

The Ecology of Games framework has recently been used to better conceptualise talent development in Nordic elite sports (Andersen, Bjørndal, et al., 2015). In this thesis, I take an important new analytical step by applying this framework to examine the variety, commonalities and distinguishing features of individual development processes within the organisation of talent development in Norwegian handball.

When applying the Ecology of Games framework to the analysis of sports talent development, athletes are understood to be part of several immediate contexts that are connected but often loosely coupled. In the context of Norwegian handball, these include clubs, sport schools, regional teams, practice settings, and the youth national teams. Collectively, these form the heterarchical organisational context in which a talented handball player is able to move in and out of different settings and is exposed to a variety of different influences. Collectively, they are crucial to talent development at the individual level.

Below, I first present the key assumptions on learning from a sociocultural perspective and examine how these relate to the study of talent development in sports. Second, I provide an account of the Ecology of Games framework and how it can be used to turn attention towards the interaction between multiple team-based settings and individual athletes.

2.1 Sociocultural perspectives on learning

Learning and development are shaped by cultural influences and sociocultural perspectives on learning attempt to explain how human learning and development relate to broader cultural, institutional, and historical contexts (Scott & Palincsar, 2009). According to Packer and Goicoechea (2000), these conceptions can be traced to Vygotsky, Leontiev, Luria and others, and arose from an effort to overcome dualism and strict demarcation between the person and the world. The ontological assumption of a sociocultural perspective is nondualist and suggests "that the person is constructed, in a social context, formed through practical activity, and in relationships of desire and recognition that can split the person, motivating the search for identity" (Packer & Goicoechea, 2000, p. 239).

Talent development in team sports is primarily shaped by the interactions and collaborations that take place in, and between, different team and club settings, and in specific initiatives aimed to promote athlete development. From a sociocultural perspective, learning is an active and dialectical process between the individual and her environment, including for example coaches, parents and peers. According to Lave and Wenger (1991, p. 35), "learning is not merely situated in practice – as if it were some independently reifiable process that just happened to be located somewhere; learning is an integral part of generative social practice in the lived-in world". Although every athlete's development is shaped by beliefs and values from the diverse domains of their lives, it is an athlete's immediate contexts that particularly influence and shape their sports development. A sociocultural approach to investigating talent development in sport draws on analytical perspectives rooted in many different disciplinary traditions, including psychology, sociology and education. Importantly, in this approach to research, organisational and individual-based analyses are viewed as complementary-and interdependent. Holistic approaches (Capra & Luisi, 2014) of this kind provide an important way of deepening insights into talent development research and human learning. They are also important because they help to overcome the weaknesses of traditional psychological approaches used in sports research, which have focused primarily on the individual at the expense of understanding the social and cultural influences shaping development.

Ironically, although sociocultural perspectives can aid understandings of the complex learning processes in sport (Baker & Horton, 2004), few studies of talent development in team sports have emphasised the role of specific institutional and societal factors (Bruner, Ericsson, McFadden & Côte, 2009; Burgess & Naughton, 2010). Packer and Goicoechea (2000) claim that situated perspectives are better suited to recognising the emergent and dynamic character

of problem spaces and interactions, and how problem solving can be influenced by motivation and identity. In this thesis, I therefore applied the Ecology of Games framework when undertaking this situated investigation of how the organisational context of Norwegian handball can shape experiences and influences at the individual level.

2.2 The Ecology of Games framework

Long (1958) defined the concept of an 'Ecology of Games' during his research on local communities, claiming that it provided a better way to describe the dynamics inherent within complex and multi-centric organisational structures. According to his model, athletes simultaneously take part in several immediate contexts that are connected but often loosely coupled. Together, these different contexts are constituted by different organisational actors (such as clubs and sport schools), each of which acts according to its own agendas and goals and, collectively, constitute a heterarchical organisation. Young handball players move in and out of different practice and competition settings and are exposed to different types of influences from different teams, clubs, sport school programmes and talent development initiatives.

However, in Norwegian handball, clubs are the nexus and basic unit of the organisational model for all youth athletes. While other team settings and talent development initiatives may complement one another, they do not ever replace the daily practice and competition settings provided by the clubs. The organisational context of Norwegian handball is therefore multi-centric, and the heterogeneity and institutional complexity of the more autonomous partners tend to be higher (Andersen, Houlihan, et al., 2015). According to Lubell, Robins, and Wang (2014, p. 1), "institutional complexity […] is the everyday reality faced by policy-makers and resource users [e.g. athletes and coaches] in social-ecological systems". Together, the interaction effects of the many influences an athlete is exposed to both enable and inhibit his or her development at the individual level.

Multi-centric or heterarchical organisations are systems of governance characterised by mutual constraints and influences (Reihlen & Mone, 2012) and by multidimensional governing structures. In multidimensional governing structures, different organisational structures, such as clubs, federations and sport schools, all have their own responsibilities which partially overlap and by doing so, partially extend their agency in talent development processes. Different actors are formally independent of one another in heterarchical organisations and may choose to act in ways that take account of others, through cooperation

and competition (Ostrom, 1991). Hierarchical organisations, in contrast, are characterised by an unambiguous systemic order.

The concept of an 'Ecology of Games' has underpinned a number of theoretical frameworks for researching complex organisations (Dutton, 1995; Lubell, 2013; Lubell, Henry, & McCoy, 2010) and is a valuable approach because it acknowledges how the different perspectives and incentives of the autonomous individuals involved create and drive behaviour.

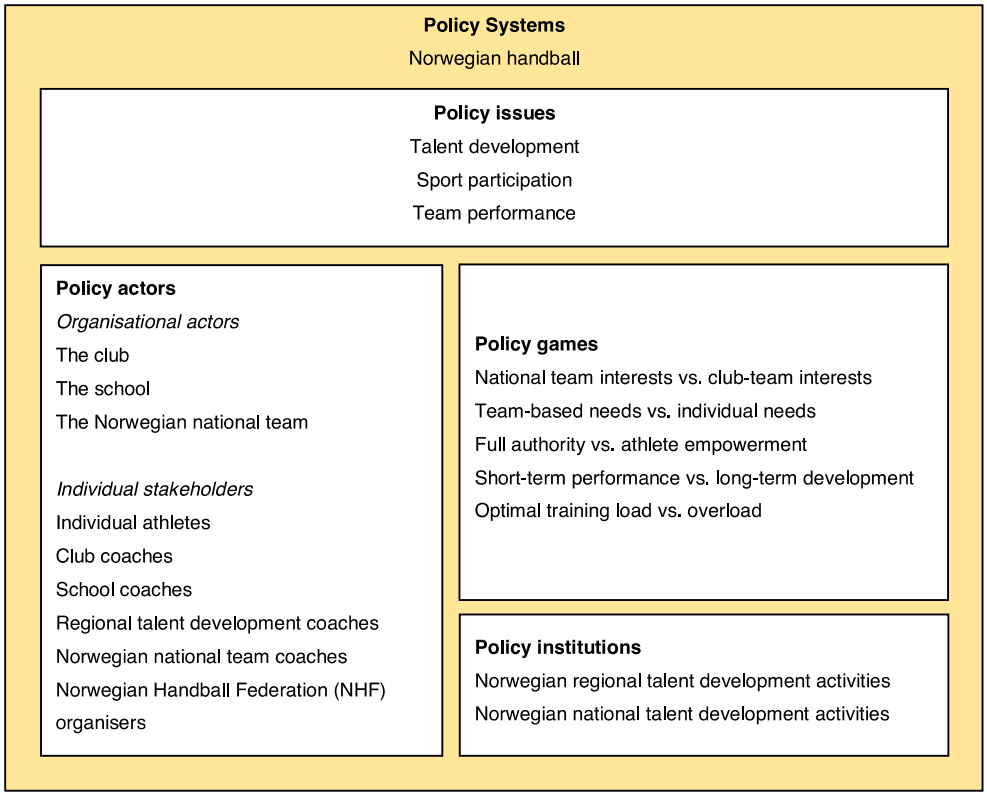

Figure 1. The Ecology of Games conceptual model applied to Norwegian handball

The Ecology of Games framework describes organisations and networks comprised of both interrelated formal and non-formal groups. The framework focuses on five main areas: policy systems, policy issues, policy games, policy actors, and policy institutions (Lubell, 2013). Policy *systems* are, according to (Lubell, 2013, p. 542) "geographically defined territories that encompass multiple issues". Norwegian handball, as a whole, can be understood to be a policy system because multiple, sometimes conflicting, issues are simultaneously overseen

within the same organisational frame, such as the pressure to promote elite sport development and the need to facilitate participation. In the wider Norwegian organisational setting of sport there are no separate elite sport bodies; in the United Kingdom, in contrast, there is a clear division between organisations such as UK Sport, which is responsible for performance in Olympic sports, and Sport England which is responsible for increasing the number of people taking part in sport. Policy systems, according to the Ecology of Games framework, can be defined at different scales or levels. Policy *issues* involve "some type of substantive collective-action problem" (Lubell et al., 2010, p. 289), such as talent development, that actors attempt to influence by participating in different institutions and games.

Policy *games* are "arenas of competition and cooperation structured by a set of rules and assumptions about how to act to achieve a particular set of objectives" (Dutton, 1995, p. 381). In complex socio-ecological systems, multiple policy games (for example, the creation of different activities aimed at developing athletes) operate simultaneously within a geographically-defined policy arena (Lubell, 2013). The coexistence of different games of interest and influence may cause dilemmas, for both individuals and organisational actors, because of the diverse objectives involved (for example, team-based needs versus individual needs; whether – and how much – to empower athletes; and how to balance short-term performance needs with the long-term development of athletes). This characteristic of heterarchical organisations can cause tensions between different organisational actors and, in team sports, between different individuals within a team. Such problems cannot be solved or resolved definitively; instead they must be continuously balanced within particular organisational settings (Jones & Wallace, 2005).

Policy *actors* have a 'stake' (as 'stakeholders') in the outcomes of policy games and the resulting rules governing specific issues. Actors can be "individual resource users or political actors like agency officials, interest groups, or elected officials" (Lubell et al., 2010, p. 290). In the context of our research, the range of stakeholders included individual athletes and their teammates, coaches in different team and school settings, and the Norwegian Handball Federation (NHF) officials responsible for the organisation of activities at the regional and national level. The main institutional actors in the case studies that were conducted as part of my research were the Norwegian handball clubs, sport schools, and the NHF. Together, these actors form a complex web of initiatives in which no actor has sole responsibility for talent development or instructional authority over other actors. In the organisations that could be described as being more 'Ecology of Games-based', athletes are

able to move back and forth between participation at different levels and settings, and their development is non-linear in nature.

Finally, policy *institutions* are defined within the Ecology of Games framework as sets of formal rules and informal norms that structure the 'operational' rules that actors use to govern on-the-ground decisions about particular policy issues (Ostrom, 1991). According to Lubell et al. (2010, p. 288), "the process of interaction that occurs in a given institution could also be referred to as a [formal] policy process or planning process". Policy institutions and games are similar in the sense that both involve interactions between the organisational actors involved that are guided by rules about how collective decisions should be made. While a game only occurs when the "players take the field, … [but] the rules [of handball, for example] still exist even when the players are not participating' (Lubell, 2013, p. 540). Within the Ecology of Games framework, the concept of a game refers, too, to the ongoing negotiation, collaboration and competition of diverse policy issues when actors are participating in institutions. The 'institution' of Norwegian handball, for example, is shaped by the values, rules and norms underpinning organised sport in Norway's voluntary organisations and the educational system.

The Ecology of Games framework supposes that institutions are 'nested' structures which exist at multiple scales or levels of context. This implies that values and norms underpinning institutions within the wider Scandinavian sports system, shape the dynamics of policy and actions at lower levels (Lubell, 2013). The uncoordinated relationship of the individual games and actors involved in such systems means, however, that collective action is problematic. In heterarchical organisations in sports, different coaches from different team settings, for example, may find it difficult to agree on the best pathway for individual athletes. However, as Lubell et al. (2014, p. 11) suggest, it is important to note that the "complex institutional arrangements are not completely chaotic – there are hierarchical structures that enable different actors and institutions to exert some control over the system". Examples in the context of Norwegian handball include the hierarchical organisation of talent development activities within the NHF's player development model, and the league system of the NHF in which youth teams compete to qualify for the national championships.

The inability of the actors involved in the multiple, inter-related groups to gain full oversight or understanding of these systems is due to the complex and fragmented nature of the organisational landscapes. Some actors may have more knowledge or awareness about other actors, but most have only partial knowledge and limited information about the wider prevailing circumstances and contexts. Stakeholders are typically unable to appreciate how

decisions made in one context, or by particular actors, may have spill-over effects or how these may affect the decisions, strategies and preferences of others. According to Lubell et al. (2010, p. 288), in Ecology of Games-based systems, "actors within individual games tend to the potential cross-game externalities, and there are few institutional mechanisms to coordinate games." As the Ecology of Games framework suggests, "uncertainty is rampant" (Lubell, 2013, p. 545) within the world of talent management.

The change processes described in the Ecology of Games framework describe interactions between different levels of contexts and individuals. Systems are seen as adaptive: change can be spurred from within (by the policies, decisions and actions of the actors). It can also be exogenous – determined, for example, by higher-level, wider macro-cultural contexts, when a particular Ecology of Games system is a subsystem of others. Systems may also be affected by incremental changes: small policy changes enacted over time may give rise to larger, broad-based policy change (Lindblom, 1959). Tipping points may also affect systems if, for example, an issue or individual concern crosses a certain threshold, gains momentum, and triggers change. Even deliberate attempts at compromise or mutual understanding may fail or have unintended consequences. To achieve coordination within a complex and multi-centric Ecology of Games system, "the overall structure of the political system [must] balance […] the benefits and costs of institutional complexity' (Lubell, 2013, p. 547).

The institutional complexity of sport settings is further complicated by the fact that teams consist of individuals who have their own diverse – and potentially incompatible – objectives (Jones & Wallace, 2006). Teams or clubs are typically regarded as 'single' organisational actors. In reality, they consist of individuals who choose to 'play' their own games of influence. This may affect the agendas of teams to the point that they seem less coherent or more ambiguous than would otherwise be expected. According to Andersen, Houlihan, et al. (2015, p. 7), the Ecology of Games framework helps to facilitate an understanding of the processes involved in the "decisions of those at the grassroots level (for example, coaches, athletes, club officials and medical support staff), the routines that they establish and the strategies that they develop to cope with resource limitations, pressures of expectations and job insecurity become the elite development system of a sport or country".

In literature on socio-ecological systems, the importance of coordination and collaboration is recognised, but few attempts have been made to investigate how exactly coordination could be achieved (Lubell et al., 2014). The Ecology of Games framework therefore offers a potentially valuable approach to exploring how interactions between

athletes and the different sporting contexts in which they are located are constrained by institutional or ecological factors at different levels.

The Ecology of Games model provides a framework that is well-suited to the empirical analysis of talent development in Norwegian handball. Further, it aligns with the interpretive orientation of this study because it allows the reality experienced by the different organisational actors to be a focal point for understanding the dynamics of complex socio-ecological systems. These orientations require a context-sensitive approach to analysing talent development. A case study methodology facilitated such an approach, as I describe in chapter 3.

Chapter 3| DESIGN AND METHODS

One of the purposes of quantitative studies is to identify correlations between variables, and to make convincing arguments about causal relationships (Charmaz, 2014). Quantitative methodology has heavily influenced contemporary talent development research and the disciplines of psychology and cognitive sciences that traditionally underpin them.

Many cognitive theories and methodologies have neglected the role of active agency and the role of the human search for meaning and interaction (Starbuck, 2006). Therefore, I decided deliberately to move away from the traditions of cognitive sciences when researching talent development in sport. My choice does not suggest that this approach to talent development research is the best or the only type of research needed. Instead, I recognise the value of new investigative approaches in complementing existing research, and how these approaches can provide what Cushion et al. (2006, p. 91) term “a more complete picture” of an activity.

The focus of my research is how the organisational context of Norwegian handball influences the complex interactions shaping situated learning and development, and how these processes stimulate more, or less, successful transitions to the elite level.

Throughout the four studies that comprise this thesis, I have utilised conceptual and theoretical frameworks from multiple research traditions. Drawing together this knowledge is important because it allowed me to explore the ways in which these different approaches are complementary and can provide new insights into talent development. It also facilitates discussion and debate about the applicability of these frameworks to the empirical material. The studies in this thesis utilise different levels of analysis, from the individual to the organisational level, and demonstrate that analytical synthesis, rooted in cross-disciplinary approaches, can be of significant analytical value.

When people are viewed as active agents in their own lives and in their own worlds, then subjective meanings, actions and processes need to be a central point of analytical focus (Charmaz, 2014). By utilising and seeing myself as a research tool, I interpreted the data and theory of this study through what Charmaz (2014, p. 17) describes as “past and present involvements and interactions with people, perspectives and research practices”. This was achieved through active, social and interactional exchanges of ideas, meanings and interpretations between the interviewer and the interviewees, and by taking part in social practices during the field work. The use of naturalistic and interpretive methods was

supplemented by other sources of data and analysis, such as document analysis, participation statistics and self-report questionnaires.

In the social sciences, case studies have been a key source for theoretical or analytical generalisations that inform concepts and models and the identification of process mechanisms (George & Bennett, 2005). As Flyvbjerg (2001, p. 81) notes, the value of qualitative research depends "on the validity claims which researchers … place on their study, and the status these claims obtain in dialogue with other validity claims in the discourse to which the study is a contribution". The analytical value of case studies therefore lies not in their importance to the establishment of predictive theories or how they facilitate the development of abstract rule-based laws which can be generalised across large populations or contexts (Flyvbjerg, 2001), but in their usefulness in allowing valid and reliable theorising (Andersen, 2013).

3.1 Design

Case studies are intensive studies "of a single unit for the purpose of understanding a larger class of (similar) units" (Gerring, 2004, p. 342). Their purpose is to enable an investigation of the real-life phenomenon within the 'real-life' context in which studies are located (Yin, 2013). In this research, I adopted a case study approach and contend, like Yin (2013), that a case study approach represents a research strategy.

Case study methodology is well suited to the analysis of processes in context (George & Bennett, 2005) because it facilitates an understanding of social agency and the complexities and ambiguities of social reality (Charmaz, 2014). This makes it possible to explore complementary layers of meaning through different interpretive techniques (Miles & Huberman, 1994). In this thesis, the aim was to identify the processes leading to successful or unsuccessful outcomes of development *and* to explore athletes' perceptions in relation to their developmental experiences and their interactions with different coaches and teams in a Norwegian setting. The use of different interpretative techniques made it possible to build a more comprehensive understanding of the prerequisites for, and consequences of, talent development at different levels of analysis.

Research methodologists have adopted a variety of methods when using case studies (Yazan, 2015). Some, such as (Stake's 1995), have focused solely on interpretative approaches when using case study research (Yazan, 2015). But case studies provide an instrumental set of strategies, guidelines and tools, and undertaking one does not imply a reliance on one particular type of evidence, or the application of prescribed data collection

methods (Yin, 1981). Case studies offer opportunities to focus on the commonalities of different research traditions and on the common tools that can be appropriated in the design and methods of a case. Yin (2010) argues that a case study does not necessarily depend on a rigid conceptual framework, but the central questions of the case study must be identified beforehand.

Further, a case study approach was selected because it is well suited to examining complex relationships, and exploring issues such as equifinality (several trajectories leading to the same outcome) and multifinality (obviously similar pathways leading to different outcomes). In the broadest sociological sense, actors' perspectives – and thus their interactions – are influenced by their membership of different social worlds and sub-worlds (Corbin & Strauss, 2008). Case studies help researchers to consider these contextual conditions, as well as the relationship between case studies and the sociocultural settings in which they are undertaken. A case study approach can provide insights into disproportionate feedback loops, path dependencies, tipping points, selection effects, expectations effects, and sequential interactions between individual agents and social structures (George & Bennett, 2005). Henriksen et al. (2011) have even suggested that a deeper understanding of complex social processes and sociocultural phenomena can be stimulated by methodological approaches in which case studies examine the real-time functioning of environments and by utilising multiple sources of evidence.

The thesis consists of four independent case studies that form part of an overarching study design of talent development in Norwegian handball. The four studies focus on different embedded analytical units. The purpose of 'embedded' case studies, Yin (2013) contends, is to investigate key elements or processes and to build a comprehensive analysis of wider systems as a whole. I chose to focus on analytical units beyond the level of the 'individual-in-context' because I wished to use a research strategy sensitive and appropriate to examining sociocultural influences (Packer & Goicoechea, 2000).

The first case study (see Appendix 1) is an investigation of the organisation of talent development in Norwegian handball. The embedded units of analysis are: (a) the overall organisational structure of Norwegian handball, (b) the key organisational actors and their characteristics, and (c) the relational processes within and between the organisational actors. The second case study (see Appendix 2) is a holistic analysis of the contemporary experiences of talented handball players during their development towards top-level play. Emphasis is placed on their experiences with multiple organisational actors and team settings. The third case study (see Appendix 3) is a longitudinal investigation of youth elite handball players and

the development pathways leading to the elite, sub-elite or non-elite levels. The fourth and final longitudinal case study (see Appendix 4) compares the successful and unsuccessful transitions made by talented athletes from the youth elite to the adult elite level. Collectively, the four case studies contributed to the development of a deeper and more comprehensive understanding of talent development in a Scandinavian team sport.

3.2 Case studies and theory development

Theories, according to Charmaz (2014, p. 228), state the "relationships between abstract concepts and may aim for either explanation or understanding". Empirical research can contribute to theory construction in addition to "being about the accurate reporting of a phenomenon studied" (Alvesson & Kärreman, 2011, p. 12). The studies included in this thesis are an attempt to use context-specific knowledge to inform theoretical development in the field of talent development. In this regard, a case study approach is particularly useful in establishing sufficient analytical control to allow for valid and reliable theorising (Andersen, 2013). The key purpose of the approach used in this research was to inform theory rather than making generalisations applicable across wider populations.

Influential theories of elite sport organisation suggest that the achievement of the best results at the adult level depends on formalised and centralised talent identification and development systems (De Bosscher et al., 2006). The talent development model in Scandinavian sport (including Norwegian handball) deviates from this structure and, despite this, has proven to be successful. The decision to study talent development in the context of Norwegian handball was therefore strategic because the 'deviant' organisational nature of this sport is of particular theoretical and practical interest (Yazan, 2015). According to Alvesson and Kärreman (2011), theory development is often stimulated by examining what is assumed to *not work*. Case studies of talent development in Norwegian handball are then well suited to challenge current theories and perfectly "tailored to cast strong doubt on theories if the theories do not fit" (George & Bennett, 2005, p. 121).

In this research, the empirical analysis of talent development in Norwegian handball is a way to interrogate contemporary theories and models underpinning talent development in sports. The purpose of the empirical analysis in this case study was to produce more fine-grained understandings of particular context-dependent influences on talent development and to explore the disconnections between traditional theoretical interpretations and the empirical findings. In this regard, case studies were seen as a way help to develop more contextually

sensitive understandings of the phenomena under consideration by "putting culture into context" and as a way to help to separate the universal from the culturally specific (Stambulova & Alfermann, 2009, p. 293).

The first paper (see Appendix 1) investigates the organisation of talent development in Norwegian handball through the theoretical lens of the Ecology of Games framework; The second paper (see Appendix 2) uses a more inductive method of analysis to explore the views of handball athletes and the implications of these perspectives; The third paper (see Appendix 3) explores methodological issues and examines general and context-independent theoretical dimensions related to talent development. The fourth paper (see Appendix 4) investigates gaps or potential mismatches between the dominant theoretical assumptions in talent development research and the empirical representations of social processes. It also explores problematic issues related to structured talent development.

3.3 Analytical control

Analytical control can be established through "comprehensive and unifying interpretations or through theoretical or empirical pre-knowledge" (Andersen, 2007, p. 604). In quantitative studies, analytical control can be achieved by using statistically representative samples and statistical techniques; in qualitative studies it is established through the use of strategic sampling and context-grounded interpretations. The logic of establishing analytical control is similar to the logic of establishing experimental control: within a natural setting, this is achieved by strategically selecting cases, processes and participants that enable more robust comparisons. For example, in the fourth study in this thesis, a strategic sample was selected based on the similarity of the participants in terms of their exposure to similar amounts and types of youth elite activities, and in terms of their differences in terms of the *outcome of their transition* to the adult elite level. This type of strategic sampling, based on the dependent variable, made it possible to trace and compare key elements in the processes that appeared to have led to different outcomes. This kind of reasoning about how to gain analytical control, allows researchers to draw inferences from observations and to increase the trustworthiness of their interpretations and analyses. In turn, this can help to better facilitate theorisation and theory development (Yin, 2013).

Researchers are an inherent part of the research reality, and researcher reflexivity should therefore be given specific attention when establishing analytical control (Alvesson & Kärreman, 2011). My pre-understanding of the empirical world of talent development in

Norwegian handball helped me to establish greater analytical control and sensitivity. Corbin and Strauss (2008, p. 41) define 'analytical sensitivity' as "what [a] researcher brings to the study as well as through immersion in the data during data collection and analysis". In this instance, I brought with me an extensive background as a coach at both the youth and elite level, and my experiences in Norwegian club, school and Norwegian Handball Federation settings.

I would argue that this experience influenced the research process, enabling focused and sensitive data collection. It allowed me to intuitively see organisational and personal connections, and to identify patterns and contexts that I could explore further and examine explicitly. The advantages of being familiar with a particular empirical universe must also be balanced against the importance of establishing analytical distance, and evaluating one's own implicit assumptions, ingrained perspectives and conditioned responses. Starbuck (2006, p. 154) notes that "everyone benefits when potential subjects compel researchers to take note of their personal values and how these values influence research". This was especially important when I was conducting fieldwork and analysis in my own cultural setting. Working together with a co-supervisor who did not have any experience in the context of Norwegian handball was helpful, too: it made me face my own implicit assumptions, and facilitated new and different ideas and interpretations. The theoretical knowledge I gained through reviewing a wide range of talent development literature also helped me to generate and refine appropriate conceptualisations, both before and during the research process.

The rigour of this research approach was also strengthened by the theoretical sampling methods that I used to determine the structure of the data collection and data analysis. In the comparative analysis of this study, for example, the research design attempted to allow for a comparison of observational units (the developmental paths leading to the elite level) that had – and had not – been influenced in specific ways by incidents and events in the talent pathways of the athletes. Starbuck (2006) compares the insights that this approach affords researchers to the technique that engineers use to see inside 'black boxes':

> 'One cannot gain a thorough understanding of a circuit by watching its response to a steady, unchanging input; but one can gain a substantially greater understanding of a circuit by watching its response to abrupt impulses or sudden changes in the input level' (Starbuck, 2006, p. 153).

In this study of transitions to the adult elite level, my colleagues and I were able to carefully identify different individual pathways that had, and had not, been influenced by different 'impulses' along the dimensions of special interest. Dimensions of special interest included injuries, selection/de-selection, opportunities for practice and play, and sudden changes in performance.

Case studies, it should be noted, also present methodological challenges. Investigations, for example, may focus on different units at different analytical levels, and it may be unclear if the findings and arguments are specific to particular populations or if they are more generalisable. Possible generalisations from this thesis are what is known as 'analytic' or 'theoretical' generalisations (Yin, 2013). An analytic generalisation is different to a statistical generalisation in that it does not attempt to draw inferences from a set of data to a population. Instead, in the four papers I aimed to compare the empirical results of the different case studies against previously developed theories and conceptualisations. This did not constrain my use of more inductive analyses. Instead, it focused my research through the use of a prior conceptual or theoretical framework. Throughout the four studies, I made use of both deductive and inductive strategies for analysis and interpretations.

Yin (2010) argues that the process of analytic generalisation is a two-step process in which a conceptual claim is first made by researchers to show how their case study findings bear upon a particular theory, theoretical construct, or theoretical sequence of events, before then applying this theory to implicate situations in which similar events might occur.

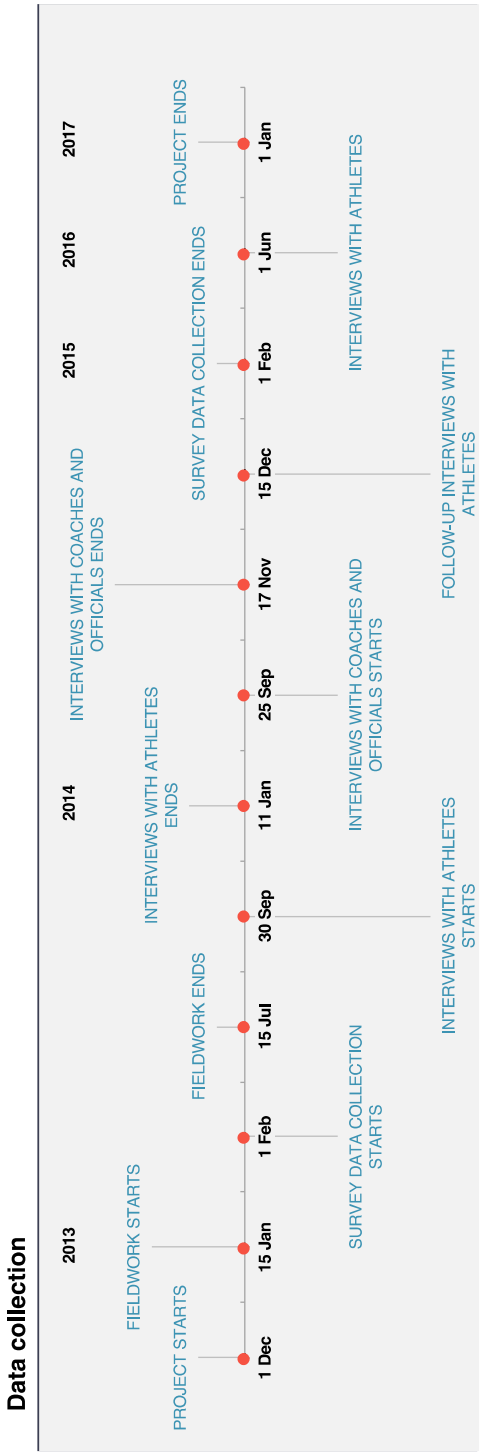

Figure 2. The different steps in the data collection process

3.4 Data collection

Collecting qualitative data over a sustained period of time enables potentially deeper insights into the study process itself by allowing issues of relationships and reciprocity to be explored in-depth (Yin, 2010). Figure 2 shows how data were collected throughout the research period. Recognising the dynamic relationship between data collection and analysis, I did not apply a step-by-step approach in which data collection was completed before data analysis began (Yin, 2010). While my supervisors contributed to the planning of the study and in discussing the interpretations of the findings, I gathered all the data myself, in processes that are described in the different papers. By accumulating an empirical understanding over time, new ideas were continuously tested, and I was able to pursue new lines of thought in a cyclic process of ongoing dialogue between theory, the generated data, our own interpretations, and feedback from the informants. This "explorative integrative approach" (Gerring, 2004) strengthened the inherent dynamism and flexibility of the research process.

A large proportion of the data in this thesis is based on qualitative interviews and these form the cornerstone of the research. Actors (athletes, coaches and organisers were the key focus at the individual level of analysis in these studies) are not passively affected by their surrounding social and cultural contexts. Instead, they are active social agents with their own goals and agendas, and purposefully try to navigate these developmental courses. To gain deeper insight into this 'agency-within-structure' reality, the interviews were conducted at different points of time throughout the investigation.

Key actors' perceptions and viewpoints are important sources of information. This is why the use of a longitudinal, interview-based approach was particularly appropriate to this research. Interviews are sometimes seen as windows into people's 'stable' perspectives, and are assumed not to be affected by context or the passage of time (Miles & Huberman, 1994). I sought, instead, to produce a 'deeper' and 'fuller' understanding of athletes' changing perspectives, perceptions and interpretations over the course of their development.

Interviews are also an *event* in which interviewers and interviewees are able to exchange perspectives, reflections and meanings (Charmaz, 2014) and I sought to play a more active role as interviewer. This dynamic approach enabled the interviewees to actively take part in the tentative interpretations of the empirical data that were being constructed during the interviews (and between the interviews, in instances in which the informants were interviewed more than once).

Retrospective research can erroneously and implicitly assume, as Starbuck (2006) suggests, that people and social systems are stable and non-reactive. This type of research has also been criticised for neglecting the impact of recall bias: the passing of time and the influence of current perspectives or circumstances may, for example, colour present circumstances or affect the way in which people recall their own history (Hammersley, 2008). The multiple *in vivo* interviews which were conducted as part of the longitudinal data gathering process in these talent development studies, enabled me to be closer in time to the experiences that people reported, and gave me deeper insights into the dynamic issues affecting their development.

One of the strengths of qualitative research is that it focuses on naturally occurring events in natural rather than laboratory settings (Andersen, 2006). My reliance on interview-derived data was complemented by prolonged periods of participant observation. I also obtained data from reports written by the athletes, as well as publicly available information (such as documentation about selection to talent development initiatives) to enhance the validity of the data constructed from the interviews. Finally, it was important for me not just to learn about the more easily observed, 'visible' elements of practice and performance. I sought to gain a more complete picture of athletes' performances and talent development by exploring both what Goffman (1959) terms the 'frontstage' (what is shown to the public and easily observed) and 'backstage' (what goes on behind the scenes and is less evident). The lengthy periods of participant observation were particularly useful in this regard.

3.5 Data analysis

According to Yin (2010), a case study does not necessarily depend on a rigid conceptual framework, but the central questions of a case study must be identified beforehand. Thus, as I have noted, concepts from the Ecology of Games framework (see Chapter Two) were used to help me to frame the research question and have informed my analysis.

Based on the gaps I identified in the research literature, I chose to focus on the interactions between athletes and their different team and practice settings, and the different organisational actors, across the organisational landscape of Norwegian women's handball. My main assumption was that the organisational actors would be acting autonomously and would be only loosely-coordinated, each acting in accordance with their own interests and aims. Secondly, I assumed that doing so might create tensions between the different organisational actors and between an organisational actor's interests and an individual's

interests. Consequently, I anticipated that a key concern for the individual athletes in this study would be how to negotiate and navigate the sometimes-divergent interests of others as the athletes moved continuously between different team and practice settings.

In this research, two complementary data analysis methods were applied, namely congruence analysis and process tracing. Congruence analysis provides a thorough comparison of theoretical predictions and empirical evidence, and is often used to supplement the comparative analytical approaches in case studies (George & Bennett, 2005). This within-case approach helps to reduce the risk of inferential-errors arising from using comparisons alone. In this study, different theoretical assumptions and explanations were made explicit and tested against the data as a way to best interpret the findings. According to Yin (1981, p. 61), congruence analysis resembles the work of a detective: "Presented with the scene of a crime, its description, and possible reports from eye-witnesses," writes Yin, "the detective must constantly make decisions regarding the relevance of various data". In these studies, the explanation building was supported by the triangulation of multiple sources of data and through the member checking that was used in the four different studies. The specific data collection and data analysis methods used in each of the four studies are described in Table 1 (p. 44) and a detailed account can be found in each of the four papers (see Appendices 2-5).

Process-tracing – the second data analysis method I applied – is, as George and Bennett (2005, p. 13) observe, "fundamentally different from statistical analysis because it focuses on sequential processes within a particular historical case, not on correlations of data across cases". I was able to utilise process tracing in the analysis of individual developmental paths because of the longitudinal design of the research. George and Bennett (2005, p. 207) note that investigators can "begin to chart the repertoire of causal paths that lead to a given outcome and the conditions under which they occur" when studies include several case studies with one or more processes. Again, the craft of a detective provides an analogous example – for instance, "a detective [may be] … confronted with another case, where the relevant conditions appear to be similar to those of the first case, and where the detective may … use the first explanation and establish that both crimes were committed by the same person" (Yin, 1981, p. 63). This 'pattern matching' facilitated the development of comprehensive and unifying empirical patterns. These relate not to the *amount* of observations but, instead, to the *inner consistency* between observations and can potentially lead to the identification and development of interlinked chains of incidents/actions that lead to particular outcomes. The stepwise and sequential data analysis of the second and fourth papers are examples of the approaches used to undertake this pattern matching.

	Analytical and observational units	Sampling criteria	Document analysis	Participant observation	Interviews	Survey data	Statistical data
Study 1	Analytical unit(s): Overall organisational structure; key actors and their characteristics; intra- and inter-relational processes Observational unit(s): Local community-based sports clubs; sports schools; the national and regional talent development initiatives offered by the Norwegian Handball Federation	Experienced coaches and professionals; have experience within different units within the organisational structure; easily accessible and willing to share their perspectives	Norwegian Handball Federation strategic plans *(n=2)*, sport school policy *(n=3)*, internal documents from workshops, evaluations and strategy meetings *(n=3)*	40 days of field work during domestic and international national team activities	*n = 11* Three women, eight men; average age 39.2 years; all had a minimum of 10 years of coaching experience; all had youth coaching experience; eight had elite coaching experience; six had coaching experience from the youth national team; four had Norwegian Handball Federation administration experience; all but one currently worked professionally within Norwegian handball		Statistics of participation in the Norwegian Handball Federation player development system
Study 2	Analytical unit(s): Youth athletes' experiences of pursuing top-level play Observational unit(s): Individual athletes	Players selected to youth national team activities; different amounts of experience from club-based, school-based and federation-based activities; different developmental trajectories leading to national team selection.			*n = 12* Women; between the age of 16-17 years; average of 9.5 years' experience as players; representing four different organisational regions; club-level experience ranged from U16 to the adult elite level *n = 10* Follow-up interviews		

Study 3	Analytical unit(s): Developmental pathways Observational unit(s): Sports participation histories	Players born in 1996-1997 involved with the youth national team during the 2012-2013 season				Demographic information; sports participation histories; change in weekly practice hours *(n = 33)*	Statistics of national team participation *(n = 74)*
Study 4	Analytical unit(s): Transition process from the youth elite level to the adult elite level Observational units: Individual athletes	Strategic sample from the cohort group based on the dependent variable: successful/unsuccessful transition to the adult elite level			*n = 9* Women; between the age of 19-20 years; average of 12 years' experience as players; representing three different organisational regions; five successful transitions to the adult elite level and four unsuccessful transitions to the elite level.		
Total			*n = 8*		*n = 42*	*n = 33*	*n = 74*

Table 1. An overview of the methods used in each of the four studies. The initial participant observation and field conversations in-directly informed all studies because it enabled us to get a thorough pre-understanding of the case and context before utilising the specific methods of each independent study (for example, by helping us develop a sensitive interview guide).

3.6 Ethical considerations

The Norwegian Social Science Data Services granted ethical approval for this study. The study was conducted according to the organisation's guidelines. All participants were informed about the purpose and focus of the study, that they could withdraw without any reason at any point in time, that all the information gathered was strictly confidential, and that the results would not be disclosed in ways that would make it possible to recognise individual participants. To ensure confidentiality, data identifying the subjects were not reported.

Due to the interactive nature of most of the data collection, the interviews and the participant observation, it was essential that I established a trustworthy and professional relationship with the study participants. My interaction with the athletes and coaches, and my participation in their daily practice activities, was respectful at all times.

In each of the studies, the participants have been given pseudonyms, and the names of the clubs, coaches or NHF officials are also not disclosed. In a few instances, the players in the different studies were given the same pseudonym. In the first study, which included data from coaches and NHF officials, the organisational titles and official roles are used because this was easier to manage analytically. Nevertheless, it is possible that the background information provided about some of the individuals in the case studies may compromise their full anonymity if readers are embedded in the same elite sport settings. All the informants were given the chance to read through the transcripts and to accept, verify or correct the content.

Chapter 4| RESULTS

The aim of this thesis is to provide a deeper understanding of how the organisational context of Norwegian handball shape and influence youth national team athletes' experiences and development at the individual level. Talent development in sport is multidimensional, non-linear and complex (Abbott, Button, Pepping, & Collins, 2005). In this work and the accompanying four papers, I focus on the following core issues: the interplay between key organisational actors; the experiences and developmental pathways of youth national team athletes throughout their adolescence; and the transition from junior to the senior sports among the same group of athletes. An overview of each of the four papers is presented, in sequence, below. Full versions of the papers are provided in the appendices of the thesis.

Paper 1: Bjørndal, C.T. Ronglan, L.T., & Andersen, S.A. (2015). Talent development as an ecology of games: a case study of Norwegian handball. *Sport, Education and Society,* published online, 1-14.

Paper 2: Bjørndal, C.T., & Ronglan, L.T. Orchestrating talent development: Youth players' developmental experiences in Scandinavian team sports. *Sports Coaching Review,* published online, 1-22.

Paper 3: Bjørndal, C.T. Ronglan, L.T., & Andersen, S.A. The diversity of developmental paths among youth athletes: A 3-year longitudinal study of Norwegian handball players. *Talent development & Excellence, 8*(2), 20-32.

Paper 4. Bjørndal, C.T., Andersen, S.A., & Ronglan, L.T. The successful and unsuccessful transitions to the elite level: The youth national team pathways in Norwegian handball. Under second review in the *International Journal of Sports Science & Coaching.*

4.1 Paper 1: Talent development as an ecology of games: a case study of Norwegian handball

Aim: The aims of the study were to: (a) describe the organisation of talent development in Norwegian handball, (b) identify how the inherent organisational characteristics of Norwegian handball have influenced the talent development processes used, and (c) discuss if contemporary talent development models provide an adequate conceptualisation of the model used in Norwegian handball.

Theoretical framework: The theoretical section examines hierarchical and heterarchical conceptualisations of organisational models. The Standard Model of Talent Development (Bailey & Collins, 2013) was shown to offer a conceptualisation of hierarchical models of talent development. In contrast, the Ecology of Games framework (Long, 1958) provides a useful conceptualisation of heterarchical organisations.

Methods: This study was designed as an embedded case study of talent development within the context of Norwegian handball. The units of analysis were: (a) the overall organisational structure of Norwegian handball, the key actors and their characteristics, and (b) the intra- and inter-relational processes between the actors involved. The observational units of the study were: (a) strategy documents and internal documentation from the Norwegian Handball Federation (NHF) that have informed decision-making about talent development, and (b) experienced coaches and professionals. The case setting was selected because handball is a major competitive sport in all the Scandinavian countries and is characterised by sustained international success and broad participation. The data sources for the study were documents, such as strategic plans. Eleven semi-structured in-depth interviews were also undertaken with key informants. The informants were representative of experienced coaches and professionals within Norwegian handball who had experience in different units within the organisational structure. The analysis was conceptually driven and its purpose was to synthesise the diverse array of data material and to create a holistic and detailed account of the Norwegian handball model of talent development. The documents were content-analysed and the interviews were coded using a provisional scheme derived from the theoretical ecology of games framework.

Findings: The talent development model of Norwegian handball is broad-based. The model consists of the different activities provided and supported by the multiple key actors involved, namely: voluntary-based sport clubs, sport schools, the regional level talent development initiatives provided by the NHF, and the youth national team activities provided

by the NHF. No actor was found to have sole responsibility for talent development within the Norwegian model, nor did any have any instructional authority over another.

Within this segmented organisational structure, volunteer-based sports clubs play a key role in the lives of all the athletes (at all levels of skill) by providing their day-to-day practice activities and competitive opportunities. Most coaching is undertaken by voluntary coaches or parent-coaches and the key objectives they define are mostly team related. The sport schools in Norway offering handball are professionalised institutions that provide practice opportunities for the athletes during the school day. They focus on individual development and are the only actors that do not participate in team-based competitions. The degree of cooperation, communication and support for student autonomy varies according to local conditions and circumstances. The findings reveal that Norway's youth national teams have an extensive influence on the development of the athletes involved. The two key objectives of the youth national team are (a) to qualify the team for international competitions and (b) to promote individual skill development. These objectives, as I show, contain potential contradictions and ambiguities.

The study makes several important theoretical contributions to the field of talent development. While many elite sport organisations advocate hierarchical talent development models characterised by top-down implementation, this paper identifies an alternative, successful talent development model in the context of Norwegian handball. Secondly, the findings suggest that successful talent development within heterarchical models is not only dependent on the individual significance of key actors, but on how well they complement each other in producing an intended outcome. Until now, this interconnection has received little attention in research literature. Thirdly, the results highlight how coordination costs increase within multi-centric systems and that unintended consequences may arise in situations in which the communication between key actors is inhibited or limited.

4.2 Paper 2: Orchestrating talent development: Youth players' developmental experiences in Scandinavian team sports

Aim: The aim of the study was to investigate contemporary experiences of athletes developing towards the elite level within a Scandinavian elite sport setting. Emphasis is placed on their experiences with multiple organisational actors and team settings. More

specifically, the study explored what kinds of concerns they experienced, and how athletes attempted to manage these as part of their interactions with their coaches.

Theoretical framework: The conceptual notion of coach orchestration (Jones & Wallace, 2005) is used as the basis for discussing the role of coaches involved in talent development in team sports. Orchestration is argued to be a form of leadership that is particularly well-suited to heterogeneous organisations that are multi-centred, and within systems of governance shaped by mutual constraints and influences.

Methods: This holistic case study of youth athletes' experiences of top-level play was informed by my interest in the universal nature of the developmental experiences of athletes. The unit of analysis was youth athletes' experiences and the observational unit was the youth national team handball players. Twelve female handball players with experience at the highest youth level were interviewed in-depth. The analysis was empirically driven and used the pragmatic grounded theory approach advocated by Corbin and Strauss (2008) in which theoretical concepts are seen as a way to focus and inform initial research and data collection before data-driven methodologies are applied.

Findings: The empirical findings reveal five main themes central to the player's pursuits. First, athletes experienced constant time and prioritisation pressures and these concerns impacted their talent development. Second, the experiences of the athletes demonstrated that the influences of the different actors and team settings involved in talent development could best be described as complementary rather than coordinated. Third, while the different team settings associated with talent development may provide complementary influences on talent development these effects, paradoxically, may also lead to the imposition of conflicting goals and demands. Athletes may find it difficult to distinguish, for example, between those actors who have legitimate claims on their development and those who do not. Fourth, the balancing of load and recovery is one of the biggest issues faced by actors within a sports system in which the totality of possible influences is potentially exhausting for athletes. Finally, the claims and well-intended efforts of the different actors involved creates challenges in the coordination of talent development.

The theoretical contribution of the paper is the link created between the organisational perspective and the specific perspective on leadership previously used to describe leadership in a context characterised by uncertainty, ambiguous demands, and inherent and continuous dilemmas. This paper helps to broaden how coach orchestration is understood. It suggests that the term encompasses the issues coaches must consider when facilitating individual development both *within* and *across* different team settings.

4.3 Paper 3: The diversity of developmental paths among youth athletes: A 3-year longitudinal study of Norwegian handball players

Aim: The aim of the study was to examine the uniqueness of pathways leading successfully to the adult elite sport level in the context of Norwegian handball.

Theoretical framework: The theory of deliberate practice (Ericsson et al., 1993) and The Developmental Model of Sport Participation (Côté & Vierimaa, 2014) are used as frameworks to describe apparent linear and predictable pathways to elite sport.

Methods: The study was designed as a 3-year longitudinal cohort study of 33 athletes who had been selected to take part in youth national team activities. Data were gathered from self-reported responses to a questionnaire about their practice and competition, and publicly available statistics about the player participation of those selected to the youth national team. The purpose of the questionnaire was to collect information on the weekly training schedules of the athletes and their involvement in different team settings. The cohort was divided into three groups, based on their level of performance after three years: (a) elites (n=21) who played at the first national level, (b) near-elites (n=6) who played at the second national level, and (c) non-elites (n=6) who played at the lower levels. 41 additional female players were included in the final analysis of involvement in the youth national team practice and competitions. A Mann-Whitney U test was used to determine if there were differences between the study groups.

Findings: The study's main finding is that elite players in Norwegian handball are more involved with youth national team activities compared to the non-elite players. However, the variations within the elite and near-elite groups were larger than the differences between the groups. This suggests that the pathways to the elite level in Norwegian handball share a set of basic commonalities but that, on an aggregated level, they are also highly variable. The findings clearly show high variability in the amount of practice and competition in the Norwegian youth national team; within-club performance trajectories; and the length of the transition of athletes from junior to senior sports.

The study makes an important theoretical contribution by presenting initial findings that highlight the difficulty of distinguishing a clearly preferred hierarchical pathway to the elite level in talent development systems. This is particularly so in the loosely organised, non-hierarchical talent development context of Norwegian handball. The existence of multiple

pathways to the elite level in this setting may be due to the diverse range of potential practice settings which have a complementary effect on the facilitation of talent development. As such, the pathway diversity found in Norwegian handball mirrors the variations found in other dynamic social systems (see, for example Lubell, 2013) and indicates the necessity of individualisation in talent development. The potential for individualisation refer to the space for different types, amount and timing of team-based activities that can complement each other in different ways. Providing general or prescriptive guidelines is therefore difficult if the socio-cultural and organisational contexts underpinning talent development processes are not considered. In building an understanding of the factors shaping successful pathways, a consideration of the variables traditionally associated with success in elite sports remains necessary (for example, the number of hours of deliberate practice). However, such considerations do not provide an adequate basis for understanding the nuanced factors shaping the successful pathways of athletes within an already selected and talented population.

4.4 Paper 4: The successful and unsuccessful transitions to the elite level: The youth national team pathways in Norwegian handball

Aim: The aim of the study was to explore successful and unsuccessful transitions in Norwegian handball from the youth player level to the adult elite level among athletes following youth national team pathways. The characteristic features of athletes within this pathway are that they have been: (a) key players in their youth teams, (b) among the best in their age group during adolescence, (c) identified as 'talented' by coaches in different team settings, (d) involved with formal talent development in clubs, schools and the NHF structure, (e) participated in initiatives at a regional and national level, (f) selected to represent the national team at the age of 15-16 years and (g) have experience at the international level.

Theoretical framework: The Lifespan model (Wylleman & Reints, 2010) was used as a basis for understanding the individual pathways of development and the transitions made by athletes. The Ecology of Games framework was shown to provide a useful complementary perspective to the Lifespan Model's individual focus because it contextualises the development of athletes within their organisational contexts.

Methods: In this multiple case study of the transition to the elite level in Norwegian handball, the unit of analysis was the transition process and the observational unit was the

individual athletes. Nine youth elite handball players were interviewed in-depth about their experiences. Five of the nine athletes in this strategic sample had established themselves successfully at the elite level; four had either quit or continued to play at a lower level during the previous season. The data was first inductively analysed before the theoretical analysis was conducted. At the individual level, we applied the process-tracing techniques of George and Bennett (2005)

Findings: Athletes frequently find the application of the talent development model in Norwegian handball exhausting. For a significant number, there is a risk of injury and burnout. Further, the findings demonstrate how thin the line is that separates two widely different outcomes: (a) drop-out due to a loss of motivation and meaning, and (b) a successful transition to the elite level.

This study makes an important theoretical contribution by helping to bridge the disconnection in athlete development research between *talent* development perspectives and *career transitions* perspectives. Further, it provides a deeper understanding of how heterarchical organisational contexts, such as those found in Norwegian handball, may have unintended consequences and impacts, both positive and negative, for athletes. Incidents and decisions beyond an athlete's immediate context may facilitate or inhibit successful transitions to the elite level. No single set of factors was found which explained why particular transitions to the adult elite level in Norwegian handball were either successful or unsuccessful. Rather, the findings demonstrated that the interaction effects over the organisational landscape, taken collectively, had a combined influence which helped to determine whether outcomes were successful or unsuccessful. The results of the study support the notion that sports development is a multifactorial and socially situated practice, and question talent development models and frameworks that are normative and prescriptive.

Chapter 5| DISCUSSION

This study sought to examine how the loosely-connected and heterarchical organisational context of Norwegian handball shapes and influences youth national team players' experiences and development at the individual level. This was done through an empirical analysis of the interactions between individual athletes and their different team and school settings, and of the interactions between the organisational actors themselves. My analysis of the organisational complexity of Norwegian handball was undertaken using the Ecology of Games framework as a focal reference point. The workings of the talent development model applied in Norwegian handball were found to resemble the characteristic features of this framework. As such, the results of the empirical analysis revealed a model that deviates from the models typically advocated in literature on elite sport organisations – models that are characterised by top-down implementation and centralisation.

The results of the study also show that the organisation of talent development processes in Norwegian handball creates both intended and unintended consequences for individual athlete development. This context-embedded knowledge allows me to draw important distinctions between how athlete development at the individual level is facilitated and constrained in the Norwegian model, compared with other models in the literature on talent development.

The discussion of the study findings is arranged in four sections. First, I discuss some of the general features of the Norwegian model at an organisational level of analysis, and how these shape opportunities for athlete learning and development, compared to those in more hierarchical models. I also examine how issues related specifically to team sport and the actual model used in Norwegian handball raise several concerns that are under-communicated in the literature on talent development. Second, I discuss the results of my individual-centred analysis in terms of the characteristics of the youth national team pathway. I show how focusing on general elements or components associated with sporting success may limit attention to the key concerns experienced by Norwegian handball players. Third, I discuss the implications that my study findings have for the planning and steering of individual development within Norwegian handball by practitioners and policymakers involved in talent development. Finally, I discuss how the study findings can help to refine the development and application of theoretical models of athlete development.

5.1 The organisation of talent development in Norwegian handball

In this section, I describe and discuss how the organisational context in Norwegian handball influences athlete development, and creates a complex and collective interplay of interacting constraints on this development. These impacts, I suggest, are not adequately recognised or addressed in applied athlete development models or in the sports science literature.

The normative systems for the identification and development of talent typically described and advocated in the literature on elite sports systems do not resemble the actual workings of Norwegian handball (Andersen, Houlihan, et al., 2015). The preferred athlete development systems in the literature are typically linear, and strong support structures are seen as important to providing the 'special attention' needed for talent development (De Bosscher et al., 2006). In hierarchical talent development systems, as De Bosscher et al. (2006, p. 206) argue, a "career path has the form of … [a] pyramid because many athletes drop out […] and only a few reach the very top".

The term "elite development 'system' ", as Andersen, Houlihan, et al. (2015, p. 5) suggests, is "simply a description of the interconnection between established practices, with little regard for efficiency and effectiveness and with little attempt to provide a foundation for the system based on research and evidence". Despite the absence of a detailed and strictly governed talent development strategy in women's and men's handball in Norway, the country has achieved great success in this sport internationally, and has a high number of handball professionals playing abroad. This raises the question of whether the hierarchical and elite development systems that are usually advocated are optimal or simply one of many potentially suitable options. Further, it raises uncertainties about whether (and to what extent) more traditional, normative organisational approaches related to talent development are working as intended, or whether or how they should be applied.

This thesis shows that athlete development in team sports in a heterarchical organisational context is an emergent phenomenon that goes beyond the 'pure sum' of the contributions of each individual organisational actor or team setting. More centralised and normative talent development systems, I would argue, tend to fail for three key reasons. Firstly, the expectation that talent identification can be made early is unrealistic and flawed (Davids et al., 2013). There is little evidence that early selection to talent development initiatives is either efficient or necessary, particularly within team sports. Rather, the lack of more structured talent identification in Norwegian handball may help to counteract the negative consequences associated with early attempts to identify talent. The selection

mechanisms that are embedded in the Norwegian system do not mimic the indicative characteristics of the Standard Model of Talent Development (Bailey & Collins, 2013). Athletes in Norway are first selected to talent development initiatives at a relatively late age (13+ years), and the country's broad-based talent development initiatives vary in quality. Players are not removed from one level to the next; there are no formal threshold measures; it is not unusual to return to the talent route after de-selection; and early specialisation is partly limited through formal child sport regulations.

Secondly, I would argue that more formal systems fail to nurture talent development because athletes are unable to optimise their development. Research by MacNamara et al. (2010a) on the role of psychological characteristics in facilitating pathways to elite performance shows that talented athletes benefit from, and need, a variety of resistance and even adversity. If formal talent development systems that are designed to maximise support do not include challenges as an integral element, they may fail to facilitate successful transitions to the adult elite level (Macnamara & Collins, 2013). Within less structured and multi-centric systems, many challenges arise because athletes simultaneously participate in different team settings and must practice and compete at different levels.

Thirdly, transferring successful elite sports policy and systems of talent identification and development from one nation, or from one sport, to another is difficult (Collins and Bailey (2013). Different contexts give rise to different uncertainties: models of athlete development may not necessarily be suitable to the social complexities of athlete development in different team sports or in different cultural and organisational settings. This means that policy and organisational changes should be based on local contextual knowledge and that a more effective strategy for change processes can be achieved through incremental systemic changes (Lindblom, 1959).

Opportunities for athlete development in Norwegian handball are shaped by the Scandinavian sports culture. This culture is characterised by democratic sports organisations, extensive volunteerism, decentralisation and egalitarianism (Bergsgard & Norberg, 2010). Furthermore, the depth of competition – both in terms of the number and quality of the active competitors – can have a strong potential influence on the organisation of talent development (Baker & Horton, 2004). Thus, the relatively large number of players in Norwegian handball, it can be argued, may allow talent development to emerge without the intense and structured efforts typically described in the literature on elite sport systems (see, for example Andersen, Houlihan, et al., 2015). This is because more loosely-nested systems create multiple pathways and conditions for (more) individualisation. In turn, this means that an emphasis on more

structured talent identification is of potentially less importance initially in the careers of athletes.

An important point to note is that despite its lack of structure, the heterarchical and multi-centric talent development model of Norwegian handball is not chaotic. Like other complex institutional arrangements, the model also includes "hierarchical structures that enable different actors and institutions to exert some control of the system" (Lubell et al., 2014, p. 23). By being loosely-connected and decentralised, the model provides room for far more players than would otherwise be the case within a talent development programme focused on one key organisational actor. Larger talent pools (like those found in Norwegian women's handball) may offer a greater diversity of opportunities for athlete learning and development if they are organised within heterarchical structures. Organisations and talent development systems are not machine-like and components of dynamic social systems change continually (Capra & Luisi, 2014). Multi-centric systems are largely self-organising because of the network-like pattern of interactions within them. To a large extent, they bypass the potential problems associated with hierarchical structures. Highly centralised systems, as (Lubell et al., 2014) content, may lack robustness and may therefore often be vulnerable: if key actors make a mistake or manipulate a decision in ways that benefit certain groups or are at the expense of others, negative effects may ripple through the entire system. Closer management may be needed in sports organisations with relatively small talent pools to ensure that players are provided with adequate and appropriate development opportunities (they may be helped, for example, by being provided with appropriate coaching and sport science expertise, having access to high-quality practice settings, and financial support). By noting this, I am not suggesting that one approach to talent development is better than another. However, the findings of this study indicate that a heterarchical and loosely-connected structure constitutes a functional alternative to talent development in team sport settings that are characterised by broad participation.

However, differences in the level of professionalisation are apparent, both within and between different Scandinavian countries (Andersen & Ronglan, 2012a). In a comparative case study of player migration and athlete development in Norwegian and Danish women's handball, Agergaard and Ronglan (2015) showed that the learning conditions for talented athletes have changed due to the commercialisation and globalisation of Danish handball. In contrast, Norwegian handball has a less professionalised club structure and, it could be argued, provides more talent development opportunities because of the looser connections between the different actors involved. The competitive levels in Norwegian handball are more

fluid and there is greater variation in skill thresholds at the club level. Within the decentralised and multi-centric structure of Norwegian handball, therefore, young talented players are likely to be less marginalised in practice than in Denmark, and opportunities at the adult elite level may be more accessible (Agergaard & Ronglan, 2015).

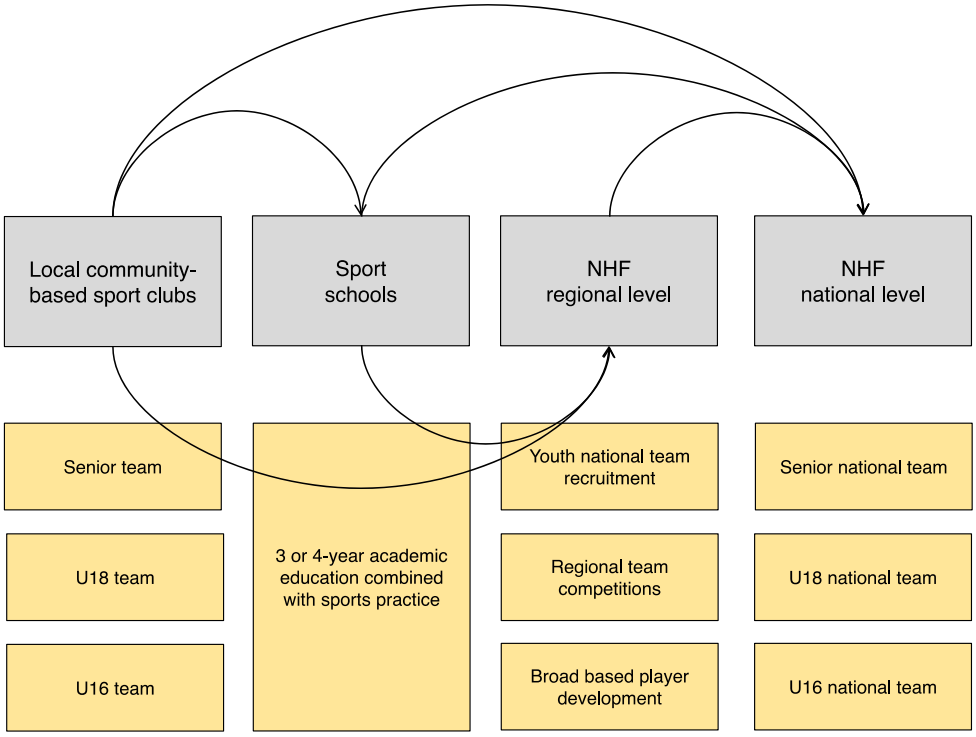

Figure 3. The Ecology of Games of youth athlete development in Norwegian handball

Team environments are the main settings for the processes that influence athlete development in Norwegian handball. Henriksen (2010) argues that understanding and nurturing talent development at the micro-level, within the immediate contexts of a team, is essential to athlete learning and development. An Ecology of Games framework aids in reinterpreting the importance of these immediate contexts, but also in looking beyond them. What may, at first, appear to be *a single* immediate context can be recognised instead as several changing contexts, each with its own demands and interests. A within-club team may be the basic development 'unit' for athletes over the course of their development, but each athlete is likely to be located within multiple team contexts (cf. Figure 3). In such instances, the management of talent development processes in Norwegian handball is made more complex both by the

issues that are specifically related to team sports and by the issues that are context-specific to the actual model.

The results from the second paper (see Appendix 2) clearly showed the embedded tensions between the optimisation of particular team settings and the facilitation of individual talent development in team sports. According to Ronglan (2016), sport teams are characterised by six distinct features, namely: competition, collaboration, complementarity, goals and interests, social relationships, and contexts on and off the court. The main concerns for the athletes in my study, for example, related to being able to get enough time for recovery, especially between different commitments. Athletes find it difficult to optimise their various needs in the context of team sports: players are mutually dependent on each other when trying to ensure that they are able to practise and perform in a functional manner. The organisational context of Norwegian youth handball is characterised by human social interactions within and between different teams: the effectiveness of talent development is therefore determined not just by the type and level of coordination, but by political power and competing claims of legitimacy (Lubell et al., 2014). The lack of professionalisation within the club structure in Norwegian handball may, in many instances, help to level the playing ground significantly between senior teams and the various youth teams. Here, talent development processes are negotiated between the different team coaches, as well as between the athletes themselves. In contrast, a study of a professional football academy in England, Cushion and Jones (2006) found that the academy structure was rigidly hierarchical, with clear differentiations between coaches and players, between coaches, and between players.

The athletes who participated in the second and fourth studies (see Appendix 2 and 4) all stated that they were willing to prioritise their sporting careers over other aspects of their lives. Facilitating better conditions for players like these, who are involved in several team settings, is also likely to be challenging. Coaches may need to compromise on wanting to achieve good short-term team results, or approaches that might otherwise be better for athletes who are less involved in other team settings. In team sports, tensions between the collective good and individual needs are an inherent dilemma for coaches (Jones & Wallace, 2005) and reconciling these talent development concerns is a balancing act. As Ronglan (2016, p. 5) observes: “common goals are accompanied by individual interests, and the amount of different goals and interests in a team contribute to complexity and tensions”. In worst-case scenarios, these may compromise long-term development. Competitions provide important development opportunities for team players. A club team coach or youth national team coach may therefore need to decide whether to use an injured player during a qualification to a

national or international championship. Using the injured player may increase the chances of a team qualifying, but it may also risk the player being unable to play for several weeks or even months (and vice versa). From a team perspective, it is (perhaps) clear which option is preferable: the risk of causing a prolonged period of injury for a single athlete could help to ensure the common good of the team for the entire season. From the perspective of an injured athlete, the optimal solution may be less certain: being kept healthy and free from injury may be preferable in the short-term, but being able to play in a championship may help to facilitate an athlete's development. The task of finding optimal solutions is complicated further because, as noted earlier, actors typically have only partial oversight over the consequences of their own decisions in these instances (Jones & Wallace, 2006). An athlete's injury may or may not get worse; a team may or may not qualify without the injured athlete.

The results of this thesis challenge the assumption that athletes (and coaches) have a clear or common goal, and that there are always solutions that are 'best'. Attempts by athletes and coaches to facilitate athlete development and to exploit developmental opportunities are not shaped by a single, specific team setting. Instead, opportunities, decisions, actions and outcomes are influenced by complex interactions across and between different settings. Participants have only limited oversight and typically lack direct influence. The second and fourth papers in this thesis (see Appendix 2 and 4) examine the (sometimes ambiguous) experiences and influences facilitating or limiting individual development. These papers provide a deeper and more holistic understanding of the relationship between individual and relational dimensions and organisational contexts.

Most conceptual frameworks used in the analysis of athlete development suggest that talent development is shaped by rational choices. Such approaches assume that individuals have a clear overview and understanding of the potential outcomes of their choices and are able to make decisions based on the potential costs and benefits of clearly preferred choices (Simon, 1991). However, the papers in this thesis demonstrate that the organisational contexts of Norwegian handball limit complete oversight. The coaches in these studies were often unware of each other's actions and decisions. Training processes therefore became both unbalanced and potentially exhausting for the athletes involved because of the amount and intensity of the activities they were engaged in, the absence of an off-season period, and the additional academic demands they faced. Athletes, as Aggerholm (2015, p. 19) argues, are not rational agents who "cognitively constitute the meaning of experience by centring the plurality of it round an 'intelligent core' through objective thinking or 'impure' psychological and analytical reflection, that is a rational and contemplative act in the subject." Neither, too,

were the athletes' experiences shaped merely by their own passive responses to external environmental stimuli.

In summary, talent development processes in team sports are socially complex and characterised by tensions and stresses between organisations, teams and individuals. The concerns of individual athletes are both independent, and partly dependent, on wider team concerns and contexts. According to Ronglan (2016, p. 3), "teammates cooperate to develop a strong collective unit, but at the same time, they compete to be picked on the team and gain playing time on court". The dilemmas inherent in team sports in general are amplified by the multiple team settings embedded in the actual model of talent development in Norwegian handball. Recognising how the social complexity of a team unfolds within a heterarchical organisational context can inform a better understanding of planning for individual development in team sport contexts.

5.2 The national team pathway in Norwegian handball

In this section, I discuss the results of my individual-centred analysis in terms of the characteristics of the youth national team pathway. I show how focusing on general elements or components associated with sporting success in Norwegian handball may result in inadequate attention being given to the key concerns and experiences by players. Furthermore, I suggest that athlete pathways are better understood as nonlinear and emergent processes, and therefore pose a challenge to the predominant models of talent development that focus on single variables or components.

The notion of a 'national team pathway' was developed in this research project to conceptualise the progress specific to youth handball players involved in Norway's national team. The term refers to the characteristics of the developmental activities of talented players selected to youth national team activities. The data in this thesis were from players who were born in 1996 and 1997 and who were selected to the youth national team. To validate the characteristics of their pathways, we compared these data to the amount of activities for players in the woman's youth national team who were also born in 1996 and 1997[5]. The number of practice hours, matches and days spent together were similar to those reported in

[5] The data from the youth national team activities for players born in 1994 and 1995 showed that the national team practised a collective total of 477 hours and played 93 matches. The players were together 241 days in the first four (out of five) years after the team was formed.

the principal findings. This strengthens the generalisability of these results to other Norwegian players involved in youth national team activities.

Models of athlete development, such as the Developmental Model of Sport Participation, have been shown to be insufficient as analytical tools for the examination of the experiences of athletes at the individual level, or the pathways leading to the adult elite level in handball. In the cultural context of Norwegian handball, the pathways of almost all athletes are characterised by early diversification. The athletes in this study had been exposed to several sports from age 6 to 12 years (in the developmental model of sport participation, this age category is referred to as the 'sampling' phase). In the interviews, all the athletes described their childhood practice activities as organised, requiring a lot of effort, and as enjoyable. Similar patterns of early pathway diversification have been noted in other studies of Scandinavian sports (Fahlström, Gerrevall, Glemne, & Linnér, 2015; Moesch et al., 2011; Moesch et al., 2013). The results of this thesis therefore echo the criticisms raised by Storm et al. (2012) study of Danish elite athletes, which found that models rooted in broad categorisations of activities are analytically inadequate. Though their study supported the notion that early diversification (sampling) does not hinder pathways to elite sport participation, they argued that the Developmental Model of Sport Participation framework adds little to understanding why some pathways to the adult elite level develop successfully and others do not. The findings from this study support the notion that pathways to the adult elite level in sports are contingent on culture and that broad categorisations of activities contribute little to the analysis of successful and unsuccessful transitions to the elite level.

Similarly, the Long-Term Athlete Development model (Balyi & Hamilton, 2004) which emphasises the importance of accumulating training hours in distinct phases, also adds little to our understanding of athlete pathways in Norwegian handball. This is because it fails to explain adequately the differences between factors shaping successful or unsuccessful transitions to the adult elite level in an already selected population. Results from this thesis shows that the average number of hours of organised and self-organised practice per year during an athletes' three years of high school ranged between 700 and 800 hours. Each athlete, on average, accumulated between 2,100 and 2,400 hours of practice throughout her final three years of high school – a period which could be described as the most practice-intensive period of a handball sporting career. Some differences were found on an aggregated level between the athletes who transitioned to different adult levels but, notably, the variability between athletes *within* the same group (for example, adult elite athletes) was bigger than the differences found *between* the groups. The individual development of all the

athletes during high school was non-linear in nature (as would be expected in a network-like organisation that facilitates development in multiple possible directions). This development was characterised by: continuously changing interactions between the individual athletes and their different loosely-connected team and practice settings, simultaneous participation in matches at different levels, and different sequential progressions through different performance levels. Although the athletic pathways to the adult elite level in our study contained similar components and experiences, it was the different patterns and variabilities which made the development of these individual pathways an emergent phenomenon. As such, the significance of these elements cannot be understood simply in terms of the total sum of the individual elements involved (such as the number of practice activities and practice hours) but rather, as Cairney (2012) proposes, in terms of the dynamic relationships and timed interaction effects between such elements.

Elite sports development is most often a 'rocky road' and is highly individual (Collins et al., 2016). Talent development models that assume there is a linear relationship between practice and skill acquisition (for example, the Long-Term Athlete Development model) implicitly presuppose that all athletes develop at the same pace, but this fails to account for individual variations. These may include differences in growth and maturation, the pace of learning in different phases, and the types of life stressors. In this study, the developmental pathways of the athletes were shown to have a number of nonlinear characteristics, and the patterns of athlete development amongst the adult elite athletes varied considerably. The third and fourth studies in this thesis (see Appendix 3 and 4) demonstrated the diversity and uniqueness of the multiple pathways leading to the adult elite level in Norwegian handball. The findings clearly showed high variability in the amount of practice and competition in the Norwegian youth national team, the within-club performance trajectories of athletes, and the length and nature of the transitions made from junior to senior sports.

The concept of nonlinearity refers not only to the biological and/or psychological premises of development but also to the social dimensions of development. Opportunities to learn and develop are provided within wider organisational contexts, such as clubs and teams. Mechanistic models tend to reduce and simplify learning and skills acquisition in sports to isolated, individual processes. This reflects a failure to recognise that in team sports, skills acquisition is the result of mutual engagement, through which skills are exchanged and shared tacitly. Learning is a socially situated practice that occurs in different self-generating networks, both formal and informal. In all organisations, these "communities of practice" (Wenger, 1998) are emergent structures. Supporting and strengthening these, according to

Capra and Luisi (2014, p. 318), is "the most effective way … to enhance an organisation's potential for creativity and learning, to keep it vibrant and alive." This can be achieved, for example, by strengthening the local resources that are in closest proximity to athletes and will have the most immediate impact on them, such as coach education and support for youth club team coaches. The findings of this research (see Appendix 2, 3 and 4) indicated that practitioners should be less preoccupied with attaining an ideal volume of training. Instead, they should focus on the quality of practice activities and relationships within their settings and on achieving better coordination between different practice settings.

The formal talent development system in Norwegian handball consists of diverse regional athlete development initiatives and national team activities facilitated by the Norwegian Handball Federation. The effectiveness of the national team pathway can be measured by observing how many of the athletes selected to the pathway emerge at the highest level as adult players: knowing the number of different players selected to such activities makes it possible to estimate the average number of players from each age category who can potentially progress to the elite level. If, for example, there are approximately 250 Norwegian adult elite players[6] in men's and woman's handball, and the average duration of an adult's career in the sport is approximately 10 years then, on average, 25 players born in each year (~50 players from the 2-year youth national team 'talent pool') will potentially progress to the national or international adult elite level. Effectively, this means that only a limited number of players can potentially progress to the adult elite level each year. It is plausible to suggest that players with more national team experience should have an advantage over players with less exposure to talent development initiatives. But the results show that the talent development system can be exhausting for some athletes and can increase the risk of receiving injuries that may potentially inhibit their further development. While this may suggest that the current operational model in Norway favours the 'survival of the fittest', the results of the studies in this thesis indicate that the reasons for the success or failure of pathways are far subtler and of a more coincidental nature. Qualitative investigations, I would argue, are valuable ways to identify and explore such nuances.

Studies of handball players show clearly that too much competition *and* high-intensity high-load training increase the risk of career-threatening injuries (Reckling, Zantop, & Petersen, 2003). Myklebust, Hasslan, Bahr, and Steffen (2013), for example, reported that 57% of all Norwegian adult elite female handball players in the domestic league suffered

[6] Data based on publicly available team rosters of elite clubs from the 2016-2017 season.

from previous or current shoulder pain. Similarly, Clarsen et al. (2015) demonstrated that there is a high prevalence of chronic knee and shoulder pain (20% and 22% respectively) among Norwegian female and male elite handball players; and Moller, Attermann, Myklebust, and Wedderkopp (2012) found that youth players are at higher risk of time-loss injuries than their adult counterparts and that previous injuries increase their risk of receiving new injuries.

Nevertheless, understanding the relationship between handball exposure and time-loss injuries is difficult. Though studies have found a higher prevalence of injuries in handball during match activities compared to practice activities (Moller et al., 2012), this does not explain the differences between successful and unsuccessful transitions to the adult elite level found in this thesis. Both groups in the final study of this thesis averaged 40 matches per year per season (23 to 58 matches among the five athletes who reached the adult elite level; 33 to 46 matches among the four who did not). No differences were noted in the number of matches played between the eight players who had experienced chronic and/or repeated injuries and the one female player who had been injury-free during her entire career. This may indicate that the association between match exposure and chronic and/or repeated injuries may be even more subtle: the total match capacity of a player might, for example, be more strongly linked to an individual's unique injury status, and/or to the match and training activities she has undertaken *prior* to entry into high school, and not simply to the absolute number of matches played. Policymakers and coaches often attempt to prescribe 'correct' or 'optimal' loads for athletes during different stages of athlete development. These apparent uncertainties raise doubts about the efficacy and appropriateness of such well-intended recommendations.

Coaches and athletes in the first, second and fourth studies (see Appendix 1, 2 and 4) noted that in Norwegian handball a strong emphasis is placed on the amount of training needed to reach the adult elite level. The results of this study suggest though that the intensity of the training load and competitions already verges on being too exhausting. Injury prevention programmes and prescriptive exercises are common strategies to cope with these pressures (Myklebust, Skjølberg, & Bahr, 2013). The benefits of intense training are undermined, even when injury prevention programmes are provided, if the potential loss of practice time due to injury exceeds the potential number of practice hours that could be gained by staying healthy.

The findings in this thesis present a fundamental challenge to the normative assumptions of many talent development practitioners – namely, that there is a 'right' way of training and that this way will always lead to better results (Denison & Avner, 2011).

Likewise, the self-reporting of the cohort athletes in the third study indicated that the adoption of a ‘one-size-fits-all’ pathway might be directly counterproductive to talent development. Acceptance of nonlinearity and emergence as features of athlete development pathways is a direct challenge to the predominant models of athlete development that focus on single variables or components.

5.3 Orchestrating talent development in Norwegian handball

In complex and nested organisations, the value of advanced planning is typically bounded by the limited control that actors (coaches or athletes, for example) have over systems as a whole. The second paper in this thesis (see Appendix 2) explored the concept of talent development in terms of ‘talent development orchestration’ and ‘coach orchestration’, and highlighted the improvisational nature and role of multi-centric leadership in talent development. Orchestration occurs at different levels: in the paper, the concept of ‘coach orchestration’ refers to the deliberate agency (individual actions) of coaches within a specific team context; the concept of ‘talent development orchestration’ refers to the emergent outcomes of subtle interaction effects (for example, the accumulated results of several coaches’ actions).

Athletes must be able to seize opportunities whenever they occur if they are to progress to the adult elite level. However, the study showed that the individual development of the athletes was nonlinear. A diversity of different team settings and initiatives provides many opportunities for collaboration, learning and innovation in the face of complexity (Ostrom, 1991). Wider mechanisms, too, including market forces, also contribute to the shaping of the continuous exchanges and interactions within the system and function across different levels and different team contexts. In general, these coupling mechanisms provide opportunities for athletes to practice and play upwards, sign new contracts, be selected to national teams, and take part in team-based talent development initiatives.

The fourth paper (see Appendix 4) examined these mechanisms in relation to transitions made to the adult elite level of Norwegian handball. Social forces and events outside the immediate context and beyond the control of the athletes impacted on transitions (for example, when the players were injured, fell pregnant or retired to other clubs). The findings of this study suggested that athlete pathways can only be pre-determined or planned in advance to a limited extent. Further, although institutionalised planning and programming may be necessary, it is not sufficient to sustain talent development. Increasingly,

contemporary sports coaching research shows that effectiveness in the coaching context is not dependent on a rule-based sequential process but on the quality of the social interactions between coaches and athletes (Cushion et al., 2006); on the recognition of the uncertainty inherent in the coaching process; and on improvisation (Saury & Durand, 1998). Athletes who successfully or unsuccessfully transitioned to the adult elite level shared more qualitative similarities than differences. Although players on the national team pathway performed better than their peers, this better performance was not a guarantee that they would be able to make a successful transition to the adult elite level.

In loosely-nested organisational networks, such as those in Norway, it is vital that those involved in talent development apply flexible approaches to facilitating and steering athlete pathways. There are few opportunities for traditional autocratic leadership in heterarchical organisational contexts. Individual autonomy is also limited becaue of the relations of power within team and club settings (players, for example, are not free to pick and choose different talent development initiatives). Like other systems, all heterarchical and multi-centric systems are shaped by political power, and the distribution of the gains from cooperation and interaction is the result of constant bargaining (Lubell et al., 2014). The conceptualisation of power within the Ecology of Games framework revolves around this focal point of mutual dependency between relatively autonomous actors. Because none of the individual organisational actors has instructional authority over another but, at the same time, each is mutually dependent on the others, power is negotiated in social relations within and between different team settings, sometimes explicitly and sometimes through the subtler influences of subjective experiences and practice. For example, the more dependent an individual athlete is on a specific coach or team setting, the more power that coach or team setting may have on the athlete. At the same time, coaches are also more or less dependent on certain players in their pursuit of team-based objectives. One could argue that the multi-centric organising of talent development provides athletes with more opportunities to choose between different team and school settings. As such, it provides them with relatively more power than they would have in a hierarchical model. Nevertheless, the constant negotiation over the objectives that influence an individual athlete between coaches in different team settings is a power struggle. Typically, it is a power struggle in which long-term talent development perspectives have a tendency to be downplayed at the expense of short-term team goals. In this study, the subtler workings of relational power were illustrated by the dominant perceptions of there being a ‘right’ way to practice and by the social pressures athletes experienced in relation to injuries and trauma. For example, athletes were sensitive

and anxious about how coaches and teammates perceived them while they were injured, and to how not being able to participate fully in all activities would potentially influence their team selections and playing time. For example, athletes were sensitive and anxious while they were injured about how their coaches and teammates perceived them, and about how not being able to participate fully in all activities might potentially influence their selection to a team and to their playing time.

As paper one (see Appendix 1) shows, these continuous negotiations occur within and across multiple team contexts, such as between different teams within a club, and between different organisational actors such as club teams, sport schools, and the national team. Social relationships, as Ronglan (2016) suggests, are the basic unit of a team, and team complexity increases dramatically as the size of a team increases. A consideration of the totality of relationships affecting the developmental processes of individuals in Norwegian handball would be overwhelming. It would be unproductive too, because as Cilliers (1998) correctly argues, it would be incorrect to assume that investigations of complexity can somehow account for, or model, the totality of things. Nevertheless, a recognition of complexity should inform the way in which coaches attempt to facilitate youth development and how they manage athletes who are selected to multiple teams and talent development initiatives. Many interacting factors influence individual development and make unpredictability and uncertainty an inherent part of the athlete development. A coach's framework for decision-making should therefore be informed by a deeper awareness of the effects his or her actions may have on athletes. Moreover, while specialist knowledge and sport science expertise might be useful, a coach's attention must extend beyond the boundaries of their own team or school setting, and include an appreciation of the interaction effects that arise within such systems. Raising the number of sport science specialists to increase the quality of sports training may, paradoxically, result in additional coordination problems, and create new and unexpected challenges.

The findings from this study show how athletes attempt to manage the different contexts in which they are located through negotiation and improvisation. In the face of uncertainty and incomplete information, coaches and athletes embark on incremental changes to the individual pathways leading to adult elite sport, stepping back and changing course, as needed. Similarly, those involved in leadership and policymaking in sport should also engage in constant and incremental adjustments – a 'fine-tuning' and 'orchestration' of athlete development pathways. Change and decision making can best be understood, as Lindblom (1979, p. 517) suggests, as "no more than incremental steps – no more than muddling." This

reality is what Chambliss (1989, p. 81) terms "the mundanity of excellence". Great performances, he suggests, are the result of a "confluence of dozens of small skills or activities, each one learned or stumbled upon, which have been carefully drilled into habit and then are fitted together in a synthesized whole." More realistic and practical models of coaching and athlete development management recognise that theoretical assumptions and policy decisions are better understood as guidelines, not prescribed rules, that direct the development and pursuit of more specific and operative goals in specific contexts (Andersen, Houlihan, et al., 2015). By utilising the viewpoints and experiences of athletes, the second and fourth paper in this thesis (see Appendix 2 and 4) show that it is possible to gain insights that can inform the role of coaches within talent development settings.

The study findings have several implications for the act of coaching. Firstly, a *flexible adaption* (Jones and Wallace (2005) of the orchestration of individual talent development is needed in team sports that goes beyond the adaption required to optimise the particular contexts of individual coaches. Optimising an athlete's particular team setting will not necessarily be the same as optimising a particular team setting for individual athletes. For some athletes, what is optimal on an individual level will be shaped by how well their different team settings complement each other. The orchestration of talent development therefore requires coaches *not* to act as individual agents striving to achieve their team's best performance.

Successful strategies for orchestrating talent development at both the individual and team level should focus on the role of coaches, and how coaches can contribute to the 'overall orchestration' of talent pathways through increased sensitivity and awareness of individual athletes and their training process. Coaches must be willing and able to adjust their own decisions and actions to those taken by the other coaches involved with the same players. This means that they must actively attempt to *notice* the changing needs of individual athletes, and that the act of noticing is a key process that will inform decision-making (Santos, Jones, & Mesquita, 2013). According to Denison and Avner (2011, p. 223), an "athlete's evolving needs will never be met when coaches' practices become routine and method-bound and athletes' problems are fitted to preconceived frameworks and solutions."

Coaches of talented youth athletes in team sports should acknowledge the dilemmas inherent in their role, and recognise that an understanding of an athlete's perceived experience can be an important development driver. I would argue that formal coach education programmes for planning and steering developmental processes should also incorporate strategies to recognise the role and impact of uncertainties within complex systems. Doing so

will enable coaches to move beyond instrumental approaches based on the belief that rational or best solutions can be found, and enable them to recognise that there are other potent (and sometimes better) strategies for influencing short and long-term athlete development.

Coaching is a continuous act of noticing and balancing dilemmas (Jones & Ronglan, 2017) and it is important to recognise that there may be no single best solution to the challenges that are faced. Doing so is potentially liberating for coaches, too, because it may free them from feeling that they have to figure out the 'right way' way to fix particular problems related to talent development. As Denison & Avner (2011: 224) write, this can be a liberation "both for individual coaches and coaching as a profession as the coaching act and one's coaching identity [can] become processes to reinvent over time and across changing contexts."

5.4 Towards more context-based models of athlete development

This thesis sought to answer the question of how the organisational context of talent development in Norwegian handball shapes and influences youth national team players' experiences and the development of athletes at the individual level. It also provided an opportunity to scrutinise models of athlete development that describe talent development processes in other domains or sports settings. In Chapter 1, I noted that Norwegian handball is an exceptional (or 'deviant') case compared to other successful elite sport systems. However, the findings in this thesis suggest that this deviant system is potentially relevant to the investigation of individual development in other settings.

Cushion et al. (2006) distinguished between models *for* and models *of* sports development[7]. The former, they contend, are idealistic representations (such as the Standard Model of Talent Development) and the latter are empirically-based. As noted, the causal relationships shaping talent development are neither clear-cut nor specific and the empirical reality of the complex social interactions within and between different contexts is messy. Despite this, current talent development models, both empirical and theoretical, often fail to reflect an adequate appreciation of the complexity and scale of the social and cultural processes influencing athlete development. Typically, they remain rooted in broad

[7] Though Cushion et al. (2006) discuss these differences in relation to the conceptual base of sports coaching, their argument is applicable to talent development.

categorisations and assumptions related to the activities involved. Linear causal relationships are assumed, for instance between the amount of practice and skill acquisition.

As my research has shown, pathways to the adult elite level in Norwegian handball are ambiguous and complex. Success or failure is hard to predict: athletes vary in terms of the number and nature of the activities they undertake, the sequence of their activities, and the time they spend at different practice and competition levels. Similarly, the ways in which individuals experience and develop vary to the same extent, even if athletes appear to experience similar opportunities, practices, and obstacles.

The findings in the thesis highlight the importance of challenging the normative assumptions of practitioners and sports policy makers who apply talent development models that resemble the Standard Model of Talent Development. The logic of many elite sport systems is rooted in perspectives that seem to be informed largely by mechanistic approaches to talent development (MacNamara & Collins, 2012). This means-focused rhetoric is often expressed in terms of concerns about the 'production' of athletes (Houlihan & Chapman, 2015); with 'effectiveness' rather than quality being used as a measurement of athletic success. According to Aggerholm (2015), instrumental rationality underpins much of contemporary sports science, including research about talent and development in elite sports. Typically, development is viewed as a linear process that progresses through clear, distinct stages of specific activities and experiences. However, Denison and Avner (2011, p. 221) argue that "instead of a coach understanding his or her training practices as formed through objective scientific research, and therefore incontestable, he or she could view knowledge as a social construction to "free" him or herself" [and] "still be incredibly effective." In the face of the uncertainties inherent in the workings of the talent development model in Norwegian handball, this approach may be fruitful.

In his existential discussion of talent development in sports, Aggerholm noted that "the means-end relations of this rationality … allows no reflection on the value or meaning of ends pursued" and may "lead to perceiving athletes as objects, leaving no room for considerations of individual meaning and subjectivity". This, he writes, "can hide qualitative aspects of practice and reduces the value of performance" (Aggerholm (2015, p. 14). In the heterarchical and loosely-connected talent development context of Norway, rationality is even less prevalent: development emerges through interactions and interplays between different factors within far more flexible organisational frames. Unpredictable events and coincidences are likely to occur more often. Successful individual development within more complex systems is, as Weick (1984, p. 43) suggests, a series of "small wins" which, he notes, "do not

combine in a neat, linear, serial form, with each step being a demonstrable closer to some pre-determined goal".

In this thesis, I have drawn attention to the complexity of individual pathways when examining the differences between successful and unsuccessful pathways to the adult elite level and when assessing transitions from junior to senior sports. Human development is shaped by complex and interlinked connections between psychological, biological and social factors (Bronfenbrenner, 2004). All learning is therefore situated within social contexts and is necessarily impacted and facilitated by the sociocultural factors influencing development (Lave & Wenger, 1991). Flyvbjerg (2001) argues that most exclusively cognitivist approaches interpret human learning as the product of rule-based problem-solving, rather than complex contextually-based social processes. These approaches inhibit the interpretation of talent development as a socially-situated practice embedded in wider societal settings (Storm, 2015).

Despite new and more holistic research trends in talent development, many models of talent development remain preoccupied with a focus on individual-focused explanations and interpretations (see for example, Araújo et al., 2010; Henriksen et al., 2010a). At best, models of skill acquisition and development in sports that focus solely on psychological or biological concerns at the individual level will provide only partial explanations of athlete learning and development. They may also neglect the impact of external coincidental influences, as well as the role of economic inequality and/or the limited abilities of teams or individual athletes. The qualitative data from this thesis highlight clearly that development is a socially situated practice in which *meaning* is essential to sustaining and facilitating development. As such, psychological and sociocultural perspectives provide important and complementary insights into human learning, and neither is a mutually exclusive perspective.

Many models (for example, the Developmental Model of Sport Participation and the Long-Term Talent Development model) are based on Ericsson et al.'s (1993) theory of deliberate practice, or variations thereof. There is still little evidence, however, that sheds light on what deliberate practice is or how it is manifested in specific sports practice activities, the organisation of practice, training methodologies, coaching, and the learning activities of athletes. Evidence of its effectiveness is also lacking. In contrast, empirical studies that have used dynamic systems perspectives have provided more extensive data and contextualised knowledge about the effectiveness of learning activities in team sports. These have tended to show that skills development is most effective when activities adequately replicate the constraints of the performance contexts athletes experience during competition (Pinder, Davids, Renshaw, & Araujo, 2011). This effectiveness depends on practice activities

mirroring (as closely as possible) the perceptual, temporal, situational, and relational team-opponent constraints of competitions, the ability to choose to act on intention and make decisions, and the affective dimensions of performance (Headrick, Renshaw, Davids, Pinder, & Araújo, 2015; Pinder et al., 2013; Travassos, Duarte, Vilar, Davids, & Araújo, 2012).

In this thesis, I chose not to examine the isolated practice activities of athletes and/or aggregated linear relationships. Instead, I focused on the accumulated interaction effects of various practice settings and idiosyncratic developmental paths and showed why the effect of such interactions might be described as 'emergent phenomena'. According to Capra and Luisi (2014, p. 319), "the process of emergence is thoroughly nonlinear, involving multiple feedback loops, …[and] cannot be fully analysed with … conventional, linear ways of reasoning." Ambiguity and uncertainty are inherent in all complex problems, but although complex problems encompass complicated problems, they cannot be understood as composites of complicated ones. A complex problem is an 'emergent phenomenon' rooted in the interdependent and relational nature of team sports.

An examination of the organisational context of talent development provides an excellent starting point for investigating talent development as a complex social process. A recognition of the importance of organisational context has profound implications for the organisation of talent development systems and elite sport policies, and for the direction of future talent development research. In contemporary literature on talent development it has been noted that mechanisms to promote lifelong sports participation and engagement are, to some extent, the same mechanisms that facilitate elite sports development (see, for example MacNamara et al., 2010a; Strachan et al., 2011). Almost all sport organisations and systems use twin track approaches that differentiate between elite sport and sport for all (Collins et al. (2012). However, participation, performance sport and elite achievement should be recognised as being on the same sporting continuum in which athletes can be empowered to transfer back and forth between different activities supporting performance, development and/or recreation throughout their sporting lives. In this system, "young elite performers can subsequently stay involved at a participation level whilst late developers or returners can attempt to move into [competitive performance oriented or personal referenced sport] at any age, practicalities notwithstanding" (Collins et al., 2012, p. 229).

It is fruitful for practitioners and researchers to recognise the value of this conceptualisation, as Collins et al. (2012) suggest, because it helps to overcome the dichotomies that underpin most sporting policies, and acknowledges the more complex social dynamics of skills development. It also reflects most closely the actual workings of the

Norwegian model in which all athletes are part of the same institutional arrangement and play and practice within the same competition structures, and where there is no systematic delineation between athletes who pursue a sports career and those who do not. Talented athletes in this context can emerge, disappear and re-emerge. Players are selected, de-selected and re-selected to different talent development initiatives, and are able to pursue different opportunities in club, school and even the federation settings throughout their adolescence.

Norwegian handball is a compelling case example which illustrates the value of talent development approaches that attempt to integrate efforts to promote sport talent development initiatives for all. It also clearly illustrative of how oversight in such systems is limited and can lead to unpredictable and unintended consequences. Improved coordination can probably be achieved, and doing so may potentially result in more sustainable long-term development for athletes.

Chapter 6| FUTURE DIRECTIONS

Future talent development research will benefit from a more extensive application of interdisciplinary approaches, a deeper awareness of the importance of context-sensitive knowledge, and an exploration of the subjective experiences of athletes. An appreciation of the role of contexts and subjective experiences is also important to decision-making. From a practitioners' perspective, I believe that attention should be directed away from trying to find 'optimal' strategies, and towards the more mundane processes facilitating development. Attention needs also to be given to the effects of the multiple interactions that continuously influence athletes and their everyday activities. In heterarchical and multi-centric systems, attentiveness beyond one's own team setting, flexibility, and mutual adaption are important to successful athlete development. A shift away from a preoccupation with more simple cause-effect correlations to the effects of (and thus, adaption to) multiple interaction effects is more in keeping with the concept of 'orchestration' and helps to draw attention more towards the outcomes of the processes involved (Ronglan, 2016).

A recognition of the deep complexity of talent development is vital. This recognition does not imply that there is little to gain from examining the constituent parts of development and performance in sport, and I would argue that each element of talent development must be considered including, for example, physiological, psychological or sociological components. Individuals are shaped by complex and dynamic social and neurobiological systems and new behaviours can emerge in nonlinear ways. Emphasising a single component, in isolation, could hinder an awareness among coaches and practitioners of how emergent processes influence athlete development, and how these processes affect the subjective and lived experiences of athletes.

Most scientific research on talent development to date has been based on approaches that have attempted to quantify and measure qualities that can be generalised across populations. Such research has tended to focus on specific aspects of performance or development, provided broad explanations for individual development, and has usually been undertaken within the confines of specific disciplines. In this thesis, I have pointed to the limitations of these more confined approaches in which elements of talent development have been analysed individually and separately. It is important to move talent development research forward by communicating across and beyond the confines of traditional disciplines and by supporting more interdisciplinary approaches.

Human interactions occur within social contexts, and talent development is influenced and spurred by a variety of social agents and societal conditions (Flyvbjerg, 2001). To gain deeper and more nuanced insights, research into the processes involved in athlete development will need to be informed by theories of complexity and incorporate more holistic, integrated considerations of both process and structure. Systems will need to be considered as a whole, and studies of systemic processes will need to go beyond mechanistic explanations. To date, such studies of systemic processes have tended to focus on the qualitative dimensions of the interactional and the relational, the nonlinear relationships that characterise development, the holistic nature of the influences shaping athlete development in sport, and on the synthesis of knowledge (Capra & Luisi, 2014). An examination of organisational settings, as this thesis has shown, can provide a strong starting point for investigating these processes.

I have also argued that focusing on subjective experiences is important when examining the developmental processes involved in talent development. This is because people's behaviours and conduct are based largely on how they interpret their contexts and on their subjective insights. "Human social systems," write Capra and Luisi (2014, p. 307), "exist not only in the physical domain but also in a symbolic social domain shaped by the 'inner world' of concepts, ideas, and symbols that arises with human thought, consciousness and language." I contend that a recognition of the role of subjective insights and the importance of personal experiences is highly relevant to sports science. It is a recognition that offers valuable opportunities to develop boundary-breaking research in, for instance, neurophysiological and neurophenomenological theories of consciousness (Capra & Luisi, 2014).

New critical approaches to understanding talent development will allow coaches and other practitioners to develop better and deeper insights (Cassidy, Jones, & Potrac, 2004). I have argued that the Ecology of Games framework, for example, provides an important alternative conceptualisation of talent development processes in team sport settings because it focuses on relations and processes. It offers a complex adaptive systems perspective that accounts for the role of agency across social settings and situates individual development within specific organisational contexts (Lubell, 2013).

Those involved in talent development must recognise the simultaneous, socially-situated and complex processes involved, and how these can affect planning, monitoring, and coordination. Chambliss (1989, p. 85) notes that, "doing more does not equal doing better" because "excellence is [also] a qualitative phenomenon." The complex organisational

landscape of Norwegian handball presents athletes with a wide range of opportunities and risks. Navigating the challenges involved in providing better and safer talent development requires attention to everyday, mundane activities across team settings. In turn, this allows those seeking to improve talent development to adapt to the dynamic needs of athletes so that more talented handball players can continue to 'muddle through', balancing potential risks and rewards, and identifying new possibilities.

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APPENDICES

Paper 1

Talent development as an ecology of games: a case study of Norwegian handball

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Christian Thue Bjørndal, Lars Tore Ronglan & Svein S. Andersen

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Talent development as an ecology of games: a case study of Norwegian handball

Christian Thue Bjørndal, Lars Tore Ronglan and Svein S. Andersen

Department of Coaching and Psychology, Norwegian School of Sports Sciences, Oslo, Norway

ABSTRACT
Structured talent identification and development, it has been argued, is one of the foundations of international sporting success and many modern elite sport systems have applied normative talent development (TD) models. The success of Norwegian handball, however, is based on an alternative approach to TD. Norwegian handball is characterized by a heterarchical organizational structure in which several key actors function highly autonomously. The aim of this article is three-fold: (a) to describe the organization of TD in Norwegian handball, (b) to identify how the inherent organizational characteristics of Norwegian handball have influenced the TD processes used and (c) to discuss if contemporary TD models provide an adequate conceptualization of the model used in Norwegian handball. This case study includes three units of analysis: (i) the overall organizational structure of Norwegian handball, (ii) the characteristics of the key actors involved and (iii) the inter-communication and collaborations of the key actors. The data sources were (a) documents and (b) interviews with 11 key informants. The informants were selected strategically to represent experienced coaches and professionals from multiple organizational units. The National Handball Federation uses a broad-based model for TD: 23% of male handball players and 15% of female handball players from the age of 13–17 years participate in regional-level initiatives in addition to practising daily in community-based volunteer sport clubs and sport schools. Findings reveal that the broad base of TD initiatives creates multiple access points to the talent pipeline for adolescents. However, because the heterarchical structure involves many actors, the unintended consequences are often related to (im)properly managing training and competition loads. There is a need therefore for well-developed coordination mechanisms and good communication between the key actors involved.

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Introduction

Structured talent identification and development systems have been shown to be key to national success in Olympic sports (De Bosscher, De Knop, Van Bottenburg, & Shibli, 2006). Policy recommendations have therefore promoted organizational models of systematic selection of talented athletes. Bailey and Collins (2013) argue that contemporary talent development (TD) models share common characteristics such as basing identification on early ability or physiological and/or anthropometrical measures, and by removing large numbers of athletes from the system in the progression from one level to the next. Bailey and Collins (2013) have termed these the standard model of talent development (SMTD). Although the use of the SMTD is common among elite sport policy-makers, Bailey

CONTACT Christian Thue Bjørndal christian.bjorndal@nih.no

and Collins (2013) argue that the model is undesirable for a variety of reasons, including its lack of conceptual validity because it implicitly presumes that development and performance in sport are conceptually simple, linear and predictable. To our knowledge, no studies have investigated the empirical validity of the SMTD, and we are unaware if alternative models are to be found in other successful sporting contexts. Further, although cultural conditions influence developmental paths towards elite sporting performance (Araújo et al., 2010; Storm, Kristoffer, & Krogh, 2012) little is known about how these variations may be the result of the specific organizational differences found in different sports and sporting cultures. As De Bosscher et al. (2006) suggest, further in-depth research is needed to provide an international comparison and comparisons on a sport-specific basis.

The Norwegian TD model, it may be argued, is an alternative to the SMTD and other national or professional elite sport systems such as the pyramid model of UK Sport, the nationalized Australian Institute for Sports' programme or Balyi and Hamilton's (2004) widely adopted Long-Term Athlete Development model, among others. Although these other approaches vary, they tend in comparison to be more centralized, specifically allocating resources to target early identification, thus assuming that progression towards the elite level is linear and/or moves through hierarchical levels. The Norwegian model includes voluntary sporting federations, local community-based multi-sports clubs and a high proportion of volunteer coaches (Ronglan, 2014). Sports participation is deeply embedded in Norwegian culture and nearly two-thirds of 16–19-year olds take part in sport 3–4 times a week or more (Green, Thurston, Vaage, & Roberts, 2013). The link between popular sport and elite sport in Norway is strong: all sports are organized and operated within similar types of organizational structures. Each individual sporting federation is responsible for the development of talent within their specific sport. While an overarching, elite sporting body has emerged over the last decades, this has supplemented the 'segmented organizational structure' rather than radically changed it (Andersen & Ronglan, 2012).

In this paper, Norwegian handball is used as an example of a successful Olympic and professional sport that has a TD structure rooted in the Scandinavian sports model. Focusing on this specific sport, the aim of this article is three-fold: (a) to describe the organization of TD in Norwegian handball, (b) to identify how the inherent organizational characteristics influence the TD processes and (c) to discuss if contemporary TD models provide an adequate conceptualization of the model used in Norwegian handball. This study is important for several reasons. First, it attempts to expand upon the emphasis on the 'cultural turn' in TD research which directs attention specifically towards an organizational level of analysis. Second, the study seeks to inform general theoretical perspectives in TD by examining these within more context-sensitive research designs. By choosing a Scandinavian sport, this study aims to provide a more nuanced picture of the heterogeneity characteristic of TD across different sporting systems. Finally, we hope that this study will contribute to making policy-makers and practitioners more aware of the constraints placed on athletes by the wider organizational context in which they are placed. This, we hope, will help to optimize efforts to manage TD processes.

Hierarchical and heterarchical TD models

The SMTD describes an implicitly hierarchical structure and assumes that talented athletes can be detected early in their sporting careers (Bailey & Collins, 2013). Athletes are continuously selected or de-selected through a hierarchy of higher level practice and competition. The focus, this model suggests, is on developing the skills of those identified as talented. The removal of large numbers of athletes from the talent pipeline makes it difficult for de-selected athletes to return to the talent pathway although they might demonstrate more potential than their peers at a later point due to individual differences in rates of development (Bailey & Collins, 2013). The SMTD, as such, can best be described as a 'pyramid model' of activities dependent on a strong and coordinated central governance.

The SMTD is rooted strongly in Ericsson, Krampe, and Tech-Roemer's (1993) concept of deliberate practice and its popular interpretation that it takes 10,000 training hours over a period of 10 years to

produce an expert athlete. Findings from sport research (e.g. Bullock et al., 2009; Soberlak & Côté, 2003) have shown that the amount of time needed to attain an expert-level performance varies greatly and highlighted the importance of the wide variety of developmental activities involved. Many contemporary elite sport policies are informed by the SMTD model and focus on the promotion of early sport specialization. However, as Moesch, Elbe, Hauge, and Wikman (2011) argue, there is very little empirical evidence in support of early sport specialization and critics have demonstrated that the negative consequences of early specialization may even lead to dropout (Capranica & Millard-Stafford, 2011; Jayanthi, Pinkham, Dugas, Patrick, & LaBella, 2013). The systematic selection mechanisms of the SMTD presume that it is *possible* to identify talented athletes at an early age. However, the prediction measures available are poor (Seifert, Button, & Davids, 2013) and the systematic selection biases found in sports (Baker, Schorer, Cobley, Bräutigam, & Büsch, 2009) undermine the effectiveness of early talent identification. The 'global sporting arms race' described by De Bosscher et al. (2006) has resulted in an incentive to import the TD models from 'successful' nations 'for uncritical reproduction in the home environment' (Collins & Bailey, 2013, p. 183) and the introduction of models similar to the SMTD. However, there is reason to doubt whether the contemporary models of TD and organization in many elite sporting structures have sufficient scientific validity. As Collins and Bailey (2013, p. 184) suggest, it is 'the illusion of scientific credibility and validity [created by sports policy makers] that provides a degree of authority to otherwise dubious ideas' in TD.

An alternative conceptualization to the hierarchical form of the SMTD is the notion of an 'ecology of games' (EG). Long (1958) derived the concept of the EG during research on local communities to better describe the dynamics inherent within organizational structures, and suggests that such groups comprise interrelated formal and non-formal groups that consistently interact with others based on their own interests and aims, and form the driving force for collaboration and competition. The concept of the EG has been applied as the foundation for theoretical frameworks when researching complex organizations (Dutton, 1995; Lubell, 2013; Lubell, Henry, & McCoy, 2010) and is a fruitful alternative conceptual approach, particularly when analysing organizations characterized by multi-centric structures rather than strictly hierarchical ones. Multi-centric or heterarchical organizations can be defined as systems of governance of mutual constraints and influences (Reihlen & Mone, 2012). Hierarchies, in contrast, have an unambiguous systemic order; heterarchies have multidimensional governing structures. The added value of the EG framework relates specifically to its acknowledgement of how organizational actors' different perspectives and incentives create and drive behaviour where multiple autonomous actors are a fundamental part of the organizations' existence. Our adaption of the EG framework in this study uses four main concepts: policy institutions, policy issues, policy games and policy actors. Policy *institutions* are defined as sets of formal rules and informal norms that structure the 'operational' rules that actors use to govern on-the-ground decisions about particular policy issues (Ostrom, 1991). In the context of Norwegian handball, the institutions consist of the values, rules and norms underpinning organized sport in voluntary organizations and the educational system (here, upper secondary schools). Policy *issues* involve 'some type of substantive collective-action problem' (Lubell et al., 2010, p. 289), and in the case of Norwegian handball, the issues are talent identification and development. Policy *games* are 'arenas of competition and cooperation structured by a set of rules and assumptions about how to act in order to achieve a particular set of objectives' (Dutton, 1995, p. 381). Such rules and assumptions in this instance depend primarily on how the concepts 'talent' and 'development' are understood and the subsequent questions of the scale, scope and time frame involved. Finally, policy *actors* have some 'stake' (ref 'stakeholder') in the outcomes of policy games and the resulting rules governing specific issues. Actors can be 'individual resource users or political actors like agency officials, interest groups, or elected officials' (Lubell et al., 2010, p. 290). In the context of our research, the actors range from club coaches and volunteers at the local level, to officials and politicians at the regional and national levels, and institutional actors such as clubs, sport schools and the National Handball Federation (NHF).

The EG framework assumes that 'uncertainty is rampant' (Lubell, 2013, p. 545) within the world of talent management, due to the limited information available to the actors involved. No actors are

ever fully aware of the initiatives of other actors, or of how decisions made by one actor might affect the decisions made by others, or of the strategies and preferences of others. While some actors may have more knowledge or awareness about other actors, no single actor is able to see the full picture. Nor are stakeholders often able to appreciate how decisions made in one context may have spillover effects. As Lubell (2013, p. 546) claims, this suggests that stakeholders 'have minimal capacity to consider the full consequences of their [own] decisions'. A lack of understanding may lead to unintended consequences. How then can one achieve coordination within a complex, polycentric system? The EG framework potentially provides a different perspective on institutions in this regard. Rather than looking for a *specific* efficient policy tool, the EG approach leads to a different question: 'How [does] the overall structure of the political system balance […] the benefits and costs of institutional complexity?' (Lubell, 2013, p. 547).

Method

The study was designed as an embedded case study of TD in handball. The context of Norwegian handball provides the analytical frame for interpretations (Miles & Huberman, 1994). The units of analysis in our study were the overall organizational structure of Norwegian handball, the key actors and their characteristics, and the intra- and inter-relational processes between the actors. The key actors examined were (a) local community-based clubs, (b) sport schools and (c) the national and regional TD initiatives offered by the NHF.

Both the principal and second authors have several years of coaching experience in Norwegian handball and therefore command a thorough understanding of the study context. This experience informed our analysis at all stages of the research process.

Case selection

The subject of Norwegian handball was chosen because it is a major competitive sport in all the Scandinavian countries, characterized by sustained international success and broad participation. We selected the informants strategically so that the study sample represented the broadest range possible across the organizational structure of Norwegian handball. Doing so enabled us to develop a deeper and comprehensive understanding of this sport. Participants had to meet all of the following inclusion criteria: they had to (a) be experienced coaches and professionals within Norwegian handball, (b) have experience in different units within the organizational structure and (c) be easily accessible and willing to share their perspectives. There were three women and eight men among the interviewees; the average age was 39.2 years (ranging from 29 to 63 years old); all had a minimum of 10 years of coaching experience; all had youth coaching experience; 8 had elite coaching experience and 6 had coaching experience from sport schools; all had NHF regional-level coaching experience; 6 had coaching experience from the youth national team; 4 had NHF administration experience and all but one currently worked professionally within Norwegian handball.

Research methods and instruments

The data sources for this study were (a) documents and (b) semi-structured interviews. Data were gathered during 2014 as part of an ongoing longitudinal research project on TD in Norwegian handball. We collected all available public documents concerning youth sport policy and TD from the NHF. This was restricted to the strategic plans for the last two election periods (2009–2013; 2013–2017). We also gathered public policy documents from two private and one public sport school programme. Further, we were granted permission to access and analyse several internal NHF documents from workshops, evaluations and strategy meetings that had served as the basis for decisions relating to TD. We found no substantial policy documents in the clubs we visited. The first author conducted the in-depth interviews. The interviews lasted between 1 and 2 hours and were recorded and

transcribed before being translated into English. In the first part of the interview, respondents were asked to describe the structure of their organization, and their objectives and practices in relation to TD. In the second part of the interview, respondents were asked about the communication and coordination processes between their own organizational units and other actors. Finally, the interviewees were asked about their general views and concerns about TD processes in Norwegian handball. The transcripts were sent to the interviewees to enable them to verify or refine their statements. This gave them the opportunity to provide additional information or elaborate on the ideas discussed.

Data treatment and analysis

The analysis was conceptually driven and aimed to synthesize the wide array of data material available to create a holistic and detailed account of the TD model. The documents were read and content-analysed to provide a preliminary overview of the organizational frame, each actor's aims and objectives, and their core strategies prior to the interviews. In the first part of the data treatment, the transcripts were read several times to enable us to familiarize ourselves with the data. We then applied the conceptual framework outlined by the ecology of games to develop a provisional scheme for the first cycle coding (Saldana, 2013). The main categories were (a) the actor's organization at the specific contextual level and (b) the interactions between the different actors. Further sets of subcodes were developed for each category during the initial coding process. All the interviews were coded using computer-assisted qualitative data analysis software (MAXQDA v11.1.5) to make it easier to organize and manage the data material. In the second cycle of coding, we searched for patterns that could help to interpret the relationships between the different actors within the overall structure of Norwegian handball and the actor's influence on the individual TD paths of athletes. This resulted in an empirical network model that mapped incidents, issues and concerns relevant to actors and their connections with other actors within the structural context of Norwegian handball. Interpretations and explanations of the data were discussed until agreement was reached between the authors. All quotes are presented with a brief description of the specific context but do not specify which interviewee said what. This has been done to ensure that the level of comparison was between the different organizational actors and not at the individual level.

Results

In this section, we first present a description of NHF's overall policy on TD, then map out the relevant organizational structures, and the perspectives of the key actors involved. Finally, we present the distinguishing characteristics of these organizational arrangements that create both unique possibilities and challenges for the TD of athletes.

TD in Norwegian handball can best be described as a complex web of diverse actors and initiatives. Those involved include clubs, sport schools and the national and regional levels of the NHF, all of which in combination influence the course of the athletes' development. In Norwegian handball, a strong centralized structure is absent because the federation is a broad-based voluntary movement. The starting point for TD is club-based practice and competition. Efforts by the different organizational units to introduce developmental activities mean that athletes face increasing TD demands throughout adolescence (Table 1). When different actors are involved at the same time both the complexity and intensity of practice activities and competitions necessarily increases. This creates coordination challenges that need to be addressed to ensure that TD is purposeful and that the negative impacts are minimized.

Overall perspective on TD

The NHF consists of a national-level administration and seven regional offices across Norway. The national administration is responsible for (i) the overall content and organization of TD,

Table 1. The TD initiatives of the main actors in youth handball throughout adolescence

Age	13	14	15	16	17	18	19	20
Club	Club training/regional championships/tournaments							
		U14 national champ		U16 national champ		U18 national champ		
NHF Regional Level	Local and regional player development							
		National talent camp	Youth national team regional recruitment					
			U15 national champ for regional teams		U17 national champ for regional teams			
School				Upper Secondary School	Upper Secondary School	Upper Secondary School		
NHF National level		National talent camp	Youth national team					
				U16 European Woman's	U17 European/ World	U18 European/ World	U19 European/ World	U20 World Men's

(ii) the facilitation of youth national team activities and (iii) cooperating with regional-level organizations (NHF responsibility matrix, 2010, p. 1). Institutions at the regional level are responsible for (a) implementing the national TD strategy, (b) identifying talented players, (c) establishing regional development initiatives, (d) operating the regional youth national team recruitment activities and (e) facilitating the regional championships and tournaments (NHF, 2010). Each regional office has its own governing board and administers its own finances.

The NHF uses the term 'player development' in their documents and communication, rather than the more international and commonly used term 'talent development'. One NHF administrator described what she understood by this term: 'We've discussed what we think … [of as] "player development". It is often linked to becoming a national team athlete, but that's a very narrow definition of player development'. Further, it is 'the broad base of handball players that participate in NHF player development initiatives' as the NHF states, 'that is the foundation for developing talents to elite handball' (NHF, 2013b, p. 4). Player development, we would suggest, is therefore relevant to all those involved in different NHF initiatives. The explicit purpose of this player development model is to 'facilitate … [the] holistic development of talented athletes towards … [the] national and international level' (NHF, 2013b, p. 9), based on an acknowledgment of the interplay between school activities, club activities, the NHF regional-level activities, the NHF national-level activity and individual needs.

Autonomous regions and differentiated initiatives

The aim of the NHF's regional-level initiatives is talent identification and player development, although no resources are allocated to actively scout for talented athletes. Instead, the initial development initiatives are broad-based. In the 2014–2015 Norwegian handball season, a total of 30,000 players took part in the age category 13–17 years; 23% of all the male players and 15% of all the female players in this category took part in regional-level player development initiatives (NHF, 2013a) (Table 2). Clubs nominate players aged 13 or 14 years to take part in player development activities. These players then get selected/de-selected by NHF regional youth coaches each year as the regions begin to narrow the selection of the participants involved. Our interviews revealed that the degree of interaction between the regions and the other actors involved (such as clubs, schools and the NHF national level) differed considerably from region to region. Interpretations of what constituted 'holistic development' differed between actors in terms of what was required in terms of communication and coordination. Some regions created specialized programmes for club coaches and selected players; other regions reported having almost no interaction with other actors.

Player development activities at a regional level consist mainly of a series of monthly single training sessions throughout the handball season. These sessions are directed towards individual development and differ in content from club practices in which more time is used to prepare the team. Geographical and demographic conditions vary across the country and each region is given leeway in terms of their organization of activities, hiring of coaches, and in the content and amount of training sessions. As one NHF regional administrator observed: 'I can't remember a clear directive from above, but I don't think that's negative. I've experienced that as a positive trend throughout my years in the organization'. However, our interviews revealed that the content of the player development model is used as a common frame of reference throughout the different regions; each region makes local modifications to the model rather than implementing radical changes.

Extensive influence through youth national team activity

The national administration of the NHF manages the youth national teams. The objective of the national youth teams is (a) to qualify the team for international competitions and (b) to promote individual skill development that can lead to international success at the adult level, and this is achieved through 'finding and promoting handball talent that have long-term development potential' (NHF, 2013b, p. 12). These dual objectives do not always fit comfortably side by side, and can be hard to realize in practice, as one youth national team coach note:

> In a way the NHF speaks with two tongues: they talk about long-term development but when it all boils down [to it], most [are] concerned about results. […] Nobody gets a flower at a coaching meeting if you got an 8th place … [even if] you may have done good developmental work.

Selection and identification are undertaken in cooperation with actors at the regional level. In each region, players from the broad-based regional player development system are selected to a regional youth national team recruitment group. From here, national youth team coaches select those who will represent the youth national team in national training camps and international competitions.

Table 2. The rate of participation in NHF regional development initiatives

% of active players involved in regional player development activities		
	Men (%)	Women (%)
Age 12	3	2
Age 13	23	15
Age 14	28	19
Age 15	33	18
Age 16	24	12
Age 17	31	17

The amount of time athletes spend in the youth national team is extensive: an average of eight gatherings per year, ranging from 4-day training camps to 14 days of participation in international championships. The intensity of this activity was acknowledged by another youth national team coach: 'You are very privileged if you're in the national team in Norway when it comes to the number of training camps [and its level of influence]. If you compare us to other countries we can't complain.' Although selections sometimes are rotated, the amount of training still places a significant load on those most frequently selected when we review how many times the most central players are participating.

The national youth team has no instructional authority either at a school level or a club level but, nevertheless, is an influential actor upon the TD of those players selected. However, the degree of coordination and communication between the national youth team and other key actors, such as clubs and sport schools, varies considerably. Few resources are allocated to this objective.

Team-based development in community-based clubs

An empirical observation is that sports clubs play a key role in the day-to-day TD of athletes. Club services are voluntary-based and function as autonomous units within the overall organization of TD in Norway. There are no systematic differences between elite and non-elite clubs in youth handball, and people identified as talented athletes train and compete within the same overall organizational framework as the less ambitious and less skilled athletes.

Most clubs do not have professional sports directors or management personnel to attend to youth development issues; in both elite and non-elite clubs, the management consists of volunteers. This limits the capacity of the club management to be involved in day-to-day sport issues such as supporting coach or athlete development. One coach quoted his club director as saying, 'I just know a quarter of what you actually do, and I don't want to know any more either, because I'm a volunteer with another professional job so I don't have the time to get asked about everything you need'. This means that the teams can be highly autonomous even within their club, and that they can facilitate and organize their practices with little interference from the club administration. Similarly, youth coaches at the sports club level are mainly volunteers and/or parent-coaches and there is no formal licencing requirement for coaching youth in Norway.

For most clubs, their key objective is team-oriented and often relates to qualifying and competing in regional and national championships. TD is therefore not a primary objective, but a by-product of practising for competitive activities. The coaches must therefore negotiate continuously the short-term team performance goals of the club and long-term athlete development. But, as noted earlier, the importance placed on performance goals and results in competitions does not always fit well alongside strategies to promote long-term athletic development. Coaches must give careful consideration to how to achieve this balance as one elite coach who is also involved in youth development elaborated:

> I've just finished the strategic sports plan for my club and one goal is to qualify for the youth national championship, but it does not say anything about trying to win gold. (…) But I've been there myself … I've got 5 gold medals from the national U18 championship and did everything I could to win it. It's something that you eventually reflect more upon when you're not that concerned with the results and your own CV anymore.

Individual-focused development in sport school programmes

Sport schools are professional institutions within the Norwegian school system that combine the standard three-year academic high school programme with sport-specific practice sessions two to five times a week. The schools operate autonomously and their primary objective is TD of athletes.

Because the sport schools do not participate in competitive activities, such as tournaments, championships and leagues, they are the only key actors within the system with opportunity to focus

exclusively on long-term development issues. A sports director at a renowned sport school provided the following account:

> Our goal is to develop as many players as possible to the top national and international level. However, we are not primarily responsible [for this] because we are a supplement to the club activity. We have identified three areas where we think the clubs maybe lack focus: technical training, individual tactical training and physical preparation.

Most sport schools recruit from their local and regional environments. The total training loads of athletes increase considerably when following the move from middle school to high school. This is because athletes then are required to have a school sports programme on top of their increased club-training load. This may result in training overload and potentially increase the risk of injuries —an important challenge that makes good, well-functioning club–school coordination a necessity. The school officials we spoke to strongly emphasized the interplay and ongoing dialogue between the school and other clubs. 'The starting point', the interviewee, an experienced coach, argued,

> … is always the needs of the individual student. Our best athletes have a flexible week and they can significantly influence their training content. If they want three physical sessions they can have that and if they want three technical sessions they can have that.

However, our findings suggest also that the degree of cooperation, communication, support for student autonomy and student empowerment, in general, varies according to local conditions and circumstances. This will be discussed in the following sections.

Differentiation, coordination and professionalization

Three key concerns related to TD were identified during our interviews and document analysis: (a) the need to differentiate between the objectives of different TD initiatives in Norwegian handball, (b) issues related to inter- and intra-level coordination and (c) concerns coaches had regarding volunteerism and professionalization.

A precondition for the success of the Norwegian model is that the initiatives complement one other and that the range of options, collectively, contributes to optimal individual development. The coaches we interviewed also highlighted the need to differentiate clearly between the objectives of each of the organizational units involved. This, they argued, would help to better facilitate holistic athlete development. It can be argued that this is particularly important given that in the Norwegian model players can participate in several developmental arenas simultaneously that are at different levels of the organizational hierarchy. One club coach, for instance, observed that good intentions could have negative consequences: 'It's a balancing act', the coach noted, 'who should participate in the different developmental groups? … good initiatives … could generate lots of motivation, but the NHF must discuss what their goal is'. At the level of club organization, for example, result- and development-oriented goals may collide, as another U18 club coach argued:

> There is a result-oriented goal in my club contract. I thought this was strange as our primary objective is to develop players to the elite level (…). It is possible to win the national championship without doing a very good job with TD.

A higher number of TD initiatives increases the number of actors involved and requires a great level of coordination. A talented 17-year-old player, for example, may regularly relate to more than 10 different coaches in various arenas, such as club teams, schools, regional activities or national teams. At the local level, it is therefore essential that clubs and sport schools communicate and cooperate, though the extent and success of this will vary between sport schools and because of specific local conditions. An elite coach with extensive experience from all actors and organizational units suggested:

> In general, I think the school lives its own life, the school coaches do their own thing, and it becomes secluded from what's done in the clubs. […] I have now got one player in the elite team who is also in the

> sport school where I teach. It's much easier to fine-tune his training process than the others that attend other sport schools.

The involvement of numerous actors in this sphere means that there is a challenge in finding the balance between the benefits of training and competition and the risks related to overload/overuse. A lack of coordination may, for example, lead to a potential increase in injuries and overload because of training intensification when athletes are selected to take part in regional and national TD initiatives. This has led coaches to advertise for more principal discussions regarding talent management within the NHF, and one U18 club coach highlights that good intentions may lead to negative outcomes:

> Think how much motivation [a] selection to the youth national team generates. (…) You'll get a lot of input, guidance and attention, but I don't know if it's player development or if it's more about motivation. Does the national youth team help the player to become better or does it have the opposite effect: you're participating too much so you get injured?

Club coaches, aware of possible unintended consequences, suggested that more resources should be allocated to the coordination and management of handball talent at the regional and national levels. An experienced coach argue:

> I think that the NHF needs to shift its focus to national youth team athletes and their total regional and national team activities. […] The national youth teams should have their own coordinator in the organization because I don't think it's good enough today.

Coordination is dependent on inter-communication between actors and efficient communication is dialectic. As one coach noted: 'It doesn't help to get an email containing information about what's done at the youth national team training camp if you don't hear anything until the next camp. That's not tenable, especially in relation to the medical team'. Further, policies and practices vary between different regions. Coaching may be provided in some instances by hired part-time help who receive minimal economical compensation; in others, training may be provided by paid full-time professionals. Such variation impacts on the extent to which it is possible to put in place well-coordinated organizational mechanisms. Many regions have part-time coaches, but many coaches we spoke to suggested that hiring fewer coaches and giving them greater responsibility would be a better strategy to promote long-term TD. As one coach proposed: 'The same persons should have responsibility for the different groups over a longer period of time or they should follow one age class through.'

In summary, it can be argued the heterarchical organization of TD creates an integrated web of activities and actors, and provides multiple developmental opportunities. However, this embedded complexity *increases* the need for integrated coordinating efforts from the actors involved. It is difficult to determine or define the overall responsibility for individual players: all have claims and varying investments, all are involved in different ways and all have varying degrees of involvement, experience and competency.

Discussion

The organization of Norwegian handball does not fit the conceptualization of hierarchical TD programmes described in the contemporary sports policy literature (De Bosscher et al., 2006). However, it has been a successful model for sport in Norway, reflected both in terms of the number of international medals won and the rate of participation. From a methodological point of view, this case is both *critical* and *unusual* in the sense that it demonstrates an alternative to other contemporary, more strictly structured TD programmes, and *revelatory* because it provides insights into how a wider organizational frame influences opportunities and challenges for individual development.

Our findings indicate that the governance of TD in Norwegian handball is not based on strict top-down implementation. Instead, it is a system characterized by multiple developmental efforts

initiated by a range of actors at different levels. This structure can best be described conceptually therefore as heterarchical rather than hierarchical. TD in Norwegian handball is a polycentric system (Ostrom, 1991) in which the TD pathways of the athletes are a product of the interplay between organizational actors at several levels. In an EG perspective, the different organizational actors are all understood as different games, and each game has several stakeholders (e.g. players, parents and coaches) who participate in several games simultaneously. TD in Norway, as an EG framework, 'adopts a complex adaptive systems perspective where policy outputs and outcomes are the function of decisions made in multiple games over time' (Lubell, 2013, p. 538). This suggests that successful TD in this heterarchical model is not merely dependent on the individual significance of key actors, but also how well individuals complement each other in producing an intended outcome. This understanding resonates with Bronfenbrenner (2005, p. 52) who claims that

> the capacity of a setting […] to function effectively as a context for development is seen to depend on the existence and nature of social connections between settings, including joint participation, communication and the existence of information in each setting about the other.

From an EG perspective, the understanding of the different objectives of the actors involved is a central focal point. This is because 'policy outcomes emerge from actors pursuing their self-interest in multiple, interdependent, and rule-structured games' (Lubell et al., 2010, p. 287). Self-interest, from this perspective, is manifested in teams as competition and collaboration between players because athletes are both mutually dependent on one another as well as competing against each other (e.g. for playing time) (Taylor & Bruner, 2012). However, it is the team and not the individual that constitutes the performance unit and this means that coaches often focus on team performance although different players have different individual needs. The goals of cooperation between key actors may also be complex or even conflicting and have unintended consequences. Bednar and Page (2007) term these unintended consequences 'payoff externalities', suggesting that they may occur in situations where actors are unaware of how their decisions in one game might affect the outcomes of other games. A coach may, for example, lack the ability to prioritize team resources and send overused athletes to play. Similarly, athletes may be impacted by what Bednar and Page (2007) term 'strategic externalities'—that is, when cognitive constraints result in players using the same strategies in different games, even though doing so is not appropriate. We suggest that athletes in Norwegian handball need to actively engage with a range of coaches and social environments; balance important and less important advice; and manage diverse training approaches in order to develop successfully.

The unintended consequences common to multi-centric organizations may stem from actors lacking sufficient awareness and understanding. Research findings from other organizational contexts have shown that stakeholders do not always share the same perceptions and have incomplete or inaccurate insights into the choices and decisions of other key stakeholders (Pankhurst, Collins, & Macnamara, 2013). However, in this study of Norwegian handball, it was evident that the coaches had a range of experiences gained from working in or with different organizational units, were often involved with several actors simultaneously, and were able to understand and empathize with the perspectives of other actors. This, we would contend, is helping to facilitate informal coordination mechanisms within Norwegian handball. The high level of mobility of the actors within the handball organizational system might also be explained by the egalitarian structure and low levels of formal professionalization that characterize this Scandinavian sporting model (Ronglan, 2014).

Access to learning environments is essential to the realization of potential performance (Bailey & Morley, 2006). Well-functioning heterogeneous and multi-centric overall organization creates multiple learning environments that can coexist simultaneously and can provide opportunities for 'strategic venue shopping' (Lubell et al., 2010). 'Each game provides different opportunities for the involved actors to acquire resources and achieve policy goals' writes Lubell et al. (2010, p. 291), and participation in multiple TD initiatives can therefore be beneficial to athletes. Compared to 'pyramid' or hierarchical models, in which the systematic exclusion of players is key, a broad-based

heterarchical TD model may be more beneficial both in terms of participation (more players are included) and the long-term identification of talent (early cross-sectional identification has a low level of prediction). A 'weaker' organizational form, we would contend, provides opportunities for more players in the talent pipeline and helps to increase the availability of multiple access points. Findings from studies of Swedish public school policy have reported a trend towards the separation of elite, performance-oriented sports from sports which are accessible to all, a process mirroring the 'sportification' of society (Lund, 2014). However, in our research on the organizational model of Norwegian handball, we identified no legislative attempts to segregate performance-oriented sports from sports characterized by broad participation. This lends support to the suggestion by Collins et al. (2012) that there is a participant continuum within sport in which the development of any particular type of orientation (e.g. towards participation for well-being) on this spectrum may later facilitate other, different types of orientation (e.g. towards elite development) or vice versa. This, in effect, creates opportunities for players to exit and re-enter the talent pipeline during their development. We hypothesize that this is one plausible explanation for the diversity of pathways towards elite sports found in Scandinavia (Storm et al., 2012).

Heterogeneity and multi-centricity in sporting organizations results in increased system complexity. The diversity of TD opportunities and pathways available to athletes may be regarded as positive. But this diversity may also impact upon athletes negatively. In particular, it is critical to manage transitional periods carefully, in which there is an increase in the number of actors involved and initiatives available. According to Wylleman and Reints (2010), transitions in athlete development also often coincide with changes at an educational, psychological and vocational level in adolescents, and coaches and administrators need to integrate a holistic focus when addressing individual capacity, appropriate demands and individual needs. Recent findings have shown, for example, that developing athletes may experience a tension between their academic, sporting and social lives when they are in upper secondary school (Henriksen, Larsen, & Christensen, 2014), and cooperation across all actors and organizational units within Norwegian handball is therefore critical. In their international review of sports schools, Radtke and Coalter (2007) noted that closer working relationships between sporting federation's and closer liaison with elite pupil's local sports club and coaches are key to successful integration of efforts. Further, as Bailey et al. (2011) have suggested, an emphasis on multi-agency collaboration should characterize any effective promotion of player development. Our findings support the suggestion that this closer cooperation is crucial when multi-centricity is an inherent part of the overall organization. As such, the practical interpretation of 'holistic' player development should involve strategies to communicate, cooperate and coordinate across actors involved in TD.

It is important to take into account that the TD model is, at least partly, an implicit consequence of cultural values and societal norms. To provide an example, because the Norwegian child sport regulations impede formal result rankings for children's sport, sport federations cannot formalize talent identification before the age of 13 (Andersen, Bjørndal, & Ronglan, 2015). Although the social legitimacy of elite sport development in Scandinavia may be under pressure, it is not plausible to believe that the multi-centric organizational model is currently threatened (Ronglan, 2014). However, if increased resources were to be spent on fewer athletes it would be a warning call that may lead to fundamental changes in the TD model. In comparison to the SMTD, the Scandinavian sport model still balances mass participation and elite sport development within the same united organizational framework, contrary to sport organizations that treat these as distinct concerns (Collins et al., 2012).

Future directions

Sports policy research has suggested that models that resemble the SMTD are of special importance to smaller nations such as Norway (De Bosscher et al., 2006). However, our findings show that the SMTD model lacks empirical validity in the context of Norwegian handball. Research into other sporting contexts, we would argue, may also reveal that systems that are apparently hierarchical may, in

reality, be more nuanced and closer to being an 'EG'. Future research in this field will need to focus on how institutions and sociocultural conditions make it possible for individuals to develop towards professional excellence. Collins et al. (2012, p. 235) argue that 'whilst the different factors impacting on engagement [or elite development] can be profitably analysed as discrete elements that offer value, they should not be used solely in isolation as the basis of policies and recommendations', but need to be understood in an interplay. As such, a next step in more holistic TD research will be to uncover how successful and unsuccessful pathways to elite sport may be either promoted or inhibited by the organizational context itself.

Disclosure statement

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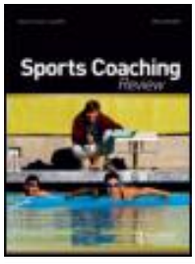
Paper 2

Orchestrating talent development: youth players' developmental experiences in Scandinavian team sports



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Orchestrating talent development: youth players' developmental experiences in Scandinavian team sports

Christian Thue Bjørndal and Lars Tore Ronglan

Department of Coaching and Psychology, Norwegian School of Sport Sciences, Oslo, Norway

ABSTRACT
The aim of this study was to investigate athletes' contemporary experiences of their pursuits toward the adult elite level within a Scandinavian team sport setting. The athletes in this study were involved in multiple teams that were led by different coaches. 12 youth handball players, aged 16–17 years, with national team experience were interviewed in-depth. The interviews were transcribed verbatim and an inductive analysis was undertaken. The findings revealed five main themes central to the players' pursuits: (a) time pressure and prioritising; (b) complimentary influences; (c) conflicting goals and demands; (d) balancing load and recovery; and (e) coordination challenges. The conceptual notion of coach orchestration is shown to be potentially relevant to understanding the role of coaches involved in talent development. In this paper, the concept of coach orchestration is expanded to encompass what coaches must consider to facilitate individual development *within* and *across* different team settings.

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Sports coaching; orchestration, team sports; player development; athlete development; handball

Introduction

In this paper, we investigate contemporary experiences of youth national team athletes in their pursuit towards top-level competition. The aim of the paper is to discuss how the findings of the study can inform the practice of coaches in Scandinavian team sports or similar settings. Youth players take part in different teams at the same time and must therefore relate to multiple coaches during adolescence. National team players at the age of 16, for example, may be part of an U16-club team. At the same time, they may also be a member of a senior first and/or second team, a school sport programme, and be involved in different national team activities. Attention in our study is directed particularly towards how team sport athletes experience and navigate the social landscape of different coaches

CONTACT Christian Thue Bjørndal christian.bjorndal@nih.no

and varied team settings. To date, little attention has been paid to the perspectives of youth athletes located in such contexts, and how their viewpoints may have implications for the role of coaches.

Coaches play a crucial role in talent development (TD), as Burgess and Naughton (2010) emphasise. Nevertheless, we know little of the *how* contextual conditions within particular sporting contexts influence the role of coaches involved in TD. Bailey and Collins (2013) argue that contemporary TD models in sport are based on presumed sets of logic that are highly questionable. They refer to these traditional understandings of TD as the Standard Model of Talent Development (SMTD). The SMTD is characterised by a belief that early performance holds predictive value (Bailey & Collins, 2013). Further, in the SMTD the sole focus for coaches is the progression of athletes who are identified as talented, and the removal of those who do not make the cut. There is little empirical evidence in TD research, however, to support the basic tenets of the SMTD. Burgess and Naughton (2010, p. 111) argue that existing models of TD "evolve from case studies in closed-chain sports" and that "strong markers of development in team sports (…) are equivocal". "Standardised evaluation tests often reduce a simulated performance context to static situations in a controlled setting instead of considering the dynamics of skill acquisition as a perpetually changing non-linear process" (Seifert, Button, & Davids, 2013, p. 168). Individual sports, such as athletics, typically focus on specific, isolated physical capacities that are potentially relevant to TD. But evaluations of talent in the context of team sports are particularly problematic because the skills required are multidimensional, relational, role-specific, and complementary within a particular team setting. Skills development is also non-linear (Abbott, Button, Pepping, & Collins, 2005) and, in the context of team sports, there is an inherent and constant tension between the different developmental needs of individual athletes. This makes it difficult for coaches to individualise and steer individual developmental processes within team sport contexts.

Bjørndal, Ronglan, and Andersen (2015) have shown that the SMTD lacks empirical validity in the context of Scandinavian team sports. Their study of Norwegian handball suggests that the TD model structure is characteristically heterarchical, and includes multiple autonomous organisational actors (such as clubs, sport schools, and the regional and national level of the National Handball Federation (NHF)) that interact and facilitate multiple pathways to the elite level. Athletes and coaches, they note, are also embedded within multiple different settings.

The Scandinavian model can best be described as an *ecology of games (EG)* (Lubell, 2013) in which athletes and coaches in different team settings act and interact in ways that are informed by the aims and perspectives associated with the specific settings in which the participants are located. This EG framework describes organisations consisting of networks of diverse sub-units (or "actors"), in which no individual actor has any instructional authority over another, and

where behaviour and change are driven by the logic of each individual actor (Lubell, 2013).

These specific contexts therefore form a natural starting point for the investigation of the possibilities, challenges, limitations, and nature of the incongruent goals of individuals within team-sport settings. They are also useful for examining how these are experienced from the perspectives of youth athletes in TD programmes. A focus on contextualised empirical knowledge, it could be argued, is a potentially better way to inform the role of coaches and the TD-related dilemmas they face, such as: how to balance team-based needs versus individual needs; whether – and how much – to empower athletes; and how to balance short-term performance needs with the long-term development of athletes (Jones & Wallace, 2005). While the concept of orchestration is a potentially useful one for analysing the agency of coaches, few attempts have been made to generate empirical evidence to test the concept's applicability to other settings or perspectives outside the setting of elite adult sports (Santos, Jones, & Mesquita, 2013).

As recent studies have shown, understanding the backdrop of a particular sports culture is important to understanding athlete development and pathways to the elite level (Stambulova & Alfermann, 2009; Storm, Henriksen, & Krogh, 2012). In Scandinavian team sport settings, for example, players identified as talented typically interact with a number of coaches in different teams. This situational complexity may influence both the experiences of players and the role of coaches. The *presence* of a heterarchical TD model and the *absence* of professional club organisations in Norway exert a strong impact on the role of coaches involved in TD and increase the complexity of the coaching process. This is because the complexity of the organisational structure further inhibits the limited oversight that coaches have. It also results in complex interplays between multiple coaches and athletes in different team settings.

We contend that two particular stress factors can be amplified within this particular form of organisational framework, namely: (a) the conflict between team-based versus individual needs, and (b) the tensions between short-term performance and long-term development. Both factors create challenges that coaches must manage within the context-specific concerns of TD in team sports. Firstly, they must navigate the challenges of fine-tuning individual pathways embedded within wider team settings. Secondly, they must facilitate long-term development within a system (i.e. the organisational context) in which coaches are heavily influenced by both short-term and team-based goals. By keeping both these stresses in focus when undertaking research such as this, this paper provides a new perspective compared to TD research that has traditionally focused solely on the individual level (Ward, Hodges, Starkes, & Williams, 2007).

The objective of this study was to investigate athletes' experiences of their developmental processes during their TD, rather than to examine the experiences of athletes who had already established themselves at the elite level. As such, our interviews provided accounts that were closer to the "real time" experiences of

athletes, and helped to reduce the problems of memory bias noted, for example, by Cohen (2008). More specifically, we wanted to explore what kinds of concerns the athletes experienced, and how they attempted to manage these as part of their interactions with their coaches. This interpretative approach, we reasoned, could help to contribute to new theoretical perspectives within TD research that has, to date, remained dominated by positivist assumptions (MacNamara & Collins, 2014). In this paper, the implications of the research findings for the role of coaches involved with TD in team sport settings are discussed. The data from the players is utilised to examine the coaching process. The paper is potentially valuable for coaches acting within specific organisational contexts of TD – in this case, the Scandinavian team sport of handball. It is hoped that the empirical knowledge and insights presented here will also help to inform the perspectives and understandings of volunteer-based or semi-professional coaches involved in decentralised sport organisations.

Coach orchestration in the Scandinavian team sport context

Wallace (2003) suggested that the concept of orchestration is a useful way of conceptualising the dynamic processes involved in leadership and the management of inherent uncertainty. Sport coaching is an example of a dynamic setting that does not follow pre-described rules and "requires flexible adaption to constraints" (Jones & Wallace, 2006, p. 52). It also has inherent ambiguities: coaches exert variable but always limited control over others actors. They also have limited awareness of the other actors involved and may operate in contexts in which differing and contradictory beliefs create divergent objectives among the actors involved. Each coaching situation is novel to some extent and this makes the coaching process "relatively uncontrollable and relatively controllable, partially incomprehensible and partially comprehensible, and imbued by some contradictory values and others that are mutually compatible" (Jones & Wallace, 2005, p. 127). Jones, Bailey, and Thompson (2013) note that the concept of orchestration suggests that leadership involves "steering" rather than controlling dynamic interactive processes. Much behind-the-scenes "string pulling" is needed, they suggest, to facilitate the achievement of desired objectives.

Orchestration leadership could be described as a form of leadership which is particularly well-suited to heterogeneous organisations that are multi-centred, and to systems of governance shaped by mutual constraints and influences (Reihlen & Mone, 2012). Within such systems, the actions of groups of autonomous organisational actors are based on their own incentives and perspectives. Long (1958) conceptualised these heterarchical organisations as an *ecology of games* – a concept that been used as the foundation of many theoretical frameworks for examining complex organisations (Lubell, 2013; Lubell, Henry, & McCoy, 2010). Bjørndal et al. (2015) describe the Norwegian TD model as an ecology of games in which the coaches located in different team settings are the key actors. These actors

create a complex web of various initiatives in which no single actor has the sole responsibility for TD or has instructional authority over the other actors. In such systems, players identified as talented must interact continuously with different coaches and navigate their way through complex landscapes of different teams and TD initiatives.

At a group level analysis, the concept of coach orchestration helps to draw attention to the limited control and awareness of coaches; similarly, the ecology of games framework helps to highlight that uncertainty is an inherent part of an organisational context, and that the information available to those involved is limited (Lubell, 2013). While some actors within heterarchical ecology of games systems may have more knowledge or awareness than others, no actor is ever fully aware of the strategies and preferences of others, or of how decisions made in one organisational context might affect the decisions made by others. Stakeholders, too, are not often able to appreciate how decisions made in one context may have spillover effects (Bednar & Page, 2007). Hierarchical organisations provide a relatively unambiguous systemic order, but in heterarchical organisational structures, coaches face far more uncertainty. We believe, therefore, that the concept of the ecology of games and the notion of orchestration are compatible and serve to mutually enrich analyses of heterarchical TD models.

Methods

This holistic case study of youth athletes' experiences of pursuing top-level play is informed by our interest in the universal nature of the developmental experiences of athletes. An in-depth study was undertaken because it is well-suited to investigating the relationship between a phenomenon and its context (Yin, 2013). In-depth studies help to identify those instances that may seem to be identical to the general class of cases but, on further investigation, are revealed to be different (Flyvbjerg, 2001). According to Aggerholm (2015), instrumental rationality underpins much of contemporary sports science, including research about talent and development in elite sports. It leaves, he suggests, little or "no reflection on the value or meaning of ends pursued" and may "lead to perceiving athletes as objects, leaving no room for considerations of individual meaning and subjectivity". This, as he suggests, "can hide qualitative aspects of practice and [reduce] the value of performance" (Aggerholm (2015, p. 14). The interpretative approach of this study therefore provides a valuable and complementing approach to research on talent development rooted in other epistemological traditions.

Further, we selected the Norwegian study case and context strategically to increase the probability that the study could provide findings that would be able to inform theoretical perspectives on TD (Andersen, 2007). All the athletes included in this study had experience in youth national team activities and were regarded by the coaches responsible for club, regional and national level selection as being among the most talented in their age category.

Case selection and context

Norwegian handball is a sport based firmly within the egalitarian and voluntary sport movement that forms the distinctive and characteristic framework of most sports organisations in Scandinavian countries (Andersen & Ronglan, 2012). Within this organisational framework, the Norwegian Handball Federation (NHF) organises mass sport, TD, and elite sport activities. Local voluntary-driven clubs, in which athletes spend most of their time, are the basic organisational unit of the handball system (Andersen, Bjørndal, & Ronglan, 2015). An increase in the number of both public and private schools offering specialised sports programmes in combination with standard academic education has resulted in sport schools becoming key actors in TD in Norwegian handball, alongside club activities and NHF-driven TD initiatives. This particular organisational context enables multiple pathways for athletes who want to reach the elite level: a broader range of players can be given special attention and access to a wider range of learning environments within several different team and practice settings (Bjørndal et al., 2015).

Youth coaches at the club level are mostly volunteer and/or parent-coaches because there are no formal licensing requirements for coaching youth. Coaches at the sports-school level are professional, although at several private sports schools in Norway, teaching qualifications are not required and the educational training of the coaches varies. Each regional department of the NHF is highly autonomous and the status of the coaches ranges from amateur parent-coaches who receive limited compensation, to full-time salaried professionals. At the national level of the NHF, youth national team coaches are professional coaches who are employed part-time. Professional coaches usually combine coaching at the club level with coach assignments at the school, regional or national NHF level. Within this broader organisational context, coaches have relatively less control compared to those in more professionalised sports organisations and relatively more autonomy than those in hierarchical TD models. Further, each coach primarily pursues her or his own interests, and because the dynamic nature of the organisational model inhibits oversight, this increases the system's complexity.

Handball is an important competitive sport in all Scandinavian countries and is characterised by sustained international success and broad participation. We purposely sampled players who had experience from youth national team activities. This meant that the study sample of players had experience at all levels within the TD model of Norwegian handball. Sampling in this way enabled us to undertake a comprehensive examination of the interplay between athletes and their club-based activities, their sports school programme and their experience with TD initiatives at different levels of NHF activities. Our selection was designed to reflect the heterogeneity of the organisational contexts in which the athletes were located. In particular, we chose athletes who: (a) had different amounts of experience with club-based, school-based and federation-based TD activities; (b) different developmental trajectories leading to national team selection; (c)

represented different geographical regions in Norway; and (d) were easily accessible and willing to share their perspectives. This approach enabled us to develop a broad range of analytical categories central to youth players concerns.

In total, 12 female handball players were purposively sampled: all had similar shared experiences from the highest youth level. The athletes also had different and unique practice backgrounds and were selected based on such variations. All the participants were 16 or 17 years old, and had an average of 9.5 years' experience as players in organised handball. The sample represented four different organisational regions in Norwegian handball and the club-level experience of the study participants ranged from the U16-level to the elite adult level. All those taking part in the study had experience being in the NHF's regional player development initiatives: their youth national team experiences ranged from 2 to 13 selections (out of a possible 16).

Data collection

Data were gathered from semi-structured in-depth interviews conducted during 2014 and 2015 as part of a longitudinal research project on TD in Norwegian handball. We utilised an in-depth interview approach because this methodology is well-suited to analysing peoples' experiences (Silverman, 2013). The first author of this paper conducted the interviews which lasted between one and two hours. During the interviews, the interviewer played an active role and continuously sought to utilise the interviews to test his own assumptions and the assumptions underlying the interviewees' observations, descriptions and assessments. As such, the interviews enabled the interviewer and interviewees to exchange perspectives, reflections and meanings. Structured interviews have dominated TD research but the in-depth approach we applied, in contrast, attempts to recognise the importance of active agency, the dynamic nature of human meanings and actions, and the complexity of social processes (Starbuck, 2006).

All the interviews were recorded and transcribed verbatim. In the first part of the interview, respondents were asked about their everyday schedule and how they experienced their everyday challenges and opportunities in relation to the pursuit of their sporting career. We asked participants about their social life and academic demands, and how those related to their sporting careers. In the second part of the interview, respondents were asked about their significant developmental experiences in club-based activities, sport school programmes, regional NHF-driven TD initiatives, and the youth national team, and how each athlete coordinated their involvement with these multiple settings. Finally, the athletes were asked about their past and present experiences with different coaches in their careers. When interviewees noted specific concerns, issues or incidents that were influencing (or had influenced) their development, they were asked to elaborate on how they managed these.

As part of the longitudinal study that was started prior to the interviews, the first author undertook 6 months of fieldwork (a total of 40 days) in national handball team activities, during which time he lived and travelled together with the athletes involved. A close connection to the athletes interviewed in this study had therefore already been established. The first author stayed in regular contact with the informants over a period of two years after the interviews were conducted. During this period, a follow-up interview was conducted by the first author with all the participants one year after their first formal interview. In this second interview, athletes were asked about their experiences during the previous year and if their earlier perceptions about their own development had changed or not. The second interview lasted approximately 30 min and provided opportunities to verify information, continue the discussions about the issues raised in the original interviews, to improve the reliability of the analysis, and to add valuable nuances to the interpretation and analysis of the data.

The study analysis was empirically driven and used the grounded theory approach advocated by Corbin and Strauss (2008). Theoretical concepts, according to this approach, are seen as a way of focusing and informing the initial research and data collection *before* a researcher turns to a data-driven approach to create and compare concepts "grounded" in empirical material. The interview transcripts were analysed in sequence. In the first coding cycle, categories based on the empirical data were constructed. Our pre-understanding of the theoretical perspectives influencing TD sensitised this process and helped us to establish analytical control. The term "analytical control" refers to how the significance of case study findings are evaluated in light of how their pre-conditions allow for interpretations of empirical variation as an expression of analytical categories or variables (Andersen, 2013). Memos were written by the authors in which the scope, dimensions, and properties of each analytical category were elaborated upon. Subsequent interviews were then transcribed and analysed in a similar way, and further additional empirical categories added to the memos. Sometimes the categories were refined further. The memo writing process continued until each category was fully developed and a point of analytical saturation was reached. In the second coding cycle, we searched for patterns between the categories. During this stage, several categories were merged and five final distinct categories were identified, each of which was central to the research questions. The core categories were: (a) time pressure and prioritising, (b) complementary influences, (c) conflicting goals and demands, (d) balancing load and recovery, and (e) coordination challenges.

Results

Time pressure and prioritising

The world of the talented handball youth athlete revolves around the pursuit of a sporting career while simultaneously balancing academic and social demands.

Most often, the athletes in this study who were attending specialised sport school programmes were also participating in regional and national TD initiatives, and playing in multiple teams in their local clubs. The combined demands could be stressful at times.

> I'll honestly admit that I can get a bit stressed about schoolwork. It's because I value my academic career highly and at the same time pursue a handball career, and sometimes those two collide and then I'm that person that chooses to prioritise handball practice instead of schoolwork. (Cecilia)

A typical day for the youth athletes started with school training followed by a full-length school day, and club practice in the evening. Study participants who attended specialised sports school programmes emphasised how important it was that their schools were able to tailor their exam plans and homework, as this meant that the athletes were able to manage their handball commitments. But even when the academic demands were well coordinated with their sporting schedules, the combination could be taxing. Participants acknowledged the tension between living an active social life and pursuing a career in sport:

> I have to say no to a lot of friends. I have to say no to family gatherings and maybe put my academic career on hold. I think it might become a problem to manage school. I read a lot when travelling to and from practice to catch up with what I've missed, and I find that a bit difficult. (Catherine)

At the same time, all the athletes seemed reflective and self-aware about how the choices they made might influence their sporting development.

> I sometimes sacrifice birthday celebrations, parties and stuff like that. When the others are going out … then I feel alone. But I don't really think that much about it. If you are to become good in sports, then you can't go out partying the night prior to a match. I've gotten used to that everybody's going out while I stay at home. (Valerie)

Most athletes depended on their parents to help them get through the day, and to organise the logistics of transportation and food preparation. The families of all the informants were highly involved in all aspects of their children's handball careers.

> I think about what I've done in practice, what went well and what didn't go that well. Dad is very interested in handball, too, so he always asks me about it. I have very committed parents who always ask me how it went in practice, and what we did. (Cecilia)

For these players, the pursuit of an elite sports career left little or no time for other activities during adolescence.

Complementary influences

In the Norwegian context, a successful transition to the top level of sport is the result of the joint efforts made by coaches in different team and school settings. Ideally, these coaches should provide a collective and complementary framework for the development of athletes. School sports programmes play a potentially vital role in the careers of athletes because they provide practice opportunities only (rather than competitive opportunities), and no pressure to achieve good team

results. Instead, the programmes focus on the development of individual skills. One study participant noted:

> I think that the sport school programme helps a lot. There you get to practise more individually, in your playing position, and you get to manage yourself a lot. There's more focus on practising according to *my* particular needs and I think that is good. (Melissa)

The youth national team provided opportunities for the athletes to develop a frame of reference for their own development. One participant commented: "I've learned what I have to work on. I've seen what it takes. There's always someone who's been there from the start, so you observe what they do and try to learn something". The NHF's broad-based approach to player development at the regional level also provided a form of socialisation into TD practices that enabled all the athletes to prepare for the next level. Cecilia commented:

> I think it would have been difficult to be picked to represent the youth national team without having the experience from the regional level TD initiatives. I wouldn't have been used to meeting new people and competing for selection. I would have been shocked! So I really think it has been good that I have that prior experience.

In all the interviews, the athletes indicated that they placed the utmost importance on having to stretch themselves to the limits of their abilities in order to progress. They valued highly the opportunity of training with more skilful players.

> When I practise with the elite team I have someone to look up to who is well over my skill level. I think that is important and that is why I'm changing clubs. When you're at practice and you don't get any resistance – that's not fun. (Stacey)

However, some observed that the transition from the youth sport level to the senior sport level of handball should be individualised and that the motivational and social considerations of the individual athletes should be taken into account:

> I profit more from training with the elite team, but if you consider the social aspect of it and what gives me motivation – it's really to practise with the U18-team. It is probably just because I've just begun training with the elite players and haven't gotten to know them yet. (Catherine)

Being involved with different coaches in different team settings creates potentially beneficial and complementary influences. In the particular context of Norwegian handball, there are – at least in theory – more potential opportunities to define appropriate challenges based on a person's individual needs than there would be in less flexible systems.

Conflicting goals and demands

Relating to several coaches in different team settings, each with their own particular claims on the development of athletes, can potentially result in individuals receiving conflicting advice. Catherine noted: "I usually do what they want me to do at the youth national team. My club coach is not very happy about it but I don't care. I have more confidence in the youth national team coaches". Several

informants described tensions between the claims and beliefs of different coaches about how best to prioritise and adjust their training schedules.

> It's hard to find the time to do everything! When we're with the national team they [the coaches] talk about how important it is to develop work capacity, strength and so on. It's just that there's so much handball practice during the season that you can't manage to work on everything. I find that difficult. […] I grow tired. When I finally have a day off, I'm all exhausted. (Valerie)

The efforts of coaches were informed by good intentions. However, attempts to encourage athletes to set practice goals, for example, or the provision of developmental tasks by the national team coach appeared to have unintended consequences or not to be relevant to the everyday life of some athletes.

> I set individual goals for practice. It may be tasks I want to focus on but it's not always that it coincides with the plan of the club coach. I have specific skills that I'm supposed to improve but it's not that often you get the time to do it. (Stacey)

Similar problems were noted in the mechanisms for formal coordination within the organisational systems. Some related, for example, to school-club cooperation. The interviews revealed that coaches did not always adhere to the advice they recommended. Melissa, for instance, noted that her coach understood "that school comes first, and says that, too. But then he made a point out of me missing out on practice because of school work at the last team meeting, so I really don't know any more". Athletes noted that formal policies were inadequate if they were not put into practice. Mary claimed: "My dad wants me to prioritise school over handball and our club contracts explicitly state this but it never ends up that way. It's never a question of skipping practice to prepare for a test at school".

Youth players who are involved with several coaches in different practice settings may therefore experience ambiguous or even contradictory demands.

Balancing load and recovery

The risk of injuries in high-speed contact sports such as handball is a concern for many athletes. The balancing of load and recovery is therefore vital, both in the short- and long-term as chronic injuries and pain may threaten the careers of youth handball players.

> I started having problems with my knee last August. I was supposed to recover for two months but then came the U16 national championship qualifications, so I played that directly after my recovery period. And then it just got worse so I was out for two more months. I still hurt because I practise too much on court. (Catherine)

Coaches, we would argue, should be aware of these risks and be able to prioritise the health of individuals over the needs of a team's performance. But achieving the appropriate balance between load and recovery is especially difficult in organisational structures in which different coaches operate autonomously and have both influence and legitimate claims on the development of handball athletes. The otherwise complementary intentions of different TD initiatives and club activities,

on occasion, lead to the overuse of the athletes in our study, and counteracted their effectiveness in contributing to the long-term development processes of athletes.

> Now I've been injury free for a long time. When I played with three different age groups, I was injured a whole season because of my back. Then I became, at a very young age, conscious that I needed to become stronger. So now I'm really satisfied with my training schedule and that I get to train enough strength training and that it's not too much handball specific practice on court. I'm not saying that's why Cecilia and many others are injured … but I don't get the same training load from handball practice that many of the others have. (Mary)

The above quote is illustrative of a finding common to all the interviews we conducted, namely that athletes tend to develop their own informal control mechanisms as a result of being injured. Some had learned from their mistakes:

> I didn't manage to hold back before, but now I've been injured so much that I've become much better at it. I now manage to control when I need to rest and when I can go all in. I kind of feel the difference between dangerous pain and pain that's just supposed to be there. (Molly)

Players were constantly exposed to expectations and pressures from coaches and peers, in addition to the expectations they placed on themselves. However, the responsibility for balancing load and recovery seemed mainly to be left to the handball players themselves.

Coordination challenges

Occasionally, gaps were evident between the policies and practices of different settings within Norwegian handball and this affected attempts by coaches to better coordinate and facilitate TD. In a complex interacting system, a lack of proper coordination can impair development, and may result in career threatening injuries or inappropriate development. The findings of our study suggest that most coordination mechanisms are person-dependent, local and informal:

> There is a good cooperation between my club and my school. My coach knows almost everyone at my school so then it's easy to cooperate. It's all about what the training schedule looks like and that it's tailored to fit school training sessions. (Christine)

A lack of communication between school and club environment lead to breakdowns in coordination.

> Last year, I thought it was difficult. I felt I was dodging practice because I was injured so much, and then I felt I *had to* participate in the school training sessions. Often it became two handball sessions a day. Today, I have a much better dialogue with the school coach. (Molly)

The athletes noted that informal coordination mechanisms were problematic given the lack of quality control; common attempts to facilitate TD from coaches in different settings had unintended consequences and coincidental outcomes. Both possibilities and challenges were evident, for example, when the coordination

of an individual training plan was reliant on the personal relationships between coaches in different practice settings:

> She [the club coach] communicates well with the national team coach and that's been a great advantage. That's probably been the biggest advantage of having her as a coach. That she can tell the national team coach how it really is when something is wrong or when I'm concerned about something … Then she just calls the national team coach and they talk and they agree that I have to improve something, work on something or that something is good. (Mary)

In some cases, the lack of coordination created environments that were unsustainable for the long-term development of athletes.

> I think that the school and my club should cooperate instead of me having to plan a day at a time. I don't have more than 10–30 min at home before I have to go to practice and then I never know if I'm supposed to train with the elite or U18-team [which practises at different times in different locations]. I don't know where or when before the school day ends. (Catherine)

The inclusion of youth national team activities creates an additional layer of complexity to coordinating different practice settings. While these activities are very important to creating a stimulating environment for athlete development, they can dramatically decrease the time available for recovery periods. When asked about how being a national team athlete had affected her life, an experienced youth national team player elaborated:

> You live a different life to other handball players. The season never ends! My physiotherapist says to me that I can recover all summer but that's not how it works, because then there's the youth national team season. (Molly)

The lack of formal coordination mechanisms between the youth national team coaches and club coaches, meant that the sole responsibility of communication was left to athletes, such as Cecilia:

> I have to be the one to tell! … I've spoken to my coaches about always letting them know if there is something wrong. Because they do not speak to my youth national team coaches so everything needs to go through me and how I feel. I need to listen to my body. (Cecilia)

Well-functioning coordination between different practice settings appears to be central to successful long-term TD. In contrast, a breakdown in coordination may lead to insufficient recovery, and increase the risk of injury or burnout.

Discussion

In this section, we discuss the concerns raised by the athletes in this study in the light of contemporary research in TD. We also explore the implications that these concerns have for the role of coaches involved with TD in team sport settings that are similar to the Scandinavian sports model. Our findings highlight how the concerns of individual athletes relate mainly to issues of recovery but also to the importance of balancing different developmental initiatives in ways that are

complementary and provide appropriate influence (for example, when prioritising one team setting over another, decisions need to be based mainly on the needs of individuals rather than the needs of a team). Successful TD relies on well-functioning interactions between coaches, and it is important for athletes to be able to manage their own competing academic and sporting demands, to ensure that these influences are complementary and therefore as effective as possible, and to balance their load and recovery.

Our study showed that this does not mean that every coach involved needs to agree on everything. Instead, mutual adaption is needed to accommodate the individual needs of athletes. The athletes in this study continuously balanced their academic and sporting demands, and their busy schedules left little for them time to pursue other interests. This finding is consistent with Wylleman and Lavallee's (2004) lifespan model which describes how athletes in development need to cope simultaneously with demands and transitions at athletic, psychological, psychosocial, academic and vocational levels. As Wylleman and Reints (2010) observe, balancing demands at the athletic and academic level is a central concern for athletes who attend sports schools. All the athletes in our study described their everyday lives as hectic, occasionally frustrating, and stressful. Such experiences were particularly evident among some of the players in club teams. This is because Norwegian youth teams are typically composed of players who have very divergent ambitions and training loads. Club coaches in Norway are responsible for heterogeneous groups of athletes, some of whom are included in a TD system (attending sport schools/selected to the national team, for example) and others who are not. As such, team mates in the same club may differ significantly in terms of their levels of interest, dedication, and the amount of time they spend on sporting activities, even if all the players are part of the same organisational structure.

All the athletes in our study were willing to prioritise their sporting careers over other aspects of their lives. The athletes were also constantly involved with *multiple* team settings (for example, club teams, school sport programmes, TD initiatives, and the youth national team). Such athletes may need to be treated differently. Sometimes this will be at the expense of, for example, practising with a full group, optimal match preparation, or short-term performance objectives. Coaches may therefore face divergent individual needs and interests. Those trying to integrate a TD perspective may, for example, need to engage in a balancing act between the collective good of the team and the needs of individuals. To facilitate better conditions for those players involved in several team settings, coaches involved with TD, for example, may have to compromise their goal of achieving short-term team results, or compromise on approaches that would otherwise be optimal for players less involved in other team settings.

Coaches, players and others involved in team sports have ambiguous goals and demands, and these are integral influences in team sport settings (Jones & Wallace, 2006). At the individual level, athletes experience conflicting goals and demands that manifest themselves not only *within* one team setting but also *across* the

different team settings in which athletes participate. This conflict is due, at least partly, to the short-term concerns of coaches for whom the primary objective of developing teams is typically informed by, for instance, the need to qualify for tournaments or to improve league positions. Necessarily, this short-term focus limits the space (and the longer-term perspectives needed) to prioritise TD. The long-term development needs of individual athletes are difficult to determine because these may be diffuse, difficult to assess in the short-term, and hard to interpret and incorporate into meaningful practice (Jones & Wallace, 2006). These constant tensions between long- and short-term objectives are not primarily due to the particular values and beliefs of coaches. Rather, these dilemmas are inherent to coaching and evident particularly in team sports.

Further, diverse coaching objectives (for example, balancing the need to win matches versus the need to help star players recover from minor trauma) cannot always be pursued at the same time (Jones & Wallace, 2006). Coaches responsible for TD initiatives at the NHF level attempt to identify talent for special competitions or the youth national team, alongside their efforts to provide a degree of developmental influence. Sport school programmes are the only setting without competition-related incentives, and provide school coaches more space to focus on long-term development. What is therefore of particular importance to TD in Scandinavian team sports is the emergent *sum* of the multiple intended and unintended consequences of coaching decisions made across multiple contexts.

In this study, the main concern of the athletes was being able to get enough time to recover, especially between different team commitments. Such problems can be tackled via a strategy known as "individualisation", which Martindale, Collins, and Daubney (2005) regard as a key element of effective TD. But to individualise responses to the different needs of all athletes is demanding in a team sport context because players are mutually dependent on each other in ensuring that they are able to practice and perform in a functional manner. There are therefore embedded tensions between the optimisation of particular team settings and the facilitation of individual TD in team sports.

The experience of the athletes in this study showed that the awareness their own coaches had about other coaches, their coaches' communication with other coaches, and their coaches' adaption to the demands of other coaches were all crucial in facilitating appropriate developmental paths for individual players – in other words, the "orchestration" of TD. Conceptually, it can be argued therefore that effective TD orchestration depends on more than just the importance of effective orchestration within a single team context. Instead, the orchestration of TD should be understood as an emergent phenomenon – one that is the result of the collective outcome of individual orchestrations by numerous coaches, each within their own context. It is not possible (at least within the Norwegian context) for a single coach to determine the totality of a player's practice schedule: all the participants partially influence each other and no one person has overall responsibility for others. This being the case, a paradox arises: TD in team sport

refers to *individual development*; however, no coach involved in TD has total responsibility for an individual's overall development. At most, a coach will have responsibility for the individual development of the players within the context of his or her team. The main responsibility of coaches is that of *team development*. TD, as such, is the result both of "orchestrating TD" and "coach orchestration", and each functions at different levels. The latter refers to a coach's deliberate agency (their individual actions), and the former refers to the emergent outcome of subtle interaction effects (i.e. the consequences of collective action).

The main challenge of this duality for athletes that are involved in different teams is how to coordinate these influences *across* different settings in ways that will ensure that both influences contribute to providing a sustainable environment for their development. In the context of this study, there were at least three types of coaches that influence the development of the athletes, and each operated within their own autonomous settings: the club coach, the school coach, and the national team coach. On the ground, the situation is often more complex still because particular athletes may "belong" to several teams within a particular club, and may also be included in regional-level TD initiatives. Training groups may also have more than one coach. Mutual adaption is therefore required; coaches located in different team settings need, routinely, to let go of some of their power to ensure that TD systems remain high-functioning and coordinated at the individual level.

However, findings from research in other contexts, such as North American high school sports, have shown that getting adult stakeholders (for example, coaches) to interact and collaborate to foster student-athlete development can be difficult (Camiré, 2014). Similarly, Jones and Wallace (2006) have argued that it can be challenging to unify stakeholders behind a cohesive strategy even when they belong to *one* team. In our study, unification was a concern for coaches across different team settings because the coaches all only had partial influence over the talent development of the athletes. If TD concerns are important, coaches must recognise that the particular team setting for which they are responsible is just one of *multiple* contexts in which the players are participating.

Recognising this can potentially enable more effective coordination between team settings. Although coaches are likely to protect their power (Potrac & Jones, 2009), coaches who have broad organisational experience, are involved simultaneously across several team settings, and have a high level of mobility, are more likely to enable more functional coordination mechanisms (Bjørndal et al., 2015). Furthermore, cooperation between coaches may help them to balance the "dilemmas" associated with coaching that would otherwise affect the individual development of athletes (Culver, Trudel, & Werthner, 2009). Although this need for more cooperation between coaches might seem intuitive, it should be recognised that a limited awareness of the varied motivations of the team members within the coaching context (Jones & Wallace, 2005), and the diversity of perspectives among the organisational actors within complex ecology-of-games organisational structures, increases the potential of unintended negative

consequences (Bednar & Page, 2007). Bjørndal et al. (2015), for example, showed that overload and incomplete recovery arise first when actors lack an awareness or understanding of each other. This observation is consistent with findings from other studies showing that coaches' efforts to impose solutions may not lead to intended outcomes (Denison, 2007).

Our findings suggest that it may be useful to use the composition of different team settings to promote the development of athletes beyond what would otherwise be achievable within a single team environment. Christensen, Laursen, and Sørensen (2011) noted that in Denmark, for example, coaches are allowed to tailor appropriate challenges and opportunities for athletes by "playing upwards" and "playing downwards" and/or by participating in sport school programmes and national team activities. Similarly, Santos et al. (2013) showed that elite coaches may orchestrate feelings of security and insecurity to ensure the development and performance of individual players. Mills, Butt, Maynard, and Harwood (2012) reported that expert coaches in professional youth football academies created challenging environments in order to promote psychological skills such as competitiveness, confidence and the ability to cope with pressure. In our study, the experiences of the athletes in different team settings showed that the security/insecurity dynamics could be orchestrated across different team settings. As the athletes noted, the challenges they faced (such as practising with someone better) and the "safer" opportunities they enjoyed (such as practising with their peers) were both important for their development and satisfaction. This suggested to us that the coordination of efforts across different contexts is important to TD. However, the fulfilment of this potential complementarity is determined by whether coaches across different team settings are able to cooperate and, together, carefully steer these processes. If such coordination is successful, this could enable the different coaches involved to have a role in the "overall orchestration" of TD, through which the conditions for facilitating holistic long-term TD could be improved.

Given the limited oversight and agency of team coaches, the challenge of orchestrating efforts within their own team context while also giving more consideration to individual TD is complex. However, coaches could sensitise themselves to actively attempting to *notice* the changing needs of the individual athletes in their team settings, athletes whose overall status is the result of the influences of multiple contexts. Santos et al. (2013) has argued that "noticing" – the act of attention in which what is noticed becomes an intake of learning (Mason, 2002) – is a key process that informs the decision-making of professional coaches. In the context of coaching, it could be argued, as Santos et al. (2013, p. 265) suggest, that noticing requires that an "emphasis is placed on looking beyond the immediate, to a close analysis of the seemingly expression of everyday life". Our findings showed that athletes already pay considerable attention to noticing subtle changes in their own physical condition, and possible signs of overuse or injury. Prior experience, for example, informed how the athletes attempted to balance load and recovery. Some informants described, for example, their awareness of the subtle differences

between the type of pain that they thought of as "dangerous" because it could lead to injury, and the type of pain that was just a natural part of intensive practice.

A recent study by Brink, Frencken, Jordet, and Lemmink (2014), however, shows that discrepancies exist between the perceptions of coaches and players about what constitutes an appropriate training dose: players, for example, systematically perceived the training given to them to be harder than the coaches intended. Coaches should therefore be more careful in noticing and recognising subtle changes in the training process, and could achieve this by engaging in a dialogue with the athletes themselves. Leaving this responsibility to either the coaches or the athletes may not be sufficient.

More effective coordination might also be achieved through a strategy of *empowering* individual athletes (Santos et al., 2013). But as previous studies have shown, though coaches may agree with particular principles of empowerment, they do not always act on them (Bjørndal et al., 2015). The value of empowerment, we suggest, will only be fully realised if athletes are given sufficient latitude to adjust their own schedules and if they are confident that their voices will be heard. This is particularly important in situations in which there is uncertainty about the appropriateness of letting athletes continue with their normal practice or competition involvement. Coach orchestration directed towards the empowerment of athletes may also have potentially negative consequences or may not be sufficient. Players may, for instance, hold back information (for example, about their emerging injuries) if they wish to qualify for the team or to play matches, and this could result in slightly injured players who are highly motivated continuing to play matches until they are more severely injured and need to carried off. Empowerment, it can be argued, should complement but never replace the effective coaching strategies of careful observation and active steering.

In summary, both the challenges and opportunities that the national team athletes in our study faced during late adolescence can be interpreted as products both of the context of team sports in general, and of TD within the Scandinavian sport model in particular. It is evident that team coaches at different levels are central to accommodating issues with which talented athletes struggle. Although coaches could utilise several of the strategies discussed in this paper, it is not possible to solve these issues for athletes or coaches entirely. There is a need for what Jones and Wallace (2005) call *flexible adaption*, because the orchestration (of individual TD) in team sports requires a kind of flexible adaption that goes beyond the adaption required to optimise the particular contexts of individual coaches. Optimising an athlete's particular team setting is not necessarily the same as optimising the particular team setting of an individual athlete. This is because for particular athletes what is optimal on an individual level is determined by how well their different team settings complement one other. The orchestration of TD requires coaches *not* to act as individual agents who strive to achieve their team's best performance. Instead, coaches need to be able to adjust to the actions of other coaches who are involved with the same players. In this way, the agency of

coaches can contribute to the "overall orchestration" of talent pathways, increasing the sensitivity of coaches to the individual athletes and their training processes. It should also be recognised, however, that the force of external expectations (Ronglan, 2011) directed towards coaches from organisations (for example, their own clubs) may also heavily influence the manoeuvrability that coaches have and their willingness to adjust to individual TD concerns.

Orchestrating talent development – More jazz than symphony?

Jones and Wallace (2005) originally presented the concept of orchestration as a metaphor to reflect the way coaches strive to manage complex coaching contexts. In keeping with the tradition of musical metaphors, we would suggest that the orchestration of TD within the specific context of Norwegian handball could be better described as a jazz session than a symphony performance in which players have clearly-defined, specialised and complementary roles.

In Norwegian handball, each coach operates more or less autonomously, performing with their own particular teams. The organisational structure lacks a conductor to oversee and coordinate the efforts the participants make with one another. As such, TD improvisation is vital (constant awareness and adaptation is needed when facing new situations) and no role is fully pre-determined (co-adaptation is continuous). Ideally, the rhythms and forms of TD should fit together in ongoing and constantly varying processes and combinations. Coach orchestration, as we have suggested, requires that those involved in athlete development notice contexts beyond those of their own immediate teams. The means that coaches must adjust to recognising the even deeper complexities of coaching processes. According to Jones and Ronglan (2017), coach orchestration "directs attention towards the outcomes of processes as opposed to exclusively prescribing how to get there".

Coach orchestration in a heterarchical organisation, we therefore suggest, is less symphonic and more jazz-like. Managing the complexities of talent development requires fluid and complementary approaches, an awareness of the influences of others, and the ability to adapt accordingly. Contemporary TD models, such as the Long-Term Athlete Development Model presented by (Balyi & Hamilton 2004), suggest that TD is linear, predictable and a "one size fits all" process. But we hope that future studies will adopt more nuanced approaches to understanding TD, and focus on how the coordination of TD processes is altered across, and because of, different contexts. They should examine, too, how the level of TD success varies across settings.

Jones and Wallace (2006) correctly observed that the concept of orchestration implies that attention must be given to specific cultural settings and specific types of communication. Our findings in the heterarchical organisational context of Norwegian handball, suggest that it would be particularly appropriate to focus on ways in which the interplay between the actors involved in TD could be

strengthened, rather than on how the role of individual actors could be strengthened at the expense of others. Studies of TD from the perspective of players, through interpretive designs, could provide a complementary contribution to understanding TD and may deepen our understanding of the processes involved.

Disclosure statement

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ORCID

Christian Thue Bjørndal http://orcid.org/0000-0001-8544-9816

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Paper 3

The diversity of developmental paths among youth athletes: A 3-year longitudinal study of Norwegian handball players

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The diversity of developmental paths among youth athletes: A 3-year longitudinal study of Norwegian handball players

Christian Thue Bjørndal[1,*], Lars Tore Ronglan[1], and Svein S. Andersen[1]

Abstract: This longitudinal study examines pathways leading to adult elite sport in Norwegian handball. The study cohort – a sample of Norwegian female handball players (n=33) selected to youth national team activities – was followed over three years (2013-2015). Some participants reached the elite level (n=21); others reached the near-elite level (=6) or non-elite level (n=6). The findings show that elite players in Norwegian handball are more involved with youth national team activities than non-elite players. There was more variation in the amount of international experience within the elite and near-elite groups than between the groups; the pathways to the adult elite level were variable between athletes. The findings are discussed in relation to the characteristics of the particular organisational context of Norwegian handball.

Keywords:
talent; team sport; coaching; expert performance; sociocultural

Introduction

Research on talent development (TD) in sport has tended to examine athletes' sports participation histories and the developmental activities leading to top-level performance (Haugaasen & Jordet, 2012). Building upon Ericsson, Krampe, and Tesch-Roemer's (1993) theory of deliberate practice, many of these studies have been rooted in cognitivist traditions which focus on the relationship between practice hours and practice activities. Typically, athlete development is viewed as an individual enterprise. This has meant that the wider contexts of learning and development have received less attention (Araújo et al., 2010). The exploration of the impacts of sociocultural influences on sports development is an important new approach to the study of TD and indicate that integrating broader organisational perspectives into interpretations of expertise can significantly improve understandings of TD (Henriksen, Stambulova, & Roessler, 2010).

Bjørndal, Ronglan, and Andersen (2015) examined the link between wider organisational contexts and talent development, and showed that talent development within the context of Scandinavian team sports involves multiple autonomous key actors (e.g. clubs, sports schools, and regional and national sporting federations) which pursue their own interests and aims. This process effectively makes TD a by-product of practising for team-based competitive goals. According to Bjørndal et al. (2015), the TD model in Norwegian handball is a heterarchically organised governance system of mutual constraints and influences: no actor has sole responsibility for TD processes or has instructional authority over any other. It was hypothesised that the specific form of TD organisation in Scandinavian team sports could be one plausible explanation for the diversity of pathways leading to the elite level in this context. This, they reasoned, is because the multi-centric and loosely-nested structure enables a potentially greater number of

[1] *Department of Coaching and Psychology, Norwegian School of Sport Sciences, Oslo, Norway*
** Corresponding author: Christian Thue Bjørndal, Department of Coaching and Psychology, The Norwegian School of Sport Sciences, Sognsveien 220, 0863 Oslo, Norway. Email: christian.bjorndal@nih.no*

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pathways than a system based on one centralised identification and development structure. In contrast, most models described in contemporary literature are *hierarchical*, and are characterised by an emphasis on early talent identification and the progressive shifting of athletes from one level to the next through an unambiguous systemic order (Bailey & Collins, 2013).

In this paper, we investigate how athlete development pathways to the elite level emerge in the Nordic team sport setting of Norwegian handball. Our definition of a pathway includes an athlete's sport activities and training, their involvement in different practice environments, and their competitive transitions. This study attempts to address gaps in existing research by focusing on variables previously associated with elite development: in this instance, through a context-sensitive longitudinal exploration of the developmental paths of a group of already-selected youth elite athletes. The aim is to explore differences within this selected and talented sample between those who make it to the elite level and those who do not.

Conceptual framework

The most influential theoretical models of athlete development in sport are based on Ericsson et al.'s (1993) theory of deliberate practice. This theory suggests that expertise can be developed through extensive, domain-specific, highly structured and intensive practice over the course of several years. The theory, tested in a range of areas, has had a major influence on research about high-level performers (for a review, see Williams & Ford, 2008). Findings indicate that deliberate practice in sport is task-specific and can take the form of both individual and team activities (Ford, Ward, Hodges, & Williams, 2009).

The theory suggests that starting specialised practice early offers potential advantages in the pursuit of expert level performance. But some sports researchers have argued strongly against early sport specialisation and highlighted the potentially negative consequences of doing so, including an increased risk of injury, a lack of enjoyment, and the pressures of identifying talent early (Capranica & Millard-Stafford, 2011). Further, early talent identification and selection schemes risk being based on biological maturation rather than long-term potential (Wattie, Schorer, Tietjens, Baker, & Cobley, 2012). They may also neglect the possibility of late specialisation and rapid expert development (Bullock et al., 2009), and ignore the role of the psychological factors underpinning development (Abbott & Collins, 2004).

In the Developmental Model of Sport Participation (DMSP), early diversification is seen as an alternative pathway to the elite level and as a way of enabling athletes to sample several sports before later specialisation (Côté & Vierimaa, 2014). Recent studies of national team-level athletes in team sports have noted patterns of early sport diversification among athletes prior to reaching the expert level (Leite, Baker, & Sampaio, 2009), and have also noted that some elite athletes start their careers later (Moesch, Hauge, Wikman, & Elbe, 2013). Although participating in other sporting activities could play a functional role in the development of sporting expertise, the concept of early diversification stands in conceptual opposition to the theory of deliberate practice (Memmert, Baker, & Bertsch, 2010).

In both models, learning and development are understood to be linear and predictable. The application of these models gives rise to a normative system for the production and enhancement of high-level athletic performance, which Bailey and Collins (2013) term the Standard Model of Talent Development (SMTD). Other examples of applied models in which TD pathways are assumed to be linear, hierarchical and predictable, include the Long-Term Athlete Development Model (Balyi, Way, & Higgs, 2013) and the Sports Policy

Factors Leading to International Sporting Success Model (De Bosscher, De Knop, Van Bottenburg, & Shibli, 2006). Researchers are increasingly interested in the unique and non-linear relationships that appear to characterise the developmental processes of individuals (e.g., Collins, Macnamara, & McCarthy, 2016). In their study of Australian national team athletes, for example, Gulbin, Weissensteiner, Oldenziel, and Gagné (2013) show that most athletes experience at least one period in which their developmental trajectory declines before returning to a higher competitive level. Further, successful competition pathways may include concurrent experiences in both age-categorised competitions and higher levels of competition (Collins & MacNamara, 2012). Gulbin et al. (2013) therefore contend that the assumption that progress and development are linear fails to recognise complex competition patterns and assumes that the transition to expertise is predictable.

Recent studies have demonstrated that pathways to expertise are influenced by cultural and societal values, and that the 'specialisation versus diversification' dichotomy is an overgeneralised conceptualisation (Araújo et al., 2010). In their study of Danish elite athletes, Storm, Henriksen, and Krogh (2012) argue, for example, that "the existing pathways in the Developmental Model of Sports Participation are inadequate as analytical categories" (p. 208). They show that early specialisation need not necessarily involve a high amount of deliberate practice and that early diversification can occur through intensive training in several sports at the same time. Further, they demonstrate that Danish athletes are embedded within a sampling culture that is a product of a wider societal context. This particular Scandinavian context may also explain the late intensification and specialisation noted in other studies of Scandinavian athletes (e.g., Fahlström, Gerrevall, Glemne, & Linnér, 2015; Moesch, Elbe, Hauge, & Wikman, 2011). If this is so, we would argue that guidelines for practitioners should offer a clear recognition of the specific cultural and organisational contexts in which TD processes occur. By putting "culture into context", as Stambulova and Alfermann (2009, p. 302) contend, investigations of athlete pathways will be able to develop more contextually sensitive understandings which can "separate the universal from the culture-specific".

Method

This examination of the development pathways of youth elite handball players was designed as a longitudinal study. The purpose of the study was to investigate the sporting experiences of youth national team players throughout late adolescence, and to explore the differences between athletes who do – and do not – continue to the adult elite level.

Participants

Norwegian handball is a competitive sport played in all Scandinavian countries, and is characterised by its international success and broad participation. Individual handball players were the observational unit in this study, and the units of analysis were their developmental pathways. The study sample was a cohort of Norwegian female handball players (n=33) who had been selected to youth national team activities. International youth handball is organised into 2-year age categories, and the study cohort therefore consisted of players born in 1996 (58%) and 1997 (42%). The players were either 16 or 17 years old at the start of the study, and represented six of the seven geographical handball regions in Norway. The players had experience in youth national team activities and regional TD initiatives, and their club-level experience ranged from the U16 level to the elite level.

During the study period, 41 additional female players within the same age group were selected to youth national team activities. Because these players were selected to youth national team activities after the cohort subjects had been recruited, we did not include them in the longitudinal data collection. However, we included these players in the final

retrospective analysis of involvement in practice, and competition for, the youth handball national team.

Context

The Nordic model of sports is dominated by voluntary sports organisations (Ronglan, 2014). Children's, youth, mass and elite sports are largely part of the same organisational structure, and the responsibility for TD belongs to the sporting associations for each sport (Andersen, Bjørndal, & Ronglan, 2015). In Norwegian handball, the TD model is characterised by a nested structure with four key actors: clubs, sport schools, and the regional and national levels of the Norwegian Handball Federation (NHF). Sport schools (both public and private upper secondary schools) are increasingly important actors and provide regular academic education and three to four training sessions per week during school hours. Sports clubs provide daily practice and competition for all athletes and the general education provided by sport schools is supplemented by specialised sport programs. The regional level of the NHF offers broad-based player development initiatives and organises youth national team activities at the national level. A player must belong to at least one club team setting but most also take part in other team and practice settings (e.g. sport school programs and national team activities). Most coaches are amateur and/or parent-coaches; professional coaches are found only in sports school, national team, and senior elite settings.

In each setting, talent identification is hierarchical *and* non-linear in nature (athletes proceed from one level to the next but may also move up and down between the youth and adult levels of training and competition); athletes are involved simultaneously in more than one practice setting (being selected in one setting does not exclude participation in others); and TD in Scandinavia is loosely structured (athletes enter, exit, and re-enter TD initiatives continuously throughout their adolescence). Thus, these organisational contexts offer a range of different practice settings which, together, comprise the developmental experiences that shape the pathways leading to adult sports. Team-based club practices and competitions, for example, offer promising athletes a lot of competitive experience in a safe environment. The national team provides a high-level practice environment in which most athletes are pushed outside their own comfort zone and given international experience. The sport schools, in contrast, focus on individual development rather than the team-based agendas of the other actors.

Procedure and analysis

Data were gathered from: (a) self-reported responses from the 33 participants to a questionnaire about their practice and competition, and (b) publicly available participation statistics on players selected to the Norwegian youth handball national team. Data were gathered from 2013 to 2015 throughout the seasons (including pre- and post-seasons). The purpose of the questionnaire (see Appendix 1) was to collect information on the weekly training schedule of athletes and their involvement in different team settings. The practice hours were 'deliberate practice hours' (Ford et al., 2009). The questionnaire was validated prior to data collection by the second and third authors. The questionnaire was based on participants' recall of events and was sent by email quarterly (12 measurement points in total) during the data collection period.

The study protocols followed the guidelines of the Norwegian Social Science Data Services and the organisation granted ethical approval. Prior to the data collection, all the study participants were informed about the aims of the study, how the data would be stored and handled confidentially, and told that they had the right to withdraw from the study at any time. Written consent for participation was obtained.
Demographic information was collected from all the participants. The sports participation histories of the athletes were also collected to determine a baseline (T1) of individual

involvement at the club, school, and youth national team levels. The participants from the cohort were divided into three different groups based on their level of performance after three years (T2): (a) elites (n=21) who played at the first national level, (b) near-elites (n=6) who played at the second national level, and (c) non-elites (n=6) who played at lower levels. We then descriptively analysed the history of the athletes' participation in sport. This was based on the following variables associated with elite sport pathways: starting age, years of involvement in other sports, and age of specialisation. Furthermore, we analysed the change in weekly practice hours from T1 to T2. Practice was operationalised as: individual and team-based, formal and informal, and handball and other practice (e.g. fitness training). We conducted an intra-class correlation analysis (ICC) to assess the relative reliability of the measure of practice hours from baseline. The test and re-test were conducted 2 weeks apart and an ICC of .966 (95% CI = .928-.984) demonstrated excellent relative reliability.

Finally, we calculated the level of involvement for the full sample of youth national team players in youth national team practice and competition (n=74). A Mann-Whitney U test was used to calculate if there were differences between the groups. A visual inspection showed that the distributions of the scores for the dependent variables – (a) the number of international matches played, and (b) the practice hours in relation to youth national team activities – were not similar. Statistical analyses were performed using the statistical program SPSS for mac (2012, version 21); statistical significance for the analytic methods was set at $p < 0.05$.

Results

Overall, multi-sport involvement was characteristic of the sport participation histories of the study cohort (Table 1). All the participants had spent several years sampling multiple sports but did not specialise until adolescence (at age 10 years or later): no differences were identified in this respect between the cohort groups. There was no significant difference in the amount of international match experience between the elite and near-elite. However, the number of international matches was significantly higher among the elites (mean rank = 38.39), than the non-elites (mean rank = 23.37), $U = 236$, $p = .001$. No significant difference was found in the number of practice hour scores between the elites and near-elites. However, the number of practice hours was significantly higher for elites (mean rank = 28.17) than for non-elites (mean rank = 13.50), $U = 76.500$, $p = .001$. Interestingly, substantial variation was found within all groups in relation to both experience in international competitions and the number of hours of practice with the national team.

Figure 1 shows the change in the number of weekly practice hours per group throughout late adolescence. Typically, sport programs in upper secondary schools in Norway include three to four weekly practices during school hours. As expected, the number of training hours increased rapidly in the cohort at the transition from middle school to upper secondary school (at age 16-17 years). The athletes also had more club practices, resulting in an increase in training loads of up to 100%. Initially, the analysis suggested that the amount of training for the near-elite group was lower than the non-elite group. However, two players within the near-elite cohort group who did not attend a sport school program had a strong influence on this finding due to the small group size. When these two players were excluded from the analysis, no differences were found in the number of practice hours between the elite and non-elite groups. Players who attended a sport school program practised 16.3 hours (SD = 0.7) on average per week during the three years of upper secondary school; the others practised an average of 11.2 hours (SD = 1.7) per week.

Table 1.
The specialisation pathways of youth elite handball players and their involvement in youth national team activities

Cohort	All (n=33)	Non-elite (n=6)	Near-elite (n=6)	Elite (n=21)
Starting age	7.7 ± 1.4[a]	8.4 ± 0.7 [a]	6.5 ± 1.0 [a]	7.8 ± 1.4 [a]
Number of other sports	2.1 ± 1.5[a]	2.1 ± 1.0 [a]	1.5 ± 1.0 [a]	2.3 ± 1.7 [a]
Years in other sports	5.3 ± 3.2[a]	4.6 ± 3.0 [a]	4.3 ± 2.6 [a]	5.9 ± 3.2 [a]
Start of specialisation	13.4 ± 3.0[a]	14.0 ± 3.0 [a]	12.2 ± 2.7 [a]	13.6 ± 2.9 [a]
Sport school (upper secondary)	81.8%	83.3%	66.6%	85.7%
Total sample	**All (n=74)**	**Non-elite (n=30)**	**Near-elite (n=13)**	**Elite (n=31)**
International matches	5 ± 0-49[b]	4.5 ± 0-28[b*]	5 ± 2-43[b]	18 ± 0-49[b]
Practice hours	154 ± 14-531[b]	62 ± 14-271[b*]	200 ± 87-519[b]	245 ± 50-531[b]

Note: [a]The first number is the mean value, and the second number is the standard deviation; [b]The first number is the median and the second number is the range. *The (a) number of international matches played, and (b) the number of practice hours in relation to youth national team activities were significantly higher for those in the elite group than those in the non-elite group ($P < 0.05$). There were no other statistical differences between the groups.

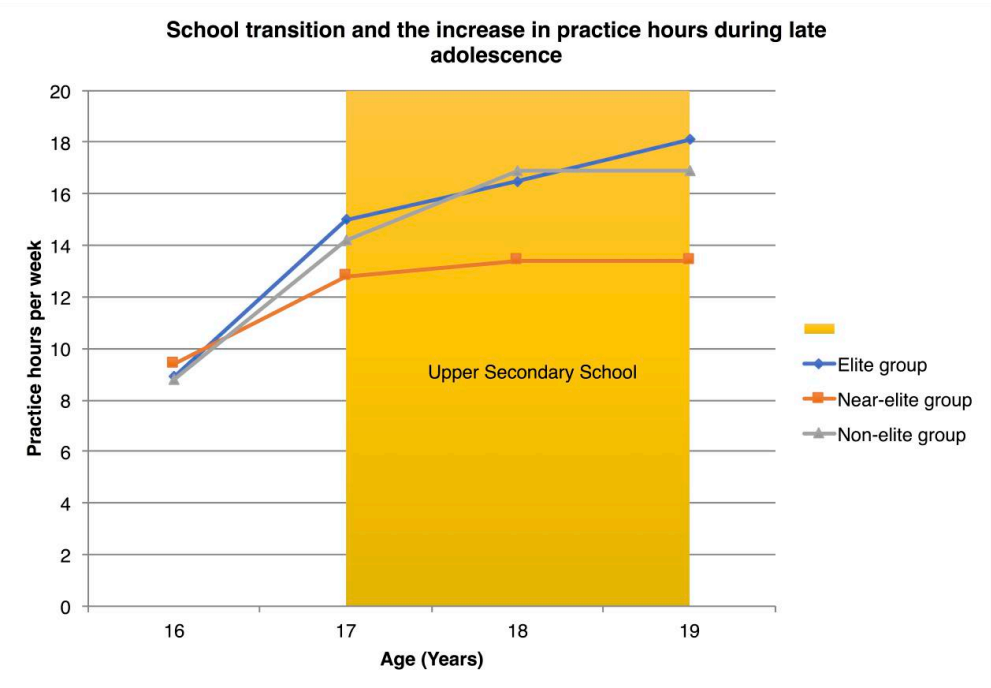

Figure 1. School transition and the increase in practice hours during late adolescence

The performance trajectories leading to the elite level among the athletes in the elite group varied considerably both in terms of how the athletes moved between levels, and in terms of when such transitions occurred from one level to the next (see Figure 2). Their simultaneous involvement in different team and practice settings suggests that TD pathways are characterised by what could be described as a 'practising upwards' prior

to the introduction of formal competitive activities. Eighty-five percent of the cohort (79% of the elite group), for instance, took part in adult competitions before or during the season in which they turned 17 (legislation in Norway prohibits players under the age of 16 years from doing so). Typically, athletes start their adult careers by experiencing adult competition at lower levels (e.g. in a reserve team). In this study cohort, the average duration of a transition from adult practice to adult competition was 0.95 years. However, the length of the transition between youth and adult sport was varied (see Figure 3). To date, 64% of the cohort (n=33) and 43% of our entire sample (n=74) have made the transition to the elite level. As all the participants are still at a relatively early stage in their adult careers, it is likely that more will proceed to the elite level over time. It is also likely that several of the players currently at the elite level will transition to lower levels or pursue other careers outside sport.

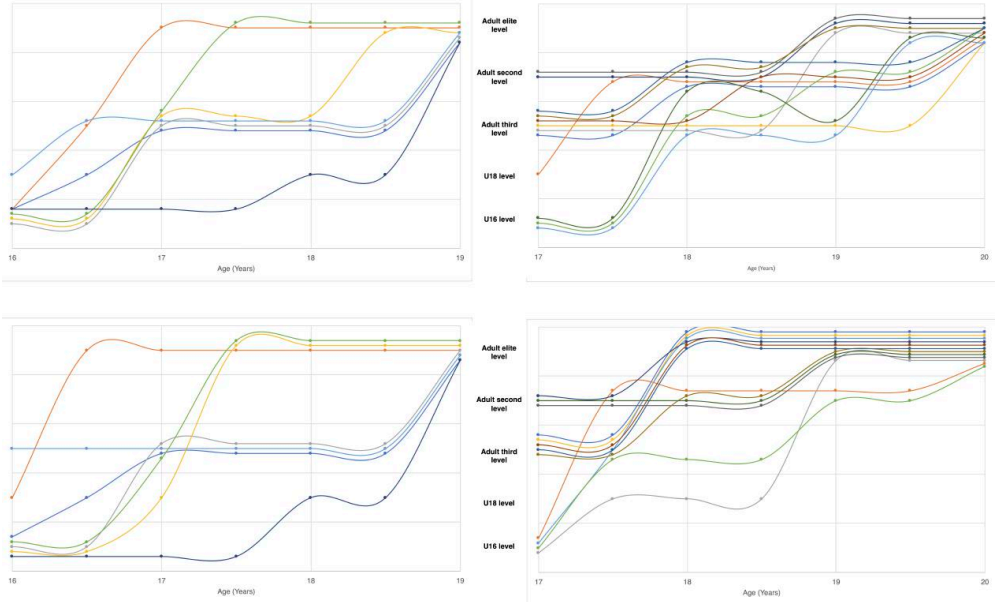

Figure 2. Performance trajectories leading to the elite level
Note: Data are missing for the athletes assigned as Numbers 20 and 21 in the cohort.

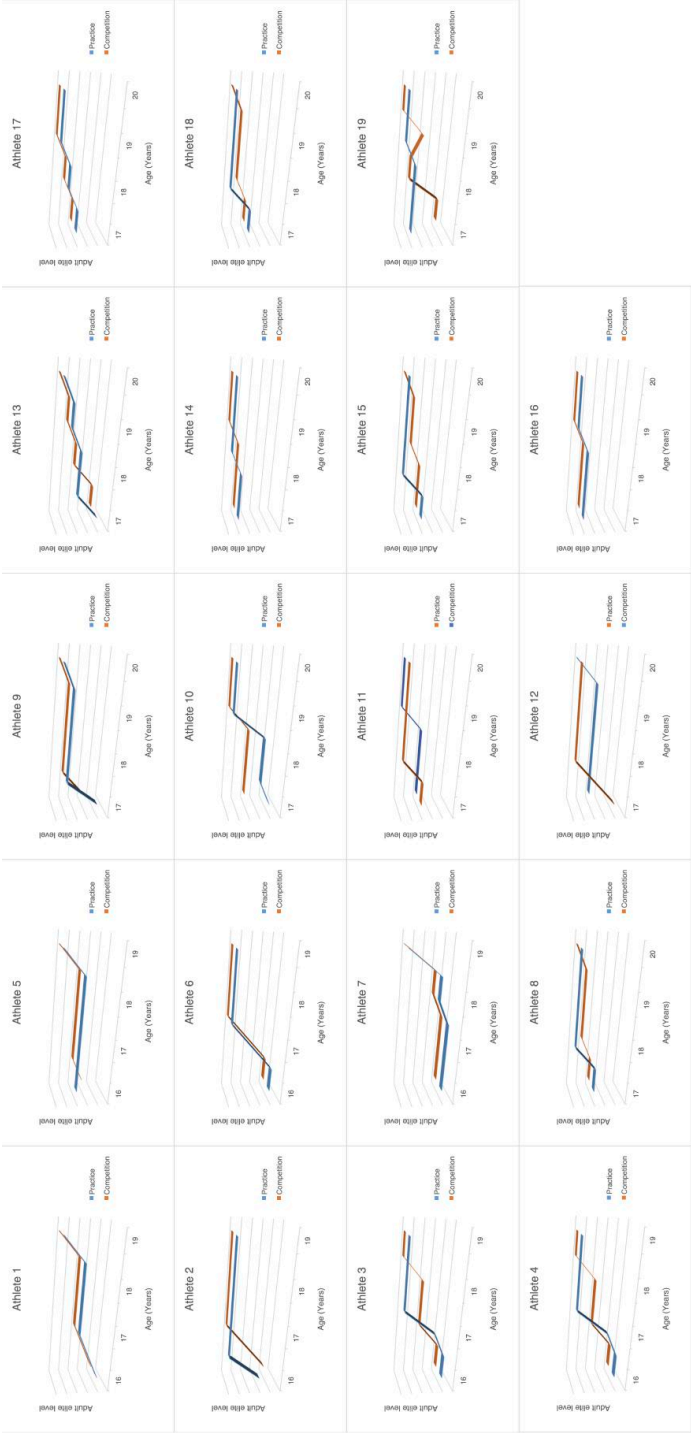

Figure 3. The relationship between practising and playing upwards for each individual athlete
Note: Data are missing for the athletes assigned as Numbers 20 and 21 in the cohort.

Discussion

The findings of this study suggest that although the pathways to the elite level in Norwegian handball share a set of basic commonalities on an aggregated level, they are also highly variable. Our findings demonstrate clearly the high variability in the amount of practice and competition in the youth national team, within-club performance trajectories, and the duration of transitions from junior to senior sports.

To meaningfully compare the sporting experiences of athletes in different groups, variations of involvement *between* the groups should be larger than variations within them. However, the performance variability within the elite and near-elite groups in our study was larger than the differences between these groups. This suggests that other extraneous reasons for such differences should be considered. Findings from studies showing that above-average amounts of domain-specific training have a favourable influence on selection to the national team in handball (Baker, Bagats, Büsch, Strauss, & Schorer, 2012) seems analytically inadequate when attempting to explain their success – or lack of success – when transitioning to the adult elite level. Above a certain threshold, other mechanisms (social, environmental and psychological, for instance) may shape the development of athletes (MacNamara & Collins, 2011). Self-regulatory skills (Jonker, Elferink-Gemser, & Visscher, 2011) and social mechanisms such as early international success at the senior grade (Hollings, Mallett, & Hume, 2014), for example, may determine whether athletes will be able to establish themselves successfully at the adult elite level. Developmental pathways are also influenced by the cultural contexts in which they are embedded (Storm et al., 2012). Sports participation histories, in isolation, therefore provide limited insights into causal inferences related to successful and less successful pathways (Ford et al., 2012). Studies have shown that social relations and the psychosocial environment are important to TD and that power relations are central to team sport practices (Potrac & Jones, 2009).

Vaeyens, Gullich, Warr, and Philippaerts (2009) demonstrated that institutionalised TD programs during adolescence need not necessarily be associated with greater success in senior elite sport. In a study of Portuguese athletes, Barreiros, Côté, and Fonseca (2014) reported that only one-third of pre-junior athletes became senior national team athletes. Our findings, in contrast, indicated that elite players tended to have greater involvement in national team competition and practice. This may be due to the specific national team context of TD in Norwegian handball, in which practice takes place under the guidance of expert coaches and also involves expert players with high levels of skill and motivation. Such practice provides ongoing opportunities for selection, for more practice, and learning environments of higher quality. However, our sample only included players who had been involved with Norway's national team, and the degree to which such cultural or organisational influences may have impacted upon player development is therefore difficult to determine. Though studies have shown that talent identification systems help to produce self-strengthening motivational mechanisms (Hancock, Adler, & Côté, 2013), few have attempted to investigate exactly *how* youth national team activities may influence TD. Exploring this issue may be challenging because the content and volume of national team activities varies considerably between countries and between sporting organisations, and are therefore difficult to compare.

Within organisational models in which TD is loosely organised, it is difficult to identify clearly-preferred hierarchical pathways leading to the elite adult level; fewer differences between athlete groups in terms of sporting experience prior to reaching adult competition might therefore be expected. In systems that more closely resemble the SMTD (Bailey & Collins, 2013), talent identification is based on particular criteria and athletes move through selection/de-selection at different hierarchical levels. In such systems, it would be plausible to assume that those who reach the elite adult level are

likely to be increasingly similar in terms of their sporting experiences. If players are able to move in and out of, and between, different levels and different practice settings, this could lead to considerable differences within all groups. In such instances, we would therefore assume that the average scores for different training and competition variables would be less representative of either elite or non-elite athlete groups. Such variability was noted within each group in our study sample. Models in which it is assumed that TD pathways are linear, hierarchical and predictable therefore do not seem to accurately represent Norwegian team sport contexts or other sporting contexts (MacNamara & Collins, 2014).

Participation in the full range of the available, diverse practice settings is potentially exhausting for athletes. However, as in other dynamic systems, these settings may be complementary and, collectively, may create multiple pathways and different combinations of sporting experiences (Davids, Araújo, Vilar, Renshaw, & Pinder, 2013). We suggest therefore that the possibility of different combinations of practice and competitive settings within the organisational context of Norway might explain the various and varying ways in which elite level athletes have been able to move through the system (e.g. via national team involvement and transitions at the club level). It is important, too, to recognise the importance of individualisation in TD (Ford et al., 2011): it could be argued, for instance, that organisational contexts characterised by a 'nested structure' of different practice settings provide *more* room for individualisation – expressed as different pathways – compared to more hierarchical TD models. In our study, the successful pathways were clearly characterised by diverse exposure to more adult level practice and/or competition during adolescence. Exposure to adult-level competition offers potential benefits and it has even been suggested that such exposure could be utilised as a tool for providing appropriate challenges for youth athletes (McCarthy & Collins, 2014). However, it should also be noted that too many potential combinations of different practice settings over the course of an athlete's development may also increase the risk of overtraining (Kristiansen & Stensrud, 2016). Daily workloads may therefore need to be carefully monitored.

Being able to follow a cohort of athletes over the course of their development enabled us to avoid the problem of 'survivor bias' which would otherwise have arisen if the analysis and interpretation had been based only on success stories. The study sample was small, however, and the timeframe was limited.

Implications

The findings of this study highlight the difficulties of providing general guidelines for TD which do not consider the socio-cultural and organisational contexts underpinning TD processes. Developmental pathways in Norwegian handball are characterised by diverse interactivity. If policy makers regard this as important, they need not necessarily focus on encouraging a more streamlined TD pathway system. Instead, it may be more valuable to focus on the mechanisms that could facilitate better interaction and coordination between different practice settings, particularly of club team practices, school practices, and national teams. Currently, the coordination of TD efforts in Norway is left mostly to individual coaches, parents and players. Whether and how these efforts are optimised across contexts is highly variable. Volunteerism is embedded in the organisational context of Norwegian handball and this means that coordination cannot be achieved simply by increasing the level of professionalism. Instead, the facilitation of both formal coordination mechanisms (e.g. adjusting competition schedules) and informal coordination mechanisms (e.g. raising coaches' awareness of the need for individualisation) are likely to be more productive approaches.

Variables such as the total training volume (traditionally associated with success in elite handball) may be *necessary* if athletes are to reach the top level. But focusing on them is not analytically *sufficient* if we wish to understand the nuanced factors shaping the successful pathways of athletes within an already selected and talented population. Future studies should investigate the differences between the impact of such variables, explore the qualitative aspects of development, and strive to analyse how and why similar TD pathways sometimes result in quite different performance levels. We concur with MacNamara and Collins (2014) who argue that TD research needs to "focus on *features* of effective TD systems and *process* markers [...] that can be adapted to meet the need of specific sports, cultures and stakeholders" (p. 793). Closer attention should be given to the idiosyncrasies of particular pathways rather than the commonalities of pathways. Specific attention also needs to be focused on how different activities and the practice settings that constitute them may – or may not – complement each other during TD.

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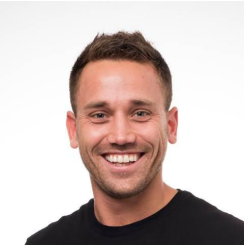
Appendix 1: Examples of the items included in the questionnaire

What kind of upper secondary school program do you attend?
Which team(s) at which levels do you currently play competitive matches for?
When did you start to play for the team(s)?
Which team(s) at which levels do you currently practice with?
When did you start to practice with the team(s)?
How does your weekly practice schedule look like (type of activity, time of day and duration)?

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday

How many weekly hours of team-based or self-organised practice do you do:
Of handball practice?
Of strength training?
Of work capacity training?
Of other types of training (please specify)?

The Authors



Christian Thue Bjørndal is a PhD candidate at the department of Coaching and Psychology at the Norwegian School of Sport Sciences. His research interest is in cross-disciplinary approaches to understanding talent development and critical approaches in sports coaching. He currently works as an elite handball coach and with youth development.

Lars Tore Ronglan is professor in sport sociology at the Norwegian School of Sport Sciences. His research interests include sports coaching and the dynamics of sport teams.

Svein S. Andersen has a PhD from Stanford University. He is a professor of organization studies at Oslo Business School, BI and adjunct professor at the Norwegian School of Sport Sciences. His research interests include the study of elite sport systems and decision making in high performance contexts.

Paper 4

Successful and unsuccessful transitions to the elite level: The youth national team pathways in Norwegian handball

Successful and unsuccessful transitions to the elite level: The youth national team pathways in Norwegian handball

Christian Thue Bjørndal[a*], Svein S. Andersen[ab] and Lars Tore Ronglan[a]

[a]*Department of Coaching and Psychology, Norwegian School of Sport Sciences, Oslo, Norway*; [b]*Department of Leadership and Organizational Behaviour, Norwegian Business School, Oslo, Norway*

[*]Corresponding author. Department of Coaching and Psychology, The Norwegian School of Sport Sciences, Sognsveien 220, 0863 Oslo, Norway. Email: christian.bjorndal@nih.no

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Abstract

The aim of this study was to explore successful and unsuccessful transitions in Norwegian handball from the youth player level to the adult elite level. The nine youth players in our strategic sample were interviewed in-depth about their experiences. Five of the nine athletes had established themselves successfully at the adult elite level; four had either quit or continued to play at a lower level during the previous season. The data were first inductively analysed before the theoretical analysis was conducted. This enabled us to develop a comprehensive understanding of each athlete's developmental path and transitions, and enabled a comparison between the different outcomes. The Lifespan Model was used a basis for understanding the individual pathways of development and the transitions made. The Ecology of Games Framework was used to contextualise the individual processes within the particular organisational context of Norwegian handball. The results show how the application of the Talent Development (TD) model used in Norwegian handball is frequently experienced as one which is exhausting for athletes. For a significant number, it may lead to injuries or burnout. Further, our findings demonstrate that there is a thin line separating two different outcomes: (a) a drop-out due to a loss of motivation and meaning, and (b) a successful transition to the elite level. We discuss how the organisational context of Norwegian handball leads to unintended consequences, both positive and negative, for athletes. Incidents and decisions beyond an athlete's immediate environment can facilitate or inhibit successful transitions to the elite level.

Introduction

Retrospective investigations of expert performers who have already reached an elite level in sport have added little to deepening an understanding of *when* conditions are adequate or inadequate for enabling successful transitions (1). There is now an emerging interest in the particular cultural conditions that influence athlete development. In this regard, in-depth approaches to research can provide a valuable level of nuance and detail, helping to refine and redefine the broad categorisations of activity patterns that have dominated talent development research (2).

The aim of this study was to investigate the successful and unsuccessful transitions to the elite level made by youth national team athletes. Nine youth elite handball players were interviewed in-depth about their sporting development during their adolescence, their career transitions, and the processes that had inhibited or facilitated their development and the transitions they had made. Norwegian handball has experienced a long period of extraordinary success and the TD model adopted within this sport has many useful and positive characteristics. These include, for example, its facilitation of broad-based participation, the complementary influences of different activities, and the diversity of pathways leading to the elite level (3). But handball has negative consequences, too: it is a team sport characterised by repeated rapid actions, powerful changes in direction, hard body tackles, and collisions between opponents. Playing handball is associated with a high-level risk of injury (4).

Previous studies of athlete transitions from a junior to a senior level have primarily examined cohorts of junior athletes and reported on the percentage of successful transitions (1). In this study, we have applied a more in-depth approach because we wanted to provide more detailed and context-sensitive descriptions than those offered in most TD literature (5). Our intention was to contribute to a better understanding of how contextual conditions impact on individual development (6) and to widen our understanding about the transitions made by team-sport athletes. By closely comparing successful and unsuccessful pathways within the same group until the end of adolescence, our purpose was to distinguish between the necessary, sufficient and incidental processes driving transitions from the youth elite level to the adult elite sport level (7).

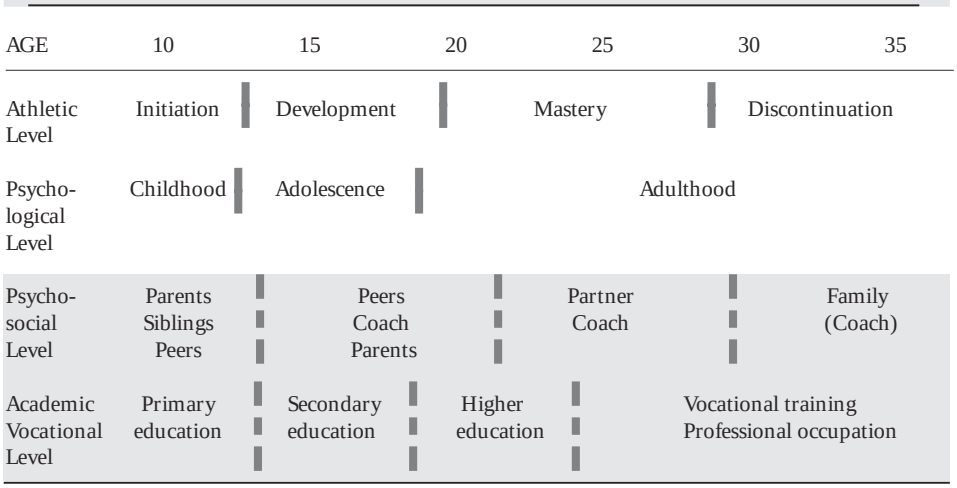
Our study is an innovative attempt to bridge the disconnection in athlete development research, identified by Bruner et al., between the *talent development* and *career transition* perspectives (8). The former approach has tended to focus mostly on practice activities

throughout athletes' sport development when investigating transitional experiences and outcomes in sport. In contrast, research in the area of career transitions has recognised that athletes may have multiple identities, and that they may be involved both in sports as well as numerous other activities (9). Both perspectives are central to our understanding of athlete development in sports. Our study attempts to integrate these approaches by applying a broader, contextualised career perspective when analysing athletes who are transitioning from junior to senior elite sports.

Theoretical framework

The Lifespan Model described by Wylleman and Lavallee (10) provides a conceptual framework for understanding the transitions athletes make over the course of their development and uses a developmental perspective encompassing athletic, psychological, psychosocial and academic/vocational domains. This model attempts to show how the development of athletes is characterised by transitions in different domains throughout their careers – sometimes coinciding and overlapping – and how transitions in one domain may influence transitions in another. The Lifespan Model takes into account the interaction between various domains in a way that provides a holistic context for the study of development and transitions (11).

Figure 1
A developmental perspective on transitions faced by athletes at athletic, individual, psychosocial, and academic/vocational levels.



Note. A dotted line indicates that the age at which the transition occurs is an approximation.

The model differentiates between normative transitions (those that are anticipated and predictable, such as moving from a junior level to a senior level) and non-normative transitions (those that are unanticipated and are most often involuntary, such as career-threatening injuries or deselection). Athletes experience non-normative traditions as more difficult to cope with because these are difficult to predict (9). Although the model provides a general perspective for understanding the interactive nature of transitions, it does not acknowledge how an athlete's development might also follow non-linear pathways. Transitions can be affected by the interaction of many factors: some may be contextual, unintended, or even accidental (5). Nor does the model recognise the importance of the contextual conditions that may inhibit or drive development within a particular sports culture (12). For this reason, Wylleman and Reints (13) have argued that more lifespan-based research is needed in high-intensity sports to examine the occurrence of non-normative transitions, such as injuries, and how athletes cope with these.

The conceptual Ecology of Games (EG) framework (14) provides a complementary perspective to the individual focus of the Lifespan Model by *contextualising* the development of athletes within organisational contexts. The EG framework has been used in research into complex organisations that are heterarchical (rather than hierarchical) in structure and in which the incentives and aims within different arenas interact and drive decisions and development (15, 16). In organisations that could be described as more EG-based, individual actors can move back and forth between participation at different levels and settings, and their development can be non-linear.

The EG framework was recently used to describe the particular organisational model of TD in Norwegian handball (3). This approach was seen as appropriate because the TD model in this sport includes multiple key actors and influences, namely: local-community based sports clubs, sport school programmes, regional TD initiatives provided by the Norwegian Handball Federation (NHF), and the national team. The actions and interactions of these actors are mostly informed by their own team-based perspectives and no single actor has sole responsibility for TD. Individual athletes can participate simultaneously in activities provided by the different actors, and the athletes may therefore be exposed to very different influences over the course of their development. However, as the EG-study showed, the involvement of different organisational actors across multiple team settings also leads to an increase in the complexity of the handball system and may limit the overall organisational capacity for precise communication and coordination.

Wylleman and Lavallee's Lifespan Model is useful when describing the general and individual developmental transitions over the course of athletic careers. The EG framework provides an additional organisational perspective and helps to contextualise the wider organisational interactions and mechanisms driving individual development, and how these influence athletes' careers over time.

Methods

This research was designed as a multiple case study of the transition to the adult elite level in Norwegian handball. According to Yin (17), case studies follow the logic of experiments and are well suited to investigating processes intended to lead to specific outcomes. The unit of analysis in this study is the transition process from the youth elite level to the adult elite athlete level within the context of Norwegian handball. In this study, the observational units are the individual athletes, and the focus is on their experiences of the processes and events inhibiting and/or facilitating their transitions from junior to senior sport during late adolescence.

Context

Norwegian handball is rooted in the values of volunteerism, decentralisation and egalitarianism which characterise the Scandinavian sports model (18). The heterarchical organisational structure of TD in Norwegian handball includes multiple autonomous actors and activities. The player development model of the NHF is broad-based, and as many as one-third of all youth handball players in Norway participate in different TD initiatives during their early adolescence (3). The NHF's various initiatives range from the regional to the national level, and the youth national team is seen as the pinnacle of achievement. Each national team uses a two-year age category: players born in the same two-year period can play together throughout their national team careers. Although selections for the national team can be rotated, monthly five-day training camps are common and many national team players participate in all four of the international handball championships throughout the five-year lifetime of their national team. Athletes selected to the youth national team remain part of their club teams and sport school programmes, and also participate in the NHF's regional TD activities.

Participants and data collection

Nine athletes were interviewed in-depth to reconstruct a detailed picture of the transition processes they had gone through. All the interviews were recorded and transcribed verbatim, and each interview lasted approximately 60 minutes. The first author conducted all the interviews. During the semi-structured interviews, the athletes were asked about: (a) their developmental experiences during late adolescence, (b) their career transitions during this time, and (c) the processes that had inhibited or facilitated their development and career transitions.

Athlete	Successful/unsuccessful transition	Born	Years of playing handball	Region	School	Current status
Kerry	Successful	1997	10	West	Normal/ sport	Elite player (1 year)
Melanie	Successful	1996	13	West	Sport	Elite player (1 year)
Mary	Successful	1996	13	Mid	Normal	Elite player (2 years)
Molly	Successful	1996	12	Mid	Sport	Elite player (2 years)
Vanessa	Successful	1997	11	West	Sport	Elite player (0 year)
Carrie	Unsuccessful	1996	12	Mid	Sport	Quit
Debbie	Unsuccessful	1996	10	South	Sport/ outdoor activities	Quit
Cathy	Unsuccessful	1996	13	South	Sport	2nd division player (1 year)
Sarah	Unsuccessful	1997	12	West	Sport	2nd division player (0 year)

Table 1. The participants of the study and their background

Seven of the nine athletes we interviewed had already been interviewed in-depth twice by the first author (two and three years prior to this study). All the athletes had taken part in a 4-year longitudinal study and were included in a cohort representative of all young elite Norwegian handball players. A strategic sample from this cohort was identified based on their similarity in terms of exposure to similar amounts and types of youth elite activities, and their differences in terms of the *outcome of their transition* to the adult elite level. This type of strategic sampling, based on the dependent variable, made it possible to trace and compare key elements in the processes that appeared to have led to different outcomes. Five of the nine

athletes in our study had established themselves successfully at the adult elite level; the other four had either quit or had continued to play at a lower level during the previous season. The detailed comparisons of the successful and unsuccessful transitions made by those in our athlete cohort provided important insights about the differences between them and about the challenges they faced even when following similar pathways towards the elite level.

We established a processual picture of their individual pathways during adolescence. We also collected information on the basic variables related to their practice histories. During this earlier research, the first author spent 40 days over seven months undertaking fieldwork during the national team activities. This took place three years before the interviews for this article were undertaken and helped to establish a personal relationship with all the athletes included in the current study. Our pre-knowledge before the interviews for this study informed our questioning and formed a richer framework for interpreting the interview material.

Data analysis

The analysis was empirically driven and rooted in the pragmatism of the grounded theory approach advocated by Corbin and Strauss (19). In this particular grounded theory approach, theoretical concepts are seen as useful ways to focus and inform initial research and data collection. The approach helps researchers to establish conceptual frameworks *before* they pursue further data driven analysis, enabling them to create and compare concepts that are 'grounded' in empirical material before further exploring the validity and relevance of the theoretical concepts.

Based on their practice histories during their adolescence, a developmental timeline was drawn up for each athlete. The complementarity of the data collected in previous research (for example, interviews, field observations and practice histories) enabled us to "characterize key steps in the process, which in turn … [permitted a] good analysis of change and sequence" (20). We used the process-tracing technique of George and Bennett (7) to determine the chain of events over the course of each athlete's development before comparatively analysing this with data from the other athletes.

Each interview was analysed in the sequence in which it had been conducted. In the first cycle of the coding process, we inductively identified themes in the data that were central to the research question. For example, four themes ("Improper load management", "Injuries and

trauma", "Identities in change" and "The importance of the social environment") were developed to characterise the unsuccessful developmental transition of one of the athletes. Similarly, we continued to inductively develop themes, one interview at a time, to descriptively depict the unique transitional experiences of each athlete. For the comparative analysis, these were then ordered in relation to each other and to a general timeline within the conceptualisation of the Lifespan Model.

We then utilised the memo-writing technique advocated by Corbin and Strauss (19) to elaborate on the common themes that were constructed through the initial data analysis. In the second cycle of the coding process, we searched for patterns among the themes by comparing the first interview with the other interviews, in sequence. We then merged any associated themes, thus adding to each category in the developing memos. Finally, we compared the successful and unsuccessful transitions with each other. Together, this process led to the establishment of the four themes that are presented in the results section. The first two themes describe the general experience of the junior to senior transition for all athletes; the last two themes capture the processes leading to the unsuccessful or successful outcome of the transitional process. As such, the results were first firmly grounded in the empirical material before we turned to discussing the relevance and applicability of the theoretical framework of the Lifespan Model and the EG framework.

Results

All the athletes in this study had extensive experience from their youth national team activities and can therefore be described as handball players who have followed what we term *the youth national team pathway* towards the elite level. The characteristic features of athletes within this pathway were that they had been: (a) key players in their youth teams, (b) among the best in their age group during adolescence, (c) identified as talented by coaches in different team settings, (d) participated in TD initiatives at the regional and national level, (e) selected to represent the national team at an early age, and (f) were experienced at the international level. The recognition that these athletes gained from playing for the youth national team made them easily visible and attractive to senior elite teams. Table 2 shows the product of the descriptive analysis which is structured in accordance with the main elements of the Lifespan Model.

AGE	15 20		Successful					Unsuccessful			
			KERRY	MELANIE	MARY	MOLLY	VANESSA	CARRIE	DEBBIE	CATHY	SARAH
ATHLETIC LEVEL	Development	Athletes that had experienced repeated and/or chronic injuries	x*		x*	x	x	x	x	x	x
		Athletes that had experienced a problematic school situation in relation to either the academic or sport domain					x		x	x	
		Athletes that had experienced a problematic club setting	x			x	x		x	x	x
		Athletes that had experienced the TD model as periodically exhausting	x	x	x	x	x	x	x	x	x
PSYCHOLOGICAL LEVEL	Adolescence	Athletes that experienced a loss of meaning and identity during periods of prolonged injuries				x	x	x	x	x	x
		Athletes that experienced a loss of meaning and identity due to sport becoming too 'serious'							x		
PSYCHOSOCIAL LEVEL	Peers Coach Parents	Athletes that had experienced periods of a problematic coach-athlete relationship				x	x		x	x	x
		Athletes that had experienced strong peer and family support	x	x	x	x	x	x	x	x	x
ACADEMIC VOCATIONAL LEVEL	Secondary Education	Athletes that had attending a sport program		x		x	x	x	x**	x	x
		Athletes that had attended a normal academic program	x***		x						

Table 2. The Lifespan model applied to the study findings: Comparing successful and unsuccessful transitions

*Late influence of injuries

**Changed program to outdoor activities in her senior year

***Changed to sport program in her senior year

Our analysis of the transition that the athletes made in Norwegian handball to the senior elite level was informed by four main themes which were constructed through the data analysis. These are presented in the next section: (a) the national team pathway, (b) the applied model of TD in Norwegian handball (which is extensive and potentially exhausting for athletes), (c) drop-out due to a loss of motivation and meaning, and (d) successful elite sport transitions.

The national team pathway

The athletes in our cohort were first selected to be part of the national team at the age of 15 years (SD = 0.9 years). Prior to their national team selection, all the athletes had been selected to take part in regional TD initiatives alongside their club-based competitions. The athletes, coaches, parents and teammates regarded selection as a recognition of an athlete's talent. Kerry, one of the players, noted that this selection was a strong motivational incentive: "I first started to realise that I could become an elite player when I got selected to the national team. Before that, playing handball was just for fun."

In Norwegian handball, athletes are permitted to play adult-level matches at the age of 16 years, and all athletes in this study were part of a senior team from that age. The national team can narrow down the transitional gap between the youth elite level and the adult elite handball. According to Kerry:

> The performance level [in the elite team] was a bit higher than in the youth national team. If I had not had the national team experience, I do not think I would have had a successful transition to the adult elite level.

Participation in the national team seemed to be particularly important for athletes during the periods in which they received limited playing time in their senior club teams. As Mary pointed out: "To have been a national team player from the beginning was really important when I played in the 1st division and was not a key player." Melanie shared a similar experience during her interview: "I think it is fun to play national team matches and it is really quite different from playing in the elite team. There, I have not played that much and I know that [another player] is the preferred player."

The youth national team was regarded by the youth athletes as an important and prestigious arena, and it had exerted a strong influence on their lives. Some, for example, had been burdened by the weight of social expectations, both on and off the court. Sarah observed that she had felt obliged to participate in all the scheduled activities to avoid being dropped from the team:

> I was told that I could forget getting back into any national team squad if I said no to any single national team activity. […] So I did not dare because I thought I would not stand a chance otherwise.

The youth national team pathway was therefore an important influence on athletes, facilitating their development and priming them for a successful transition to the elite level. However, the needs of athletes over the course of their adolescence are dynamic and individual. These were not always fully and flexibly accommodated in the context of the national team.

The applied model of TD in Norwegian handball

The TD activities available in Norwegian handball are extensive. This is true particularly for athletes in the youth national team pathway who strive to participate in all the available team settings despite the risk of injuries, overuse, and loss of motivation. Debbie's experiences illustrated how this could become too much for some to manage:

> I had to perform well in school [handball]. I had to perform well in the national team and I had to perform well in front of the club coach. There was no cooperation. […] It really just became too much. It was demotivating.

The intensity of national team activities was especially demanding, and Kerry observed that she had been "exhausted when [she] … got home from national team activities". Carrie compared her own training load to those of her sport school classmates:

> When I told the skiers in my class about our national team activities, they were shocked about the amount of training. … when you get back home […] you just go straight back into club activities. There is always a match the next day! We do not get the same time to recover as the skiers. We just keeping going full steam ahead!

In the international youth competition schedule, the European and World Championships and the European Youth Olympic Festival are played in the middle of summer each year, and athletes on the Norwegian national team therefore have no off-season period between the regular competitive seasons. Sarah explained:

> The handball season is a full year when you are a youth national team player. Whenever we have a break from club activities, the national team uses it. There is no time to recover and pause. The break you have from club activities in May coincides with the period for most of the national team activities. In addition, you have your exams at school. It is hard.

The absence of an adequate recovery period after the national team championships and before the return to club activities was physically and mentally challenging, as Mary noted:

> When I started last season, thinking about handball almost made me throw up. I was so tired! Last season started with a really bad national team championship. I had not been performing well and the coach was not the type who noticed that I needed a break. I was really tired of handball but was thrown right into club training.

To manage these demands, the athletes tried deliberately to orchestrate the settings over which they had most control. Melanie, for example, decided to play only senior handball, and Vanessa stood firm in her decision not to participate in regional level TD activities. Similarly, Molly

changed clubs so that she could have the same coach in both her school and team settings. Kerry's strategy was to ask to take part in a 4-year high school sport programme instead of the regular 3-year programme, and Mary chose a regular high school programme without sports training. The choice Debbie made was to change her sport programme to outdoor activities instead of her preferred handball programme. She explained her decision: "I got to practise [handball] only once a day. That was what made me continue to play handball. […] It was so helpful to change programme because I no longer got the same amount of handball training."

The interviews revealed clearly that the TD model of Norwegian handball is both exhaustive and potentially exhausting, and places great demands on athletes. They are affected by the amount and intensity of activities, the absence of an off-season period, and the additional academic demands placed on the athletes. It should be noted, however, that those athletes who experienced this totality as being particularly exhausting were not the ones whose transitions to the elite level were unsuccessful.

Drop-out due to a loss of motivation and meaning

Repeated injuries were caused by factors such as the extensive amount of activities in the TD context, the high-risk nature of competitive handball, and because coaches were unable to mutually and sufficiently adapt to each other's constraints. These injuries negatively influenced the motivation of athletes. One of the consequences of a decline in motivation over a sustained period, as Carrie suggested, was a loss of meaning and identity:

> Honestly, if I had never been injured I would never have even thought of quitting. […] When I was injured for the first time and was through half a year of rehabilitation, I was very motivated. […] But the next time, when I got the message I would be out for about a year… that is when those thoughts [about quitting] slowly arose.

Most of the injuries reported in our study were recurrent and/or chronic. Melanie was the only athlete in our study sample who had managed to avoid being injured during adolescence. Interestingly, the key issue of concern for the successful athletes was not whether or not they got injured or not. Instead, they were concerned primarily with not getting injured *too early* or

too often. The risk of injuries appeared to increase if athletes were involved in more than one team setting. Debbie observed, for example: “The injuries came after I started the sport school programme, was a youth national team player, and played for the senior club team”.

Coaches and teammates impose pressure on athletes to participate, both consciously and unconsciously, and this can inhibit proper injury management. Cathy noted with frustration: “I am tired of coaches yelling at me for being injured!” At times, this perceived social pressure and lack of social support resulted in some athletes experiencing a mental and physical breakdown during practice sessions.

> “It came to the point,” commented Vanessa, “where [the coaches/club] knew about [my chronic injury] and I just wished that they had told me to stop. It got to the point where I broke down in practice. I just fell to the ground and started screaming [because of the pain].

Perceived social pressures can be subtler in form or even regarded as the product of specific sports cultures. Sarah noted: “You are told to be sensitive [i.e. to be aware of your own injuries] and sit down if it hurts. But then you feel like a huge wimp when you sit down.”

The athletes’ perceptions of the social pressures to participate illustrated the dilemmas ‘listening to players’ as way of better injury management. Athletes tend to under-report injuries, as Carrie noted, not only because they think they *have* to play but also because they *want* to play:

> I should not have played in three to four teams or skipped practice to play matches. But players do not say “no” to playing a match instead of going to practice. The coaches need to be determined and pose a demand: that you actually need to practise if you are to play. I often went straight from being injured to playing matches.

Sustaining motivation and meaning through periods of prolonged injuries is not an individual process. Rather, it seemed to be a social process that was strongly influenced by an athlete's social environment and her relationship to her coach. Carrie's experiences clearly reflected this:

> In retrospect, I realise how much the social environment meant to me. I thought that it did not matter that much where I played or with whom. But evidently it meant a lot to me. It is strange what you realise in hindsight.

Issues such as the impact of injuries, the degree of athlete motivation, and the meaning of particular events to athletes are interrelated. In the context of Norwegian handball, these issues cannot be managed in one team setting alone. Instead, they need to be managed *across* the different team settings in which athletes are involved. Sarah's experiences reflected the dilemmas faced by athletes:

> Nobody took me seriously. I said that [the injury] hurt. [The national team physiotherapist] told me to attend the training camp just so she could have a look. I was in so much pain during the first practice that [the physio] wanted to send me back home but then the pain decreased and I played the World Championship. When I got back home, we were on a pre-season training camp and there [the coach] did not take me seriously. I told him that it hurt but he commanded me to run high-intensity intervals with the rest of the team. When I came back home I was totally wrecked.

In Sarah's case, the series of incidents described above ended in a season-long injury.

Although the primary concerns of coaches *may* come into conflict with the needs of individual athletes, a lack of facilitation on the part of coaches may lead to unsustainable training environments and prolonged periods of injury. This may negatively influence player motivation and result in higher drop-out rates. Our results suggest that there is a clear connection between injuries and a failure to transition successfully. However, it should also be

noted that two of the five successful transitions recorded in this study were made by athletes who had experienced some of the worst chronic injuries during their adolescence.

Successful elite sport transitions

The athletes in our study were highly skilled, very dedicated, socialised into the culture of an elite sport, and had more international experience than most of their peers. This would suggest that those following the national team pathway are advantageously positioned to transition successfully to the elite level if they are not too injured to continue. Those who were successful, however, did show *different* patterns of transitions. Examples included: (a) Kerry, who had progressed directly to the elite level from the 2nd division handball team where she had *not* been a key player, and (b) Molly, who had experienced a temporary *declining* trajectory in which she had gone from finding it difficult to establish as a player in the 1st division, to a 2nd team in the 2nd division in an elite club, before moving back to the 1st team. Mary, Melanie and Vanessa exhibited more regular, linear progressions from a 1st division team to an elite team.

Interestingly, the successful transitions reported by the participants in this study were never well planned or deliberately organised. Instead, they were shaped by a series of incidents occurring outside the athletes' immediate sporting contexts – in other words, they were influenced by factors outside their control. Kerry, for instance, wanted to take part in a 4-year high school sport programme (rather than the standard 3-year programme) because doing so would have enabled her to manage both her sporting and academic careers:

> I applied for school in the city. I had decided to move before finding a new club. I talked to [the national team coach who is also the coach of an elite team] to get his opinion. He recommended that I play in the 1st division. Then he suddenly offered me a contract with his elite team.

Processes beyond Molly's control had also led to her moving to the elite team.

> I was supposed to practise with the elite team but to play for the second team in the 2nd division. But then [Stephanie] got pregnant and [Ann] tore her anterior cruciate ligament. Then suddenly I was an elite player.

Events of a similarly coincidental nature changed the path of Mary's progress when her club went bankrupt just as she was about to sign for a 1st division (Level 2) team:

> I was about to sign the contract when I noticed there was something wrong with my salary. […] We were to meet the next day so that we could sign the correct contract. That same day [Sophie] tore her anterior cruciate ligament and then [Sophie's elite club] called me and asked if I could come play for them instead. It was pure chance.

The sudden changes and coincidences experienced by the participants suggest that only a thin line separates successful transitions from unsuccessful transitions. Unpredictable events affected Vanessa's choices, for example: unhappy in her 1st division team as a starting player, she had had a history of struggling with chronic injuries. As she was about to quit handball altogether, she was offered an elite team contract: "They really want me on the [elite] team and they want to give me opportunities to grow. I had to take this opportunity. I have always wanted to play at the elite level."

Discussion

In TD research literature, access to TD environments is seen as one of the decisive factors determining elite sport success (21). However, the experiences of the athletes in this study suggest that providing extensive access to TD environments can cause the applied TD model to become inefficient. At worst, doing so can negatively impact the health of athletes due to the mental and physical demands placed on them. Athletes experience new and greater demands and stresses in sport and life as they transition from a junior to a senior level (9). In this study,

the experiences of athletes who had successfully made the transition to the adult elite level and those who had not were often more similar than dissimilar. This was seen when the Lifespan model was applied to the study findings. Although all the athletes had experienced many normative transitions, their initial transitions to the elite level and their transitions out of the sport were non-normative. For some, incidents and decisions made in other contexts led to offers to join an elite team. Likewise, decisions to drop out were related to periods of sustained or repeated injuries. It is reasonable to suggest therefore that keeping athletes in the national team pathway healthy and (more) free of injuries ought to be recognised as important. Doing so is likely to increase the likelihood that athletes will successfully transition to the elite level.

The EG framework highlights how processes initiated in one team setting can influence processes in other settings (15). We have shown that the level reached by athletes is influenced by multiple decisions made *across* different team and practice settings. This implies that initial transitions to the elite level cannot be easily or directly managed or planned. In the examples highlighted here, processes both in an individual's own team *and* in other teams heavily influenced the immediate setting of each individual. All instances in which the transitions had been successful were shaped by incidents and decisions in other teams. In the TD model of Norwegian handball, most coaches are responsible for a particular team. Although the coaches, through their positions, operate within a broader EG-based system, their actions and interactions are mostly based on their own perspectives. Necessarily, their immediate team-based needs occupy the foreground of their decision making: the development of individual athletes is just one of their many concerns (22). Conversely, the unsuccessful transitions noted in our study were a consequence of the breakdown in mutual adaption between the different team settings in which the athletes were involved.

The drivers creating high-risk environments for athletes are products of the collective actions of coaches across the organisational landscape. As noted, no individual stakeholder in Norwegian handball has overall organisational responsibility or 'manoeuvrability'. Nor can they, alone, incentivise or optimise the development of individual athletes and transitions to the elite level (3). This is because athletes participate simultaneously in an extensive number of team and practice settings. The collective effect of the different objectives of different teams can overextend the potential capacity of athletes at the individual level. Across these diverse settings, the number of activities affecting athletes can be mentally and physically challenging.

Hollings, Mallett and Hume (1) demonstrated that track and field athletes who did not reach the elite level had competing demands and tensions in their social and academic life. In our study, both successful *and* unsuccessful athletes experienced periods during which they struggled with competing social and academic demands, and the pressures of their athletic activities. Sarah highlighted how an increase in the amount of national team activities had coincided with the pressures of her academic exams. Even when actions are intended to be helpful (such as enhancing players' abilities through international competitions), Grossmann and Lames (23) argue that unintended negative consequences may still arise and overstrain young talent. Athletes with early international exposure, as Martindale and Collins (24) suggest, are at risk of burn out. As our study shows, increasing well-intentioned demands can lead to recurring and/or chronic injuries for athletes on the national team pathway in handball.

Bahr (25) has questioned whether being a talented athlete is, in itself, a threat to the well-being of athletes: talented volleyball players who jump higher and baseball pitchers who throw harder, he suggests, face a greater risk of injury by virtue of their special physical skills. Norwegian handball athletes on the national team pathway, are examples of athletes at high-risk and we would argue therefore that they should be handled with (greater) care.

Doing so appropriately is difficult because, as Hollings, Mallett and Hume (1) note, "the full impact of injury is difficult to gauge due to the complexity of the situational, interpersonal, and intrapsychic variables present". Our findings show that the management of chronic injuries is subtle and complex, and that the processes involved are challenging for physicians, coaches, and even the athletes themselves to notice, comprehend, and manage. The data indicated that an athlete's strong identification with handball may change over time or shift to another domain, such as academic performance. Such shifts may initiate deeper changes at the psychosocial level or compromise an athlete's overall commitment. During periods of prolonged injury, for example, athletes may orientate themselves gradually towards friends or activities outside their sporting context. This *slower* process towards dropping out of handball (compared, for example, to the immediate impact of a major acute injury) may be much harder for coaches and athletes to recognise. Coaches should be sensitive to warning signs when dealing with athletes who are chronically injured, or at increased risk of becoming injured, particularly if the extensive involvement across several team settings inhibits adequate oversight.

Conclusion

This study contributes to the existing TD literature by highlighting how the Lifespan model can be utilised as a tool for analysis and interpretation when comparing pathways and transitions to the adult elite level in sports. Together, the holistic Lifespan model and the EG framework, provide a powerful set of conceptual tools for investigating the reciprocal interaction effects between individual development and organisational contexts. The study has empirical value because it expands our knowledge of the necessary, critical and decisive processes that drive successful and unsuccessful transitions in youth sports. Thus, it can contribute to the knowledge of researchers and practitioners who interpret athlete development through the lens of a broader career view.

In this study, no single set of identified factors explained why transitions to the adult elite level in Norwegian handball were either successful or unsuccessful. Previous findings (3) have shown that the particular TD system in this sport in Norway allows many athletes to develop the skills and capacities that may lead to the elite level. Ultimately, the selection from the pool of players is shaped by both an athlete's skills capacity and by chance circumstances. Inherently unpredictable events (for example, team selections and injuries) are further shaped by unintended and unplanned interaction effects across the organisational landscape. Taken *together*, these influences determine successful and unsuccessful outcomes. In team sports, injuries have a strong influence on individuals and on the other players within and outside the immediate team. Injuries can impact a team's competitiveness or negatively influence the quality of the practice environment. They may also bring unexpected positive benefits and opportunities to others within and outside the team. Several successful transitions noted in our study, for example, were prompted because other players had been injured.

Athletes in the Norwegian national team are affected by inefficient and unsustainable routines and practices and their success could therefore be described as the 'survival-of-the-fittest' or, perhaps, the 'luckiest'. Troublingly, the unpredictable and demanding reality faced by athletes seems largely to be improperly managed. We would argue that this failure runs counter to the official policies and proclaimed values of the sport. Collins, MacNamara and McCarthy (26) suggest that high achievers in sport appear to have more proactive coping approaches to challenges than their less successful counterparts. In our cohort, the adolescent athletes were *all* highly resilient in the way they coped with multiple stresses. However, the

experiences of some athletes who were not successful indicated that such capacities can be ground down under the pressure of social expectations and constraints.

Our findings show that the value of TD models or frameworks should be questioned because they do not acknowledge that human development is a socially situated practice, or that social forces facilitate and inhibit individual development (5). As Denison (27) contends, "What may appear to be an athlete's personal problem [of successfully reaching the elite level] might actually be related to some larger social construction of how we believe sport should function". Future in-depth studies are needed so that the normative and general models underpinning TD in elite sport organisations can be refined.

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The cohort of Norwegian female handball players and their backgrounds

Athlete #	Year of birth	Quarter	Type of high school	NHF region	Age when starting handball	Number of other sports played	Age when specializing	Level
1	1997	3	Sport	East	7	3	14	1st division
2	1996	2	Sport	West	9	4	14	Elite
3	1997	2	Vocational	South-West	9	3	11	
4	1996	1	Sport	Mid	6	2	18	Quit*
5	1996	2	Sport	Mid	7	4	16	Quit
6	1997	2	Normal academic	West	6	3	12	1st division
7	1996	2	Sport	South-West	9	3	17	Quit
8	1996	4	Normal academic	East	6	2	11	1st division
9	1996	1	Sport	South-West	9	3	17	Elite
10	1996	2	Sport	West	9	0	9	1st division
11	1996	2	Sport	East	7	3	11	Elite
12	1997	1	Sport	East	6	3	12	Elite
13	1997	1	Sport	East	9	2	13	1st division
14	1997	2	Sport	East	7	0	7	
15	1996	2	Sport	South	8	0	8	1st division
16	1997	3	Normal academic	West	11	1	12	Elite
17	1997	1	Sport	East	5	2	15	Elite
18	1996	2	Sport	South-West	9	2		Elite
19	1996	1	Sport	Mid	6	7	17	Elite
20	1996	2	Sport	Mid	9	1	15	1st division

Athlete #	Year of birth	Quarter	Type of high school	NHF region	Age when starting handball	Number of other sports played	Age when specializing	Level
21	1996	3	Sport	Mid	10	2	16	
22	1996	1	Sport	South	7	0	7	3rd division
23	1997	4	Normal academic	West	9	3		Elite
24	1997	3	Sport	East	6	2	14	Elite
25	1996	4	Normal academic	Inland	12	6		Quit
26	1996	4	Sport	South	7	4	15	
27	1996	3	Sport	West	6	2	15	Elite
28	1996	2	Sport	South	8	1	8	
29	1996	3	Normal academic	Mid	7	1	14	Elite
30	1997	2	Sport	East	6	4	12	1st division
31	1996	1	Sport	Mid	8	5	17	Elite
32	1996	1	Sport	West	9	1	14	Elite
33	1996	3	Sport	South	Unknown	Unknown	Unknown	Quit
34	1997	2	Sport	East	7			Elite
35	1997	4	Sport	South	8	3	15	Elite
36	1997	2	Sport	West	7	1	14	2nd division
37	1996	4	Sport	Mid	7	1	13	Elite
38	1997	1	Sport	West	8	1	14	Elite
39	1996	2	Sport	South-West	8	2		

Appendix 1. The cohort of Norwegian female handball players and their backgrounds

[1] All other sports had to be played for a minimum of a full season.

* The athlete quit handball to continue an already engaged career in professional football.

Ethical approval from the Norwegian Social Science Data Services

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Christian Thue Bjørndal
Seksjon for coaching og psykologi
Norges idrettshøgskole
Postboks 4014 Ullevål Stadion
0806 OSLO

Vår dato: 03.04.2013 Vår ref:33476 / 3 / JSL Deres dato: Deres ref:

TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 20.02.2013. Meldingen gjelder prosjektet:

33476	*Talentutvikling i norsk lagidrett*
Behandlingsansvarlig	*Norges idrettshøgskole, ved institusjonens øverste leder*
Daglig ansvarlig	*Christian Thue Bjørndal*

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://pvo.nsd.no/prosjekt.

Personvernombudet vil ved prosjektets avslutning, 01.01.2017, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Vigdis Namtvedt Kvalheim

Juni Skjold Lexau

Kontaktperson: Juni Skjold Lexau tlf: 55 58 36 01
Vedlegg: Prosjektvurdering

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 33476

Utvalget består av ca 30 u-landslagsutøvere (jenter født 1996-1997) i håndball, samt trenere og ledere i Håndballforbund og på klubbnivå. Utvalget er fra 16 år og oppover. Utvalget rekrutteres strategisk., og kontaktes via e-post gjennom NHFs administrativt ansvarlige for LK96.

Opplysningene samles inn gjennom deltakende observasjon på u-landslagets treningssamlinger og kampaktiviteter. I forlengelse av dette vil det gjøres personlige intervju av utøvere og nøkkelpersoner i Norges Håndballforbund og klubb (trenere og ledere). Forsker vil også be om å få bruke utøvernes treningsdagbøker som datagrunnlag. Det benyttes lydopptak under intervjuene. Kartlegging av bakgrunnsinformasjon (treningshverdag og aktivitetshistorie) gjøres delvis på e-post.

Det registreres direkte personidentifiserende opplysninger gjennom navn, fødselsdato og e-postadresse. Det registreres indirekte personidentifiserende opplysninger gjennom klubbtilhørighet og deltakelse i landslagsaktivitet. Informasjon fra intervju vil kobles til informasjon fra observasjon og omvendt.

Det vil i prosjektet bli registrert sensitive personopplysninger om helseforhold, jf. personopplysningsloven § 2 nr. 8 c).

Ifølge prosjektmeldingen skal det innhentes skriftlig samtykke basert på skriftlig informasjon om prosjektet og behandling av personopplysninger. Personvernombudet finner informasjonsskrivet tilfredsstillende utformet i henhold til personopplysningslovens vilkår. Det bes om samtykke fra foreldre for utøvere under 18 år.

Jf. e-post mottatt 22.03.2013, skal direkte personidentifiserbare opplysninger lagres separat fra det øvrige datamaterialet ved hjelp av en koblingsnøkkel som kun forsker har tilgang til.

Prosjektet skal avsluttes 01.01.2017 og innsamlede opplysninger skal da anonymiseres og lydopptak slettes. Anonymisering innebærer at direkte personidentifiserende opplysninger som navn/koblingsnøkkel slettes, og at indirekte personidentifiserende opplysninger (sammenstilling av bakgrunnsopplysninger som f.eks. yrke, alder, kjønn) fjernes eller grovkategoriseres slik at ingen enkeltpersoner kan gjenkjennes i materialet. Anonymisert materiale oppbevares videre, og er planlagt brukt i videre oppfølgingsundersøkelser.

Information for participants and the written consent form

Informasjon og samtykkeerklæring om forskningsprosjekt:

Talentutvikling i norsk håndball

Norges Idrettshøgskole og Norges Håndballforbund vil i perioden 2013-2016 samarbeide om et forskningsprosjekt som skal omhandle talentutvikling i norsk håndball. Hensikten er å se på muligheter og begrensinger innenfor den norske organiseringen av talentutvikling.

I prosjektet inngår det en toårig studie av LK96-landslaget (jan 2013 – jan 2015) hvor målet er å spore unge talentfulle håndballspilleres utviklingsforløp. Christian Thue Bjørndal (NIH) vil følge landslagets samlinger og kampaktivitet i denne perioden. Datainnsamlingen vil foregå gjennom innsamling av treningsdagbøker, feltobservasjon, feltsamtaler og intervjuer med utøvere og trenere. Prosjektleder er Lars Tore Ronglan (NIH). Norges Idrettshøgskole v/ Lars Tore Ronglan og Christian Thue Bjørndal vil ha tilgang til dataene i prosjektperioden.

Det er helt frivillig å delta i prosjektet og alle deltagere er forbeholdt retten til å trekke seg til enhver tid under prosjektperioden, uten å måtte begrunne dette nærmere. Hvorvidt du velger å delta i prosjektet har ingen betydning for videre deltagelse i LK96-landslaget. Alle data vil anonymiseres innen 01.01.2017 og behandles strengt konfidensielt. Etter prosjektperioden vil data lagres anonymt v/NIH til bruk i publisering av forskningsartikler og til intern bruk i NHF. Prosjektet er meldt inn til Norsk Samfunnsvitenskapelig Datatjeneste.

Dersom du ønsker å delta i undersøkelsen er det fint om du signerer den vedlagte samtykkeerklæringen. Vi ønsker at så mange som mulig vil delta. Vi ber om at spillere under 18 år også innhenter samtykke fra forelder.

Samtykkeerklæring:
Jeg bekrefter at jeg har mottatt skriftlig informasjon og er villig til å delta i studien.

_____	_____
Utøvers underskriftdato	Foresattes underskrift/dato

Spørsmål kan rettes til

Christian Thue Bjørndal	Lars Tore Ronglan
Tlf: 408 98 766	
E-post: christian.bjorndal@nih.no	E-post: lars.tore.ronglan@nih.no