

DISSERTATION FROM THE  
NORWEGIAN SCHOOL OF  
SPORT SCIENCES  
**2017**

Gro Jordalen

# **Development of Excellence in Young Norwegian Athletes:**

The Interaction between Motivation and Self-Regulation

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Så lenge

Så lenge du berre

er draumen min

– ein leik i mitt tankespinn,

så lenge du berre

sviv i mitt sinn

og ror meg inn i svevnen din,

så lenge du berre

er ein visjon,

eig eg i minsto ei von.

Ferdavegen, Olav Hole, 1995



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The Norwegian School of Sport Sciences, April 21, 2017

Gro Jordalen

## Summary

**Introduction:** Motivational and cognitive processes are interrelated and greatly influence one another (e.g., see Baumeister & Vohs, 2007; Inzlicht, Schmeichel, & Macrae, 2014).

Investigating the interactive nature of these constructs will increase our understanding of human behavior (Baumeister, 2016). Guided by the self-determination theory of motivation (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000), as well as the social cognitive (Zimmerman, 1989; Zimmerman & Campillo, 2003) and self-control (Baumeister, Vohs, & Tice, 2007) models of self-regulation, the current doctoral thesis aimed to investigate the interaction between motivation and self-regulation in young high-level winter sport athletes. Some have argued that elite-level athletes are likely to be driven by a complex amalgam of motivational regulations (Gillet, Berjot, Vallerand, Amoura, & Rosnet, 2012). However, in the long-term development to reach elite-level performance and become World or Olympic Champion, the more self-determined types of motivation are believed to promote higher cognitive capacity and lead to more positive sport participation outcomes (Briki, 2016).

**Aim:** The aim of the current thesis was to explore the respective role and the interplay between different types of motivation regulations and self-regulation competencies in the development of elite level performance. In a series of papers, we investigated how different types of motivation interact with self-control in predicting exhaustion within proximal and distal timeframes. In addition, we examined the temporal ordering of motivation and self-control to gain insight about the interaction pattern between these two intertwined constructs. Up until now, competing self-control depletion models had proposed opposing orderings of these two constructs (e.g., Baumeister et al., 2007; Inzlicht & Schmeichel, 2012).

**Methods and Design:** Three data collections were conducted (i.e., Studies I-III) leading to four distinctive papers (i.e., Papers I-IV). Adopting a post-positivistic paradigm, we employed both qualitative and quantitative methods. First, a retrospective qualitative design was used

when interviewing five World and Olympic Championship medalists (aged 23 to 34 years,  $M = 26.20$ ,  $SD = 4.49$ ) and thematically analyzing the role of different types of motivation and self-regulation as athletes progressed from novice to elite levels of performance (Study I; Paper I). Second, high-level athletes ( $N = 199$ ; 16 to 20 years of age,  $M = 17.10$ ,  $SD = 0.97$ ) participated in a cross-sectional data collection at the beginning of the competitive season, and indirect effects of self-control in motivation to exhaustion associations were investigated (Study II; Paper II). Third, high-level athletes ( $N = 321$ ; 16 to 20 years of age,  $M = 17.98$ ,  $SD = 0.89$ ) participated in a 10-week longitudinal data collection during an important period of the competitive season with international and national competitions (Study III). We examined autoregressive and cross-lagged effects of motivation and self-control (Paper III), as well as the association between motivation and exhaustion via self-control in two mediation models (Paper IV).

**Results:** In Paper I, findings revealed that motivation and self-regulation competencies interchangeably influenced elite athletes' career trajectories in a non-synchronously fashion. These athletes reported being intrinsically motivated at a young age, while their motivation became more externally oriented and their drive for success challenged various self-regulation skills as they developed. At the senior level, they had a complex motivation profile and well-developed planning and self-control competencies, gradually improving self-reflection skills. In Paper II, motivation regulations were investigated individually in six mediation models, and results yielded indirect effects of self-control on the motivation to exhaustion association, on all motivation regulations. These associations were negative when driven by self-determined types of motivation, while they were positive for controlled types of motivation. Bayesian methods were used to analyze longitudinal data in Study III, and approximate measurement invariance was confirmed (Papers III and IV). In Paper III, two-wave (i.e., 10-week time-lag) and three-wave (i.e., 5-week time-lag) cross-lagged panel models showed

strong autoregressive effects. In the former model, credible motivation to self-control effects were found, and in the latter model, credible self-control to motivation effects were found. In Paper IV, simple mediation models are shown to confirm that self-control mediated the effect between motivation regulations and exhaustion, with the exception of introjected regulation. A small and medium amount of variance explained T2 self-control and T3 exhaustion, respectively. In the focused mediation models, no indirect effects were found. Substantial amount of variance explained T2 self-control and T2 and T3 exhaustion.

**Discussion and Conclusions:** In summary, findings from the four papers clearly highlight the complex motivation and self-regulation profiles in high-level athletes. First, elite athletes recalled how their motivation and self-regulation evolved throughout their career, they also reported being highly influenced by significant others and external contextual factors. Further, mediation analyses showed that associations between motivation, self-control, and exhaustion were conceptually consistent (e.g., Muraven, 2008; Ryan & Deci, 2000). That is, self-determined and controlled motivation interacted with self-control, negatively and positively predicting athletes' perceived exhaustion, respectively. Investigating the temporal ordering between motivation and self-control, findings showed that motivation initiated cross-paths over time, and self-control initiated cross-paths when the time-lag decreased. These results emphasized important theoretical and methodological findings. Analyses confirmed theories stating various orderings of these constructs, possibly emphasizing the infinite interplay between them as strong motivational forces seem to direct cognitive competencies over time (Baumeister, 2016). Overall, results emphasized the dynamic nature of psychological concepts (Gelman, 2015) such as motivation and self-regulation competencies. Time point intervals yielded different results (Selig & Preacher, 2009), and adding autoregressive effects particularly changed model results (Adachi & Willoughby, 2015). In addition, analyses

showed some limitations when it comes to established scale reliability, as well as the scales' factor structure. Future research should address these limitations.

## Sammendrag

**Introduksjon:** Motivasjonelle og kognitive prosesser påvirker og er avhengige av hverandre.

Å undersøke felles kvaliteter ved disse psykologiske prosessene vil gi økt kunnskap om menneskets handlingsmønstre. Med utgangspunkt i teori innen motivasjon og selvregulering ønsket vi i denne doktorgradsavhandlingen å undersøke sammenhengen mellom motivasjon og selvregulering i den konkurranseorienterte norske vinteridretten. Det har nylig blitt argumentert for at eliteutøvere er drevet av ulike typer og en kompleks sammensetning av motivasjon. Det har imidlertid også blitt argumentert for at motivasjon kjennetegnet av selvbestemmelse vil påvirke den kognitive kapasiteten positivt og føre til gunstige effekter over tid, noe som er essensielt for utøvere som ønsker å konkurrere på elitenivå.

**Mål:** Formålet med denne avhandlingen var å undersøke sammenhengen mellom ulike typer motivasjon og evner for selvregulering hos utøvere i tiden fra de starter med idrett til de når elitenivå. Vi ønsket også å se på hvordan ulike typer motivasjon og evner for selvkontroll påvirket symptom for utbrenthet hos utøvere, både gjennom tverrsnittsdata og longitudinelle data. Videre, å utøve selvkontroll vil over tid oppleves utmattende, og utøveres motivasjon kan spille en rolle. Siden ulike modeller prøver å forklare hvordan disse begrepene påvirker hverandre, undersøkte vi hvorvidt motivasjon påvirket selvkontroll, eller vice versa, over tid.

**Metode og design:** Denne avhandlingen er basert på tre datainnsamlinger (dvs. Study I-III) og fire artikler (dvs. Paper I-IV). Med utgangspunkt i et post-positivistisk paradigme brukte vi både kvalitativ og kvantitativ metode. I Study I ble fem medaljørere fra VM og OL i alderen 23 til 34 år intervjuet. Ved å gjøre en tematisk analyse undersøkte vi rollen til ulike typer motivasjon og evner for selvregulering i utøvernes utvikling (Paper I). I Study II deltok utøvere i alderen 16 til 20 år som konkurrerte på et høyt nivå. Denne tverrsnittstudien ble organisert i begynnelsen av konkurransesesongen. Vi undersøkte hvordan selvkontroll påvirket sammenhengen mellom motivasjon og utbrenthet (Paper II). I Study III deltok

utøvere fra tilsvarende gruppe i en 10-ukers longitudinell datainnsamling. I perioden for datainnsamling deltok utøverne i viktige nasjonale og internasjonale konkurranser. Her undersøkte vi hvorvidt motivasjon og evner for selvkontroll påvirket hverandre og seg selv over tid (Paper III) og hvordan selvkontroll påvirket sammenhengen mellom motivasjon og utbrenthet over tid i to mediasjonsmodeller (Paper IV).

**Resultater:** I Paper I beskrives betydningen av motivasjon og evner for selvregulering gjennom eliteutøvernes karriere. Fra å være indre motivert i ung alder ble utøverne gradvis mer ytre motivert, og deres hunger etter suksess utfordret forskjellige evner selvregulering. Som seniorutøvere var de motivert av både indre og ytre faktorer, og de utviklet spesielt evner for planlegging og selvkontroll, og senere evner for selvrefleksjon. I Paper II valgte vi å se kun på emosjonell og fysisk utmattelse heller enn utbrenthet på grunn av utilstrekkelige data og konseptuelle argumenter. Resultatene viste at utøvernes evner for selvkontroll påvirket sammenhengen mellom motivasjon og utmattelse. Selvbestemte og ytre kontrollerte former for motivasjon sammen med selvkontroll førte til henholdsvis mindre og større sjanse for utmattelse. I Paper III viste analysene at motivasjon og selvkontroll hadde størst påvirkning på seg selv over tid. Med tanke på hvordan de påvirket hverandre, påvirket motivasjon selvkontroll mest over lengre tid (10 uker), mens selvkontroll påvirket motivasjon mest over kortere tid (5 uker). I Paper IV undersøkte vi sammenhengene fra Paper II i to ulike mediasjonsmodeller og med longitudinelle data. Den ene modellen bekreftet at selvkontroll påvirket sammenhengen mellom motivasjon og utmattelse, mens den andre modellen avkreftet disse sammenhengene.

**Diskusjon og konklusjon:** De fire artiklene viste at norske vinteridrettsutøvere er drevet av ulike typer motivasjon og evner for selvregulering. Eliteutøvere på seniornivå viste hvordan deres motivasjon og evner for selvregulering hadde forandret seg gjennom karrieren, mye på grunn av ytre faktorer i toppidrettskonteksten. Videre, sammenhengen mellom motivasjon,

selvkontroll og utmattelse var konseptuelt konsistent. Det vil si at selvbestemte og kontrollerte typer motivasjon sammen med evner for selvkontroll påvirket utøvere henholdsvis positivt og negativt. Vi fant også at utøveres motivasjon vil over tid ha større påvirkning på deres evner for selv-kontroll, mens selvkontroll påvirket motivasjon mer over en kortere periode. Resultatene fra denne doktorgraden reflekterer både teoretisk og metodologisk viktige funn. Resultatene viser svært komplekse og dynamiske sammenhenger mellom psykologiske variabler, og hvordan utøveres ekstreme motivasjon driver kognitive ferdigheter. Det er viktig å studere disse psykologiske variablene over tid for å undersøke dynamiske sammenhenger, og siden variablene påvirker seg selv i høyest grad er det viktig å ta høyde for dette. Analysene viste også noen begrensninger angående spørreskjemaers reliabilitet og struktur, og fremtidig forskning bør undersøke dette.



## List of Papers

### Paper I

Jordalen, G., Lemyre, P.-N., & Durand-Bush, N. (2017). *Interplay of motivation and self-regulation throughout the development of elite athletes*. Manuscript submitted for publication.

### Paper II

Jordalen, G., Lemyre, P.-N., & Durand-Bush, N. (2016). Exhaustion experiences in junior athletes: The importance of motivation and self-control competencies. *Frontiers in Psychology*, 7(1867). doi: 10.3389/fpsyg.2016.01867

### Paper III

Jordalen, G., Lemyre, P.-N., Durand-Bush, N., & Ivarsson, A. (2017). *The temporal ordering of motivation and self-control: A cross-lagged effects model*. Manuscript submitted for publication.

### Paper IV

Jordalen, G., Lemyre, P.-N., Solstad, B. E., & Ivarsson, A. (2017). *The role of self-control and motivation on exhaustion in youth athletes: A longitudinal perspective*. Manuscript submitted for publication.

## **Abbreviations**

SDT	The self-determination theory
CET	Cognitive evaluation theory
OIT	Organismic integration theory
COT	Causality orientation theory
BPNT	Basic psychological needs theory
GCT	Goal contents theory
RMT	Relationship motivation theory
SMS-II	Sport motivation scale II
BSCS	Brief self-control scale
ABQ	Athlete burnout questionnaire
ABQE	Emotional and physical exhaustion
ABQR	Reduced sense of accomplishment
ABQD	Sport devaluation
SEM	Structural equation modeling
BSEM	Bayesian structural equation modeling
MI	Measurement invariance
FIML	Full information maximum likelihood

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## Introduction

Recent interest in motivation research has emphasized that the psychology of human behavior can be investigated in terms of basic processes of motivation and cognition (Baumeister, 2016). Motivation is concerned with what moves people to act (Ryan & Deci, 2000, 2017), and theories of motivation are concerned with what energizes and directs behavior (Ryan & Deci, 2017). Early cognitive theories treated motivation as a unitary entity, that is, these theories solely investigated the amount or strength of motivation. However, the organismic integration theory (OIT; Ryan, Connell, & Deci, 1985), a sub-theory of the self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000), suggested that different types and sources of motivation influence the quality and dynamics of behavior. Within this theory, motivation is seen as more or less self-determined, and thus reflects behavior driven by sentiments of fun and enjoyment, volition, self- or other-imposed pressure, or external control.

Across a series of factors and contexts, high self-determined motivation and low controlled motivation have generally been found to predict the most optimal participation outcomes (e.g., in high school and college students; Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). However, athletes' motivational profile in the competitive context of elite sport may diverge from other contexts, as elite athletes seem to benefit more from high self-determined and high controlled motivation simultaneously (Gillet, Berjot, Vallerand, Amoura, & Rosnet, 2012). That is, in the highly competitive elite sport context, athletes may benefit from being driven by both internal (e.g., intrinsic interest, personal value) and external (e.g., prize money, demanding coaches) forces at the same time. These forces are not necessarily antagonistic in this context. Furthermore, these forces are served by cognitive competencies such as self-regulation and self-control, and together these psychological aspects of performance will increase the understanding of how athletes reach the elite level (Baumeister,

2016). While research on the interplay between motivation and self-regulation in the development of elite sport performances is scarce, it shows that athletes will improve their optimal functioning and sense of well-being when motivated to increase their self-regulation capacities (Dubuc-Charbonneau & Durand-Bush, 2015). In addition, when driven by self-determined motivation, athletes are less prone to experience depletion subsequent to acts of self-control (Muraven, 2008). The current thesis investigated how this interplay develops over time in athletes progressing from novice to elite levels of performance. Specifically, whether athletes' various types of motivation are served by self-regulation competencies, or conversely, to what extent various self-regulation competencies foster emerging types of motivation, was investigated (see Paper I and III).

Youth elite athletes develop key psychological qualities during their sport involvement. For example, they seem to benefit from a multidimensional motivation profile (Gillet et al., 2012; Martinent & Decret, 2015), and they develop important self-regulation competencies that help them optimize their behavior in training and competition (e.g., reflection competencies; Jonker, Elferink-Gemser, de Roos, & Visscher, 2012; Toering, Elferink-Gemser, Jordet, & Visscher, 2009). These achievement profiles of motivation and self-regulation might lead to good results but may not be without a cost. These extremely driven athletes walk a fine line when it comes to sport-specific stress, exhaustion, and burnout (Gillet et al., 2012; Gould, 1996; Martinent & Decret, 2015). To our knowledge, no studies have investigated the association between motivation, self-regulation, and negative sport participation outcomes such as exhaustion and burnout. Hence, the current thesis focused on elaborating current research that has investigated symptoms and development of burnout in association with motivation and self-regulation individually, and merged these concepts when examining antecedents of burnout symptoms in youth athletes (see Paper II and IV).

In summary, the current doctoral thesis attempts to assess the role of motivation and self-regulation in the development of elite level sport performances. The motivation profile and self-regulation competencies of high-level athletes might differ from those in less competitive settings. The scope of the current doctoral thesis was to provide insights on the basic processes of motivation and cognition, and investigate the degree of interplay between these interrelated constructs. The subsequent sections are organized as follows. First, a brief outline of the theoretical frame of reference is presented, along with the research questions. Second, the methodology is presented followed by a short result summary of the thesis' four articles. Third, research questions and study findings are discussed in view of the theoretical framework. Finally, the limitations, conclusions, theoretical and practical implications of findings, and future directions are presented.

### **The Theoretical Frame of Reference**

First, a brief introduction of the Norwegian elite sport context is offered. Then, the theoretical framework of the doctoral thesis is presented, which is founded on the organismic dialectic SDT, as well as social cognitive (Zimmerman, 1989, 2006) and self-control (Baumeister, Vohs, & Tice, 2007) models of self-regulation. Additionally, an outline of sport participation outcomes is given, with an emphasis on literature in relation to athlete exhaustion and burnout (Raedeke, 1997). This theoretical framework aims to address the current thesis' research questions, and issues raised in contemporary developmental junior and senior elite sport. Finally, a short theoretical summary is offered and the research questions are presented.

### **The Context of Norwegian Sport Development**

At the age of 16 years, high school is optional in Norway (high school is comparable to upper secondary school, involving students who are 16-19 years; Kristiansen & Houlihan, 2015). At this age, athletes often choose to attend elite sport schools, which can be either public (state funded) or private (privately paid). Over the subsequent high school years, they often combine elite sport development with their academic endeavors and are likely to be confronted with career conflicts (Kristiansen, 2017). These specialized elite sport schools aim to make this challenging combination less demanding (Kristiansen & Houlihan, 2015). However, these schools are often far from athletes' homes, and athletes may need to deal with the psychological, physical, and social demands involved with the intense training settings of youth elite sport without proper family support (Martinet, Decret, Guillet-Descas, & Isoard-Gauthier, 2014; Nicholls & Polman, 2007).

Early sport specialization is needed in many sports, and the time to reach the highest level is relatively short (Toering et al., 2011). However, The Norwegian Olympic and Paralympic Committee and Confederation of Sports (NIF) have placed restrictions on the age

at which Norwegian athletes are allowed to participate in competitions, both nationally and internationally (The Norwegian Ski Federation, 2017). From the age of six, children are allowed to participate in local competitions without ranking. They can participate in regional competitions where they are ranked for the first time from the age of 11, and are allowed to participate in national and international competitions from the age of 13. These restrictions aim to protect young sport participants from the negative consequences of early and intense competition experiences. The age at which athletes achieve the level of performance in the winter sports we were concerned with in the current PhD project has remained stable throughout the last decades. However, talent identification occurs now at a younger age, emphasizing the need to perform early (Kristiansen & Houlihan, 2015). Thus, athletes need to reach high levels of performance at a young age, and acquire and sustain a strenuous amount of training. These training activities are very repetitive and structured rather than solely interesting and fun (Ericsson, Krampe, & Tesch-Römer, 1993). As such, athletes who finally reach the elite senior level have been able to consistently motivate and regulate themselves to fuel the immense and constant effort required to achieve this level (Ericsson et al., 1993).

### **Motivation**

Human motivation is one of the central concerns of modern life (Roberts, 2012). In many situations, motivation is emphasized as the key to success, for example in business and exercise contexts, or the highly competitive context of elite sport. Motivation is considered important for optimal performance, viewed as a consequence of self-confidence, a winning attitude, positive thinking, the right personality, or genetics (Roberts, 2012). There are at least 32 theories with specific definitions of motivation, which, when viewed along a continuum they range from being deterministic, mechanistic, organismic, or cognitive (Roberts & Treasure, 2012). SDT has become one of the most popular theories in sport and exercise psychology, developed by Edward L. Deci and Richard M. Ryan who first published on it in

1985. Over the past 30 years, they have developed and refined the theory (Ryan & Deci, 2017). SDT is an empirically based, organismic and dialectic theory of human behavior and personality growth and development (Deci & Ryan, 2002; Ryan & Deci, 2017). In the organismic view, SDT considers humans as active, growth oriented organisms, who innately seek and are engaged in challenges in an attempt to actualize their potential (Deci & Ryan, 2002). In the dialectic view, SDT considers the interaction between humans' organismic nature and their social contexts, which either nurture or thwart their inherent active qualities. Further, SDT maintains that an understanding of human motivation requires a consideration of the underlying orientation and level of motivation (i.e., the type and amount of motivation), and how satisfaction of the basic psychological needs of autonomy, competence, and relatedness enhances intrinsic and self-determined forms of motivation (Ryan & Deci, 2000).

### **Self-Determination Theory**

In SDT, motivation is not considered a unitary phenomenon where you either are motivated or unmotivated (Ryan & Deci, 2000). Ryan and Deci (2000) state that "To be motivated means *to be moved* to do something" (p. 54), and they argue that people differ in the degree (i.e., how much) and also orientation (i.e., what type) of motivation. The orientation of motivation concerns the why of actions, and is depicted in the six motivation regulations of SDT (see *Figure 1*). For example, athletes may execute their practice sessions out of interest and enjoyment, solely act to improve their capacity and increase their chances of winning, or significant others may direct their behaviors. However, the degree to which they internalize and integrate the type of motivation depends on the satisfaction of the innate, basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). The concept of need fulfillment specifies a psychological criterion essential for life, just like physiological needs for food, beverages, and sleep (Deci & Ryan, 2002). To the extent that individuals' social contexts' allow need fulfillment, their engagement is characterized by

personal growth and development, increased well-being and positive functioning (Deci & Ryan, 2002). Thus, by the process of internalization, individuals take in a value or regulation, and by the process of integration they more fully transform the regulations into their own values and goals (Ryan & Deci, 2000). When autonomously motivated, athletes feel they are the origin and source of their actions, and these actions express their sense of self even though they are influenced by external sources (Deci & Ryan, 2002). Further, the need for competence refers to feelings of confidence, effectiveness, and opportunities to exercise and express one's capacities; and the need for relatedness refers to feeling connected to significant others. Satisfaction of these needs influences athletes' self-determined motivation positively, and a wealth of research shows that psychological need satisfaction and need thwarting are respectively positively and negatively associated with athletes' engagement and well-being (e.g., Curran, Hill, Ntoumanis, Hall, & Jowett, 2016; Jordalen & Lemyre, 2015). To provide detailed information regarding the different types of motivation within this internalization process, the various motivation regulations were used as the theoretical framework in the current PhD project.

SDT consists of six mini-theories, the cognitive evaluation theory (CET), the OIT, causality orientations theory (COT), basic psychological needs theory (BPNT), goal contents theory (GCT), and relationship motivation theory (RMT; see Ryan & Deci, 2017, for details). The CET concerns how social-contextual variables influence people's intrinsic motivation, and thus presents intrinsic and extrinsic types of motivation. The OIT presents a taxonomy of motivation regulations, a self-determination continuum, reflecting the degree to which behaviors have been integrated with the self. Hence, various types of motivation regulations were mainly presented in the CET and OIT mini-theories. The six types of motivation regulations along this continuum differ in the degree to which they represent autonomy, and consist of one type of intrinsic motivation regulation (i.e., intrinsic), four types of extrinsic



motivation regulations (i.e., integrated, identified, introjected, and external), and one type of amotivation regulation (i.e., non-regulation; see Figure 1; Deci & Ryan, 2000). Broadly, these six regulations are separated to encompass self-determined (i.e., intrinsic, integrated, and identified) and controlled (introjected, external, and amotivation) types of motivation, empowered by choice and intention on the one side; and extrinsic rewards and external control on the other side, respectively. In line with SDT as an active-organismic metatheory, the OIT suggests that people are naturally inclined to internalize extrinsic types of motivation. To the extent that this occurs, they will autonomously perform the particular activity (Deci & Ryan, 2002). Thus, this theory describes individuals' "inherent tendencies to internalize and integrate social and cultural regulations and the factors in social contexts that promote or inhibit internalization and integration" (Ryan & Deci, 2017, p. 38).

The differentiation between OIT's motivation regulations is based on the reasons or goals implicit in individual's actions. For example, athletes' self-determined motivation is described as being inspired and energized toward an end, and fully engaged in order to prepare for the next training session, competition, or competitive season. When intrinsically motivated, engagement is characterized by fun, intrinsic interest, and the doing of an activity for its inherent satisfaction rather than for any external rewards (Ryan & Deci, 2000). However, external forces simultaneously influence their behaviors, and they are continuously challenged to transform and internalize these forces into personally endorsed and meaningful values and goals (Ryan & Deci, 2000). Thus, intrinsic motivation is closely associated with, yet different from, integrated regulation. Regulated by integration, athletes identify with and integrate the importance of their activities, and fully understand how these behaviors will help them reach their goals. This instrumentality differentiates this regulation from intrinsic motivation, even though behaviors are still fully self-determined and endorsed by the self. As with identified regulation, athletes are less self-determined but still recognize and accept the

underlying, other-imposed value of behaviors and directives to accomplish certain outcomes. They highly value these activities as they help them progress and influence their goal achievements. This differentiates identified and introjected regulated behaviors, as behaviors directed by the latter regulation are performed solely because of contingent consequences administered, but not assimilated, by the self. Thus, behaviors are not part of athletes' individual set of motivations, cognitions, and affects, even though they are controlled by the self. This control entails that the regulation is within the person, though, relatively external to the self and only partially internalized. When it comes to externally regulated behaviors, these are extrinsically motivated, fully controlled by external sources in the form of for example other-imposed rewards or punishments. Behaviors directed by this regulation are poorly maintained, and will stop without externally encouraging contingencies. Thus, regulatory processes influence both self-determined and controlled motivated behaviors. However, when athletes lack intentions to act, lack a sense of efficacy or control concerned to the resultant outcome, or do not value the activity, they may experience amotivation. In these situations, they are typically non-regulated, controlled by the environment and/or significant others, and do not have nor believe in goal achievements (Deci & Ryan, 1991, 2002). However, these characteristics of amotivation rarely correspond with the reasons why athletes participate in sport, as most of them are typically highly motivated for intrinsic (e.g., enjoyment) and/or extrinsic (rewards, status) reasons (Cresswell & Eklund, 2005b).

Introduction

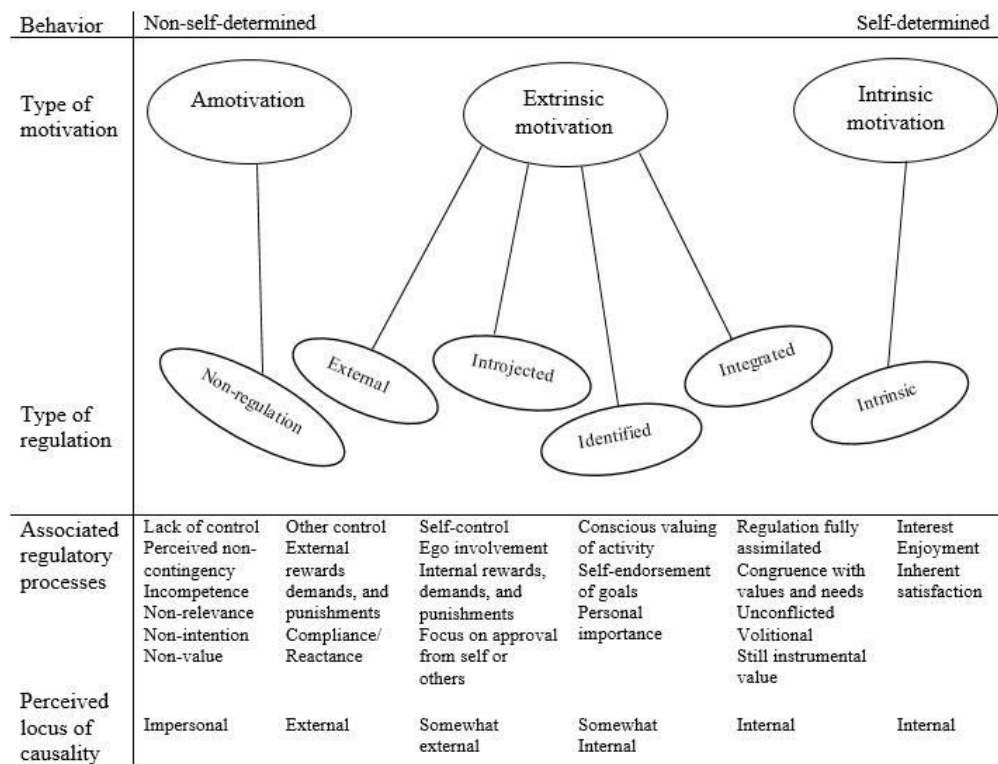


Figure 1. The self-determination continuum (Deci & Ryan, 2000; Ryan & Deci, 2000; 2000).

To summarize, SDT differentiates between various types of motivation regulations within the self-determined and controlled subdivisions of overall motivation (Ryan & Deci, 2000). The regulations are differentiated on the degree of intrinsic and extrinsic influence. More internalized and self-determined motivation regulations are described by increased value and importance of behaving in specific ways. They lead to increased maintenance, continued engagement, and higher commitment; because they are, to a great extent, endorsed by the self (Deci & Ryan, 2000). Thus, the more self-determined athletes practice and perform due to immediate satisfaction, well-being, and personal importance. Conversely, athletes motivated by external factors such as external rewards and winning, possess less internalized motivation regulations. These regulations are less stable and often maintained to obtain external rewards or avoid punishments (Deci & Ryan, 2000; Ryan & Deci, 2000).

**Self-Determination Theory in Sport**

Intrinsically and self-determined motivated behaviors lead to inherent satisfaction without need for external rewards (Deci & Ryan, 2000; Ryan & Deci, 2000), and have been associated with increased maintenance and persistent sport involvement (Pelletier, Fortier, Vallerand, & Brière, 2001). Further, this type of motivation positively influences sport performance over time (i.e., one and two competitive seasons; Gillet, Berjot, & Gobance, 2009), and athletes' situational self-determined motivation also seems to immediately positively impact their performance (Gillet, Vallerand, Amoura, & Baldes, 2010) via positive effect (Gillet, Vallerand, Lafrenière, & Bureau, 2013). These results are confirmed by investigations on latent motivation profiles, where athletes with the most self-determined profile show the highest level of performance (Gillet, Vallerand, & Paty, 2013; Gillet, Vallerand, & Rosnet, 2009).

Self-determined motivation has also been negatively associated with burnout in cross-sectional (Cresswell & Eklund, 2005b; Lonsdale, Hodge, & Rose, 2009) and longitudinal research (Cresswell & Eklund, 2005a; Lemyre, Roberts, & Stray-Gundersen, 2007; Lonsdale & Hodge, 2011). Shifts in the quality of motivation throughout one a competitive season reliably predicted elite swimmers' end of season burnout level, and especially athletes' season-long trend in self-determined motivation negatively predicted reduced sense of accomplishment, devaluation of sport participation, and total burnout scores (Lemyre, Treasure, & Roberts, 2006). However, investigating reciprocal effects between motivation regulations and burnout dimensions showed that initial athlete burnout (sport devaluation and reduced sense of accomplishment) significantly predicted motivation across a two-month period (i.e., intrinsic, extrinsic, and amotivation; Martinent et al., 2014). In this study, only introjected regulation positively predicted end of season burnout. Thus, more controlled forms of motivation may lead to less adaptive sport involvement outcomes, such as exhaustion

experiences and burnout (Gillet et al., 2012; Lemyre et al., 2006; Martinent & Decret, 2015). Over time, shifts in the quality of motivation as well as reduced self-determination were associated with symptoms of burnout in junior and senior elite level athletes (Lemyre et al., 2007; Lemyre et al., 2006). Thus, the quality of athletes' achievement motivation is the key to long-term successful development. However, recent research suggests that the combination of high levels of self-determined and controlled motivation simultaneously are associated with the highest performance level (Gillet et al., 2012). As such, the competitive atmosphere of elite sport requires an extreme composition of motivation forces, and this finding differentiates SDT based research in sport from other less competitive settings where self-determined motivation is optimal and primarily directs individuals successful behaviors (e.g., at work; Niemiec & Spence, 2016). This complex motivation in elite sport settings seems to empower athletes' competitive efforts. Their sport motivation profiles influenced by controlled forms of motivation valuably directs achievement behaviors, though at a cost. Similar to other competitive and non-competitive settings, controlled aspects of motivation increase the vulnerability of burnout experiences (Gillet et al., 2012; Lemyre et al., 2006). Indeed, meta-analytic findings show that athletes with increased levels of self-determined motivation reduce the risk of experiencing burnout, and conversely, high levels of controlled motivation and amotivation more likely lead to this maladaptive sport participation outcome (Li, Wang, Pyun, & Kee, 2013).

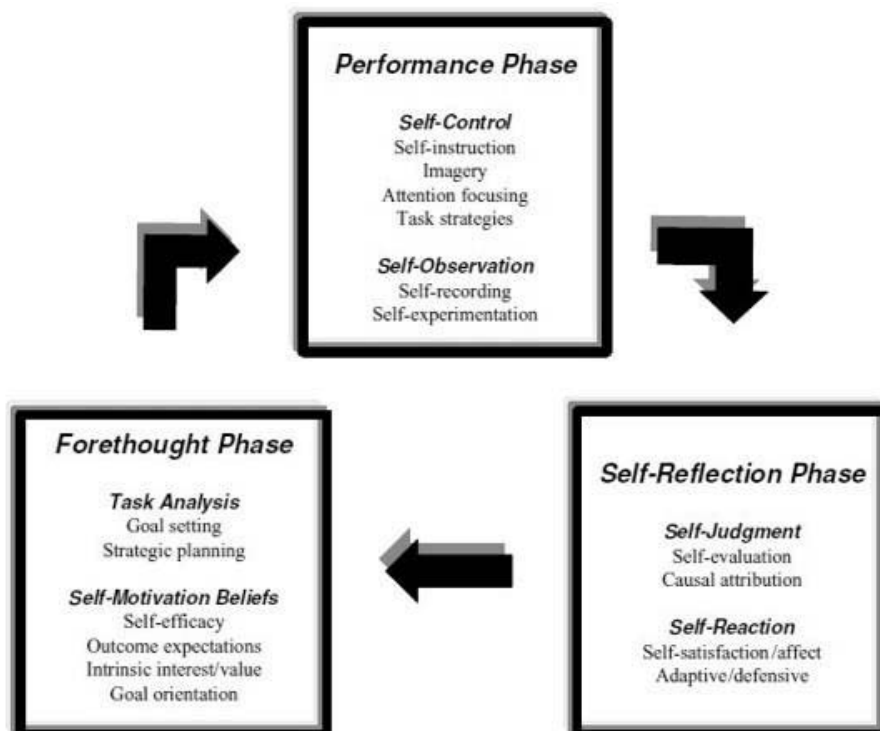
In summary, athletes exhibit various types of motivation to attain elite-level performances in sport. These types of motivation further influence the choice of strategies they use and the strength of their cognitive control (Muraven & Slessareva, 2003). However, there is a reciprocal association between athletes' motivation and their cognitive competencies to self-regulate and exert self-control (Zimmerman, 2006). The self-regulation competencies may direct athletes' motivation, for example when they overdo the amount of training—their

reflection and planning skills may restrain the desires to continue training without adequate recovery. Thus, athletes' initial motivation is served by cognitive competencies, and conversely, these cognitive competencies direct subsequent motivation to engage in future acts of self-regulation (Baumeister, 2016; Baumeister & Vohs, 2007). As such, this interplay is manifested in the regulation of motivation through cognitive control (Kim, Reeve, & Bong, 2017).

### **Social Cognitive Self-Regulation**

Meta-cognitive self-regulation competencies enable athletes to proactively plan, monitor, and reflect on aspects of their ongoing training and competition efforts over long periods of time and across varied contexts (Zimmerman, 2006). In order to grasp these short- and long-term aspects of athletes' cognitive competencies, the current thesis merged social cognitive and self-control models of self-regulation. Both models address short-term and long-term self-regulation strategies, even though self-control is viewed as the deliberate, conscious, and effortful subset of self-regulation (Baumeister et al., 2007). Self-control often deals with more immediate concerns of self-regulation, referred to as the ability to override or change one's inner, automatic responses (Tangney, Baumeister, & Boone, 2004). However, self-control capacity is motivated by long-term goal-directed behaviors, willpower in resisting immediate temptations in favor of long-term goals, and individuals' ability to delay gratification (Mischel, 2014; Mischel, Shoda, & Rodriguez, 1989). As such, athletes' self-control capacity is intertwined with every aspect of their social cognitive self-regulation, which is defined as "self-generated thoughts, feelings, and actions that are strategically planned and adapted to the attainment of personal goals" (Zimmerman, 2006, p. 705). Within the social cognitive perspective, self-regulation exists as the interaction between cognitive, behavioral, and environmental factors (Bandura, 1991). The cognitive component includes cognitive processes such as monitoring one's cognitive and affective states and evaluate

adjustments, the behavioral component includes self-observation resulting in strategic adjustment of one's overt performance, and the environmental component includes observations and adjustments of the environmental conditions of performance (Zimmerman, 2006). Thus, feedback from prior performance efforts informs and guides current and subsequent efforts, and self-regulation is structured in the cyclical forethought, performance, and self-reflection phases (see Figure 2; Zimmerman & Campillo, 2003).



*Figure 2.* Phases and sub-processes of self-regulation (retrieved from Zimmerman & Campillo, 2003).

Forethought phase processes precede performance efforts and fall into two major categories, namely task analysis and self-motivation beliefs (Zimmerman & Campillo, 2003). Particular task analysis strategies include goal-setting and strategic planning. In the sport context, athletes analyze performance strategies, and set goals in accordance with their

intended and desired goal achievements (Zimmerman, 2006). In its more advanced form, athletes' goal-setting is organized hierarchically, and short-term goals for example for their next training sessions serve as proximal regulators of their long-term goals such as performing well in major competitions. Subsequently, in their planning, athletes will consider strategies that are likely to enhance the benefits of the current practice session or improve their performance in competition. These strategies will guide their cognitive competencies to control and direct their efforts (Zimmerman, 2006). However, in order to initiate and execute these forethought phase processes, a number of key self-motivation beliefs are suggested. These pertain to athletes' feelings of self-efficacy, their outcome expectations, intrinsic interest or value, and their goal orientation (Zimmerman & Campillo, 2003). Closely associated with intrinsic motivation in SDT, athletes' engagement in their training sessions and competitions is described by their inherent interest in the activity and the rewards they experience accordingly (Ryan & Deci, 2000). In regard to outcome expectations, self-regulation theory additionally suggests that extrinsic sources of motivation will improve athletes' interest in the task at hand (Zimmerman & Campillo, 2003). Motivation for the ultimate end of performance is externally oriented. Thus, outcome expectations combined with high levels of self-efficacy are quite powerful as athletes subsequently evaluate themselves as capable or not capable of reaching their desired goal (Bandura, 1997). However, whether their goals are self-referenced or normative will influence their motivation, as they will either focus on developing new skills and competencies, or focus on demonstrating superior ability over others with as little effort as possible (Nicholls, 1984). In summary, the social cognitive theory of self-regulation combines metacognitive processes such as strategic planning and goal setting, and social cognitive motives such as feelings of self-efficacy and intrinsic interest, to explain athletes' thought processes subsequent to their performances.



Performance phase self-regulation processes pertain to athletes' self-control and self-observation competencies (Zimmerman & Campillo, 2003). Self-control competencies (e.g., self-instruction, imagery, attention focusing, and specific task strategies) help individuals focus and direct their efforts on the task by implementing strategies developed in the forethought phase. During practice sessions and competitions, athletes' self-talk may encourage them to put in more effort, for example "let's go strong" and "give it all", thus directly enhancing their performances (Hatzigeorgiadis, Galanis, Zourbanos, & Theodorakis, 2014). The mental process of imagery or visualization is popularly used to enhance performance, as it helps athletes prepare for situations that might happen during training and competitions (Cumming & Williams, 2013). Additionally, by visualizing possible situations, athletes can prepare where to focus their attention when distracted and which task strategies to use prior to and during performance (e.g., when to wake up, eat breakfast, enter the competition arena). However, within the social cognitive model of self-regulation, many self-control processes essential to high-level sport performance are not described. For example, how to control impulses and resist temptations is not specifically addressed. The current thesis integrates self-control competencies described in the strength model of self-control (Baumeister et al., 2007; Tangney et al., 2004).

The second self-regulation process described in the performance phase, namely self-observation, is an important aspect of improving one's capacity as it allows athletes to track and evaluate their performance and performance outcomes. By self-recording training and competition experiences, athletes are able to evaluate specific aspects concerned with, for example, their preparations and performance efforts, which will increase their self-efficacy, intrinsic motivation, satisfaction, and performance results (e.g., Kolovelonis & Goudas, 2013). Focusing on their performances in detail, athletes are further able to engage in systematic self-discovery or self-experimentation (Zimmerman & Campillo, 2003). In this

process, they change certain aspects of their performances, and evaluate if these changes lead to desired outcomes and increased performance capacity. In the competitive context of elite sport, the ability to be creative, seek innovative solutions, and evaluate how to improve performance are decisive aspects of development (Zimmerman & Campillo, 2003).

The self-reflection phase also contains two major groups of processes: self-judgment and self-reaction (Zimmerman & Campillo, 2003). Through self-evaluative judgments, athletes compare their own performances with one of three types of criteria, a) self-improvement, b) social comparison, and c) mastery (Zimmerman, 2006). These criteria refer respectively to comparing current and previous best performances, comparison to competitors, or comparing one's performance to formal standards or records. Importantly, these self-evaluative standards must be neither too high nor too low to optimize motivation in future performances and keep athletes challenged (Zimmerman, 2006). Furthermore, these self-judgments involve causal attribution of errors to controllable or uncontrollable sources, which influence how athletes interpret their own performance level (e.g., if they attribute their victories to their own capacity or the bad luck of their opponents). Moreover, these self-evaluative standards and the causal attributions that follow lead to self-reactions such as self-satisfaction or dissatisfaction and associated emotions (Zimmerman & Campillo, 2003). When satisfied with their performances, athletes' reaffirmed feelings of competence will likely increase their ongoing efforts and facilitate motivation in forethought phase processes (Zimmerman, 2006). However, regardless of positive or negative outcomes, they do make adaptive or defensive inferences and respond in consideration to their achievements (Zimmerman & Campillo, 2003). Defensive inferences serve to protect their self-image, for example by avoiding competitions when they are not sure to win or by deliberately reducing their chances to win by going to a party the evening before a competition. Conversely, their adaptive inferences or reactions refer to attempts made to increase the effectiveness of their

methods and chances to succeed, such as optimizing training strategies and habits prior to competitions.

Successful self-regulated learners and athletes approach their tasks and activities proactively rather than reactively, and display superior personal initiative, perseverance, and adaptive skills originating from favorable metacognitive strategies and motivation beliefs (Zimmerman, 2006). Motivation and self-regulation techniques advance youth performance development, motivate athletes to “acquire the most out of” training, and results in increased performance levels (Cleary & Zimmerman, 2001; Deci & Ryan, 2008a). Hence, highly self-regulated athletes may get more out of their potential due to effective mobilization of knowledge and skills, evaluated through the cyclic phases of self-regulation (Zimmerman, 2006). Comparing actual and desired performances and reflecting on the processes contributing to these performances enables athletes to adjust behaviors in future efforts, and use a number of strategies and possibilities to perform even better (Ertmer & Newby, 1996). During these phases, self-regulation processes enable athletes to adapt to the psychological and physical demands of sports by means of planning, self-monitoring, evaluation, and reflection—all aspects essential for performance development (Ertmer & Newby, 1996). In particular, self-reflection phase processes will influence subsequent forethought phase processes, which in turn, will influence performance phase processes, resulting in the cyclical view of social cognitive self-regulation (Zimmerman, 2002).

In the social cognitive self-regulation framework, self-regulated learners are characterized as active agents in their learning processes: meta-cognitively, motivationally, and behaviorally (Zimmerman, 1989). Self-regulated athletes are aware of and reflected on their own thoughts, for example, when they proactively set goals and use imagery prior to their performances (Collins & Durand-Bush, 2010). Further, they are motivated by inherent drives and impulses, external factors such as rewards or punishments, and their own

perceptions of efficacy when performing a task (Baumeister & Vohs, 2007; Deci & Ryan, 2000; Zimmerman, 1989); and they are behaviorally engaged through their strategies and actions for reaching subsequent goals (Zimmerman, 1989).

### **Self-Regulation in Sport**

In their research on elite soccer players, Toering, Ripegut, and Jordet (2013) suggested that planning, reflection, and evaluation competencies describe general self-regulation processes used by athletes, whereas other self-regulation processes may be more individually determined. For example, several studies have emphasized that athletes high in reflection competencies compete at a higher level, and this reflective awareness helps them pinpoint their strong and weak points, thus promoting responsibility for their own learning processes (Jonker et al., 2012; Toering et al., 2011; Toering et al., 2009). Athletes with high self-monitoring, evaluation, and effort, also transfer their self-regulation competencies in sport into other contexts, such as academia, and vice versa (Jonker, Elferink-Gemser, Toering, Lyons, & Visscher, 2010). Thus, it seems that elite performers have exceptional cognitive competencies that are transferred within life domains, and their self-regulation skills help them combine education and sport as they simultaneously perform at a high level in various areas of life (Jonker, Elferink-Gemser, & Visscher, 2011). Self-regulation capacity helps athletes to develop successfully, and avoid negative sport participation outcomes such as burnout (Dubuc-Charbonneau & Durand-Bush, 2015).

The development of self-regulation through sport participation is especially supported by coaches' co-regulation, as coaches are able to facilitate athletes' strategies prior to and during competitions (e.g., preparing for obstacles, letting go of mistakes, and focusing on goals; Collins & Durand-Bush, 2014). Thus, coaches and significant others may help athletes shift toward more independent self-regulation strategies, and increase their self-control to focus on the task and their pre-determined performance plan. Thus, self-control capacity helps

athletes stay true to future plans in an attempt to evaluate the most important aspects of short-term and long-term performance development (Baumeister & Vohs, 2007; Moilanen, 2007; Tangney et al., 2004).

### **Self-Control**

The concepts of self-control and self-regulation have been used interchangeably. However, self-control is the deliberate, conscious, and effortful subset of self-regulation (Baumeister et al., 2007). Self-control enables inhibition of impulses and overriding of temptations (Milyavskaya, Inzlicht, Hope, & Koestner, 2015), and this cognitive ability greatly improves the chance to succeed when guiding tough choices in the efforts of reaching long-term goals (Mischel, 2014). Thus, athletes' self-regulation capacity depends on available self-control resources, as each act of self-regulation requires cognitive energy and competencies to evaluate short-term versus long-term outcomes (Baumeister et al., 2007).

Self-control is crucial in the immediate, short-term context (e.g., impulse, attention, or emotion control in the "heat of the moment"; Moilanen, 2007), and in the pursuit of long-term goals (e.g., delay of gratification; Mischel et al., 2011). More than 40 years of follow-up studies show that the widely known marshmallow test used to investigate individuals' delay of gratification abilities has significant predictive validity for subsequent outcomes (e.g., Mischel et al., 2011). That is, findings suggest that the ability to delay gratification in children predicts cognitive and social competencies over the course of life. Delay of gratification research has more specifically defined self-control as an instant preference for larger delayed rewards over smaller immediate ones, that is, a struggle to resist temptations and manage to succeed over time. When athletes are successful in their self-control efforts, they exert sufficient self-restraint to wait for delayed rewards rather than choosing immediate ones (Mischel, 2014). Thus, self-control and self-regulation competencies are key features of

healthy, productive, and flourishing living, enabling athletes opportunities for success (Milyavskaya et al., 2015).

This thesis focused on the limited resource or strength model of self-control (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Baumeister et al., 2007). In this model, self-control capacity depends on limited resources and is impaired when used sequentially. This leaves the individual in a state (refractory period) called ego-depletion where further acts of self-control are prone to failure. Self-control competencies have been compared to the functionality of an anatomical muscle because they require considerably amounts of energy and willpower, are inhibited, and hence could be exhausted by overuse without proper recovery (Baumeister et al., 2007; Hagger, Wood, Stiff, & Chatzisarantis, 2010b). As such, self-control is crucial for successful long-term goal attainment, and depends on motivation to avoid depletion and exhaustion (Muraven, 2008). That is, the choice between small immediate or larger delayed rewards provokes a dual-motive conflict, and seems challenging, as a successful resolution requires individuals to consistently stay focused on the larger, more distal reward. They need to consciously and strategically plan, reflect on, and evaluate actions to reach their long-term goals (Zimmerman, 1989). These self-regulation skills have an important impact on performance in cognitively demanding sports (Eccles, 2008). Athletes have to stay focused over an important period, plan and monitor their actions, as well as persist during extensive psychological and physical challenges. These self-regulation competencies enable athletes to perform within a split second, and the competencies have a big impact on the final result.

### **Self-Control in Sport**

In exercise contexts, acts of self-control will likely deplete resources and lead to self-regulation failure, and conversely, rest and frequent training will typically enhance self-control capacity (Hagger, Wood, Stiff, & Chatzisarantis, 2010a). However, when individuals

in exercise contexts expect they have to exert subsequent acts of self-control, they might conserve their self-control in the present situation. Furthermore, in elite soccer players, self-control was positively linked to performance, and seems to increase athletes' persistence in their development and maintenance of elite level pursuits (Toering & Jordet, 2015). To perform up to their capacity, especially in high-pressure situations, athletes' self-control competencies are crucial. For example, when experiencing self-control depletion, athletes seem to be easily distracted and display worse performance (Englert, Bertrams, Furley, & Oudejans, 2015). Thus, when ego-depleted and under pressure, athletes' attention regulation cannot be maintained (Englert, Zwemmer, Bertrams, & Oudejans, 2015). Just as their muscles get tired from exertion, athletes' self-control may be exhausted after strenuous acts requiring this cognitive capacity (Baumeister et al., 2007). However, there have been speculations how far the muscle analogy can be pushed, for example linking self-control depletion and experiences of burnout (Baumeister et al., 2007). To our knowledge, no research to date has investigated self-control associated with athlete burnout, even though cognitive deficits have been found in athletes characterized with symptoms of burnout (Ryu et al., 2015).

### **Athlete Burnout**

In the development and maintenance of elite level performances, athletes need to invest substantial amount of time and effort in their sport and thus sacrifice other personal and extracurricular activities (Durand-Bush & Salmela, 2002). Even at a young age, they often combine sport involvement and education (Kristiansen & Houlihan, 2015), and need to find a balance between the physical, psychological, and social stressors experienced accordingly (Martinent et al., 2014). In Norway, they may additionally lack proper family support, as athletes often need to move away from home to attend an elite sport school (Jordalen, Lemyre, & Durand-Bush, 2016). This makes them vulnerable to experience both adaptive and maladaptive sport participation outcomes, as they are afforded with the best facilities, though,

still may experience their total devotion to sport stressful (Martinent et al., 2014). In these situations, athlete burnout is considered a serious condition with increased prevalence due to extreme training loads combined with the social and psychological demands of elite sports (Gould & Diefenbach, 2002; Martinent et al., 2014). Within the last 30 years, several models have attempted to explain athlete burnout (Raedeke & Smith, 2001), even though the condition was already reported by the media in the 1940s when the Swedish middle distance runner and multiple world record breaker, Gunder Hägg, was reported to be burnt out (Gustafsson, Kenttä, & Hassmén, 2011).

Models attempting to explain burnout have suggested that stress (Smith, 1986), identity and control issues (Coakley, 1992), psychological and physiological demands and negative adaptation to training stress (Silva, 1990), external shifts in motivation (Gould, 1996), sport commitment/entrapment (Raedeke, 1997), and differences in the quality of motivation (Cresswell & Eklund, 2005b; Lemyre et al., 2006; Lonsdale et al., 2009) may all contribute to athletes' experience of burnout. In summary, athlete burnout encompasses a psychophysiological and dysfunctional response to training and competition activities (Gustafsson et al., 2011). The majority of current research conceptualizes athlete burnout as a multidimensional construct consisting of three subscales (Raedeke, 1997; Raedeke & Smith, 2001). That is, emotional and physical exhaustion characterized by feelings of emotional and physical fatigue caused by training and competition stressors, reduced sense of accomplishment characterized by inefficacy and a tendency to evaluate oneself negatively, and sport devaluation characterized by negative and detached attitudes toward sports and lack of sport and performance quality concerns (Raedeke & Smith, 2001). When they developed their questionnaire regarding these three dimensions of burnout, Raedeke and Smith (2001) emphasized the need to stimulate research on this topic due to increased demands of sport participation and the trend toward sport specialization at young ages. Early specialization in



competitive sport and the fact that many young athletes attend elite sport schools far away from home highlights the need to deliberately monitor the development of young athletes (Kristiansen & Houlihan, 2015).

### **Integrating Psychological Concepts**

Conceptualized as the product of the social organization of high performance sport, athlete burnout is thought to be related to athletes' subjective experience of degree of self-control (Coakley, 1992). External control experienced by young elite athletes (e.g., training sessions constrained by coaches, uncertain future opportunities), may result in a unidimensional sport identity where athletes solely focus on elite sport development. Recent research shows that athletes' self-regulation competencies provide personal resources to their self-determined types of motivation. Through participating in a self-regulation intervention where they were probed to focus on self-regulation competencies such as self-management and coping strategies, student-athletes with higher self-regulation capacity showed reduced symptoms of burnout over time (Dubuc-Charbonneau & Durand-Bush, 2015). Further, young athletes who are more adaptable in their everyday life and driven by self-determined motivation typically demonstrate higher levels of general and sport-specific recovery and more developed strategies to deal with everyday life demands (Martinent & Decret, 2015). This is especially important as young athletes are often engaged in high-level sports and education simultaneously. Thus, athletes are at risk for burnout due to high emotional, physical and psychosocial demands inherent in their situation (Isoard-Gauthier, Guillet-Descas, & Duda, 2013), and self-determined motivation and self-regulation competencies may increase their chances of success when transferring between junior and senior elite levels of sport.

### **Purpose and Research Questions for the Doctoral Thesis**

The literature review showed that a substantial amount of research has investigated positive and negative correlates of sport participation outcomes in consideration to motivation, self-regulation, and self-control in high-level athletes. The importance of self-regulation aspects of performance is thoroughly emphasized, hypothesized to suit successful motivation characteristics such as higher levels of self-determined motivation and performance based on enjoyment, personal importance, and self-endorsement of goals (Ryan & Deci, 2000). Successful youth athlete development is founded on healthy motivation and self-regulation profiles (Martinent & Decret, 2015), which serves young athletes who combine sport, education, family, and a social network of friends (Moilanen, 2007).

The last decade, research has also started to explore the antecedents of depletion and exhaustion related to acts of self-regulation and self-control, and goes beyond the simple explanation behind ego-depletion that self-regulation capacity depends on limited resources (e.g., Inzlicht, Schmeichel, & Macrae, 2014). Additionally, there has been a quest to acknowledge the interplay between motivation and cognition for a comprehensive understanding of the indispensability of the two concepts (Baumeister, 2016). However, sport psychology research investigating the interaction between motivational and cognitive facets of performance in high-level athletes is scarce. As such, the overall purpose of this doctoral thesis was to investigate associations between the quality of motivation and various self-regulation competencies in the development of elite athletes. We investigated whether athletes' various types of motivation and self-regulation competencies facilitated their elite sport development, helping them overcome difficulties and challenges experienced accordingly in counteracting symptoms of exhaustion. Thus, this thesis merged contemporary motivation and self-regulation theory frameworks using SDT (Deci & Ryan, 1985, 2000), and social cognitive (Zimmerman, 1989, 2006) and self-control (Baumeister et al., 1998; Baumeister et al., 2007) models of self-regulation.

These four specific purposes and research questions related to paper I-IV were formulated:

Paper I aimed to investigate retrospectively elite athletes' subjective experiences of motivation and self-regulation from early sport participation and throughout their career. The research question was:

- What is the role of different types of motivation and self-regulation competencies as Norwegian winter-sport athletes progressed from novice to elite levels?

Paper II aimed to examine high-level youth athletes' motivation and self-control associated with sport participation outcomes, based on cross-sectional data. The research questions were:

- Do self-determined types of motivation energize self-control competencies, and negatively associate with burnout?
- Do controlled types of motivation induce self-control depletion, and offer a positive association with burnout?

Paper III aimed to elaborate on the link between motivation and self-control in high-level youth athletes throughout a competitive season. The research questions were:

- What is the temporal ordering of motivation and self-control competencies?
- Do self-determined types of motivation predict self-control capacity positively, while controlled types of motivation predict self-control capacity negatively?

Paper IV aimed to extend previous research findings by longitudinally examining the model proposed in paper two. The research question was:

- Do self-determined and controlled types of motivation interact with self-control competencies over time, and differentially predict exhaustion?

## Methods

In the following sections, the current thesis' methods pertaining to its three studies and four papers are presented. First, a brief overview of the methods and the scientific position of the thesis is clarified. Second, a brief presentation of the thesis three data collections' (hereafter Study I, II, and III), participants, procedures, and measures are outlined. Third, data analyses pertaining to Paper I-IV are presented. Paper I originates from Study I, Paper II from Study II, while Papers III and IV are based on Study III.

### Overview of the Doctoral Thesis Methods

Different methods and methodological research designs were chosen to investigate this doctoral thesis' research questions (see Table 1). Informed by the thesis' theoretical framework, these research questions and corresponding papers build on each other.

Table 1

#### *Overview of the Thesis' Four Papers*

<b>Paper I</b>	
Design	Retrospective qualitative study
Participants	Five senior elite athletes were interviewed
Analysis	Thematic analysis
<b>Paper II</b>	
Design	Cross-sectional data collection at the beginning of the competitive season
Participants	A total of 199 junior high-level winter-sport athletes
Analysis	Structural equation modeling, Simple mediation
<b>Paper III</b>	
Design	10-week longitudinal data collection throughout an important competitive period, including three time point measurements
Participants	A total of 321 junior high-level winter-sport athletes
Analysis	Bayesian structural equation modeling cross-lagged panel model analyses
<b>Paper IV</b>	
Design	10-week longitudinal data collection throughout an important competitive period, including three time point measurements
Participants	A total of 321 junior high-level winter-sport athletes
Analysis	Bayesian structural equation modeling, Simple and Focused mediation

### **The Doctoral Thesis' Scientific Position**

A paradigm refers to a worldview or philosophy of science, and includes a research approach or orientation with inherent scientific assumptions (Haase & Taylor Myers, 1988). The current doctoral thesis is situated in the post-positivistic paradigm. This paradigm emerged as a reaction to and critique to the positivistic paradigm and its narrow assumptions and perspectives (e.g., objective and subjective realities are mutually exclusive, and there is one single true reality; Denzin & Lincoln, 2011; Racher & Robinson, 2003). The post-positivistic paradigm acknowledges the criticism and weaknesses of rigid positivism, and today informs much of social science research, including sport psychology (Creswell, 2013; see also Bejar et al., 2017). For example, post-positivism is different from positivistic claims by positing that a) it is problematic to claim causality with certainty in human affairs, b) knowledge is relative rather than absolute, and c) to generate and test theory and improve understanding of how the world operates over time, multiple methods need to be used as all methods are imperfect (Creswell, 2013). The post-positivistic paradigm assumes a critical realist ontology, a modified dualistic epistemology, and further relies on modified experimental and quasi-experimental methodology (Denzin & Lincoln, 2011). Critical realism is based on the assumption that reality must be subject to critical examination to facilitate apprehension. Its epistemology is dualistic—both objective and subjective. However, this is a modified dualism recognizing that objectivity can never be fully attained as it is always influenced by researchers' subjectivity. It is always an individual who interprets the "objective" reality, and it is always "someone's" reality (Racher & Robinson, 2003). Thus, the researcher and the researched subject both shape the research process, as personal processes, involvements, and the contexts characterize human inquiry. Quantitative and qualitative research methods that may complement each other are employed, and research seeks to explain, predict, and describe (Racher & Robinson, 2003). In this perspective, the

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developed knowledge is not universally generalizable to all causes and situations, and reality exists but is only imperfectly apprehendable (Guba & Lincoln, 1994). However, using empirical evidence, post-positivists assume that it is possible to “distinguish between more or less plausible claims, to test and choose between rival hypotheses, and to distinguish between ‘belief and *valid* belief’” (Creswell, 2013, p. 106).

The post-positivistic paradigm that guided this doctoral thesis possesses a less rigid worldview, which seems important when studying human affairs and social life. In this view, it is not possible to achieve 100% objectivity, as this is influenced by the researchers’ subjectivity, the study’s participants, and the dynamic interaction between them (Racher & Robinson, 2003). For example, the choices made in consideration to particular methods and analyses in the current thesis were influenced by our theoretical and statistical stand. Thus, objective reality is only approximated. However, this paradigm offers an important approach to explain, predict, and describe human phenomena in a modest but definite way. The combination of qualitative and quantitative research methods used in the current doctoral thesis to illuminate the interplay between motivation and self-regulation, and also the use of Bayesian statistics in the quantitative analyses, is in accordance with post-positivistic claims. In accordance, the thesis’ three studies and their participants, procedures, and measures will be presented in detail in the following section, as well as the analytical methods used in the four papers.

## **Study I**

### **Participants**

Five Norwegian elite female winter-sport athletes aged 23 to 34 years ( $M = 26.20$ ,  $SD = 4.49$ ) participated in the first study. These individual athletes were active members of the national team within their sport at the time of data collection, and were purposefully recruited based on previous accomplishments. All five athletes were World and Olympic

Championship medalists. This study was idiographic in that we used a small and fairly homogenous sample of athletes to explore the role of motivation and self-regulation from novice to the most elite levels (Langdridge, 2007).

### **Procedures**

Following approval of the study from the Norwegian Centre for Research Data (see Appendix I), we adhered to national ethical standard procedures for the protection of research participants. We contacted the head of the national team for consent to approach the athletes. Next, athletes were informed about the project and provided with a letter that explained the purpose and procedures of the study (see Appendix I). Additionally, they were informed about their participation rights (e.g., we insured athletes' anonymity and confidentiality, and the freedom to withdraw from the study without consequences). However, if they wanted to withdraw from the study, we encouraged athletes to do this within a specific date to make sure we analyzed all available data for the final paper. All five athletes agreed to participate, signed the declaration of consent, and never withdrew consent. Following consent, semi-structured interviews were scheduled and conducted by a sport psychologist familiar with but not professionally involved with each athlete and their team. The interviews were arranged at the training site during a training camp in the off-season period when athletes had no formal competitions but trained extensively. Informed by an interview guide (see Appendix II), the semi-structured nature of the interviews allowed athletes to provide in-depth information about how they developed throughout their athletic career, while giving us an opportunity to *somewhat* control the line of questioning (Creswell, 2013).

Initially, athletes were prompted to talk about their everyday life as an elite athlete, which served as an "ice-breaker". Then, with an emphasis on motivational and self-regulatory concepts, athletes were asked about their introduction to sport, and their development and maintenance of elite level performances (e.g., What was your introduction to sports and

physical activity like? How did you experience these activities and what led to your prolonged engagement?). Further, athletes were asked to describe in details their experiences during their last season and finally, they reflected upon their overall career as elite athletes. The interview guide was first piloted with two elite level athletes, one active long-distance runner and one retired alpine skier. The five interviews included in the study lasted between 55 minutes and 1 hr 35 min and were recorded for transcription.

## **Study II**

### **Participants**

A total of 199 winter sport athletes (male  $n = 123$ , female  $n = 72$ , and four did not report gender; 16 to 20 years of age,  $M = 17.10$ ,  $SD = 0.97$ ) attending elite sport colleges in Norway consented to participate. Athletes competed in cross-country skiing ( $n = 51$ ), biathlon ( $n = 68$ ), ski jumping ( $n = 53$ ), alpine skiing ( $n = 22$ ), and some athletes ( $n = 5$ ) did not indicate their main sport. Competitive experiences ranged from 1 to more than 15 years ( $M = 6.83$  years), and athletes competed at international ( $n = 23$ ), national ( $n = 153$ ), or regional ( $n = 17$ ) levels.

### **Procedures**

Subsequent to approval by the Norwegian Centre for Research Data (see Appendix III), national ethical standard procedures were followed for the protection of research participants. In the recruitment phase, sports directors at elite sport colleges in Norway were contacted. Following the sport directors' endorsement, we asked these directors and athletes' coaches to invite athletes for participation. The information letter and declaration of consent (see Appendix III), and the questionnaires (see Appendix IV) were sent by mail to the sport directors, they were distributed to athletes and they returned the declaration of consent and questionnaires by mail. The survey was conducted at the beginning of the competitive season, thus, data collection was completed when athletes experienced a challenging period (e.g., they



aimed to document sport performance progress) and when the concepts under study were especially meaningful.

### Measures

**Motivation.** The Sport Motivation Scale II (SMS-II; Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013) measured athletes' motivation regulations, and response options ranged from 1 (*does not correspond at all*) to 7 (*corresponds completely*). Athletes reported the extent to which the listed reasons for practicing their sport corresponded with their own personal reasons at the current moment. The questionnaire was translated using the translation-back translation method (Duda & Hayashi, 2000). That is, the first author familiar with both languages translated the original questionnaire, and two bilingual colleagues performed back translation. Then, the back-translated questionnaires were compared, checked for equivalence to the original questionnaire. Composite reliability (Rho [ $\rho$ ]; Raykov, 2009) and factor scores' validity coefficients (VC > .80; Brown, 2006) were used to evaluate scale reliability<sup>1</sup>. The six 3-item subscales measured intrinsic (e.g., "because it is very interesting to learn how I can improve"), integrated (e.g., "because participating in sport is an integral part of my life"), identified (e.g., "because I have chosen this sport as a way to develop myself"), introjected (e.g., "because I feel better about myself when I do"), external (e.g., "because people around me reward me when I do"), and amotivated (e.g., "it is not clear to me anymore, I don't really think my place is in sport").

**Self-control.** A Norwegian version (Toering & Jordet, 2015) of the Brief Self-Control Scale (BSCS; Tangney et al., 2004) assessed athletes' dispositional self-control abilities (12 items, e.g., "I am good at resisting temptations"). Athletes were asked to indicate how much each statement reflects how they typically act, and response options ranged from 1 (*not at all*) to 5 (*very much*).

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<sup>1</sup> For questionnaire and reliability details, see Paper II.

**Athlete burnout.** A Norwegian version (Lemyre et al., 2006) of the Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001) was used to assess athlete burnout. The ABQ is a sport-specific multidimensional measure composed of three 5-item subscales measuring emotional and physical exhaustion (ABQE; e.g., “I feel ‘wiped out’ from [sport]”), reduced sense of accomplishment (ABQR; e.g., “I am not achieving much in [sport]”), and sport devaluation (ABQD; e.g., “I’m not into [sport] like I used to be”). Athletes rated how often they experienced each item at the current moment, and response options ranged from 1 (*almost never*) to 5 (*almost always*). A total burnout score is achieved by creating a latent factor using the three subscales as manifest indicators.

### Study III

#### Participants

A total of 321 winter sport athletes (male  $n = 173$ , female  $n = 98$ ; 16 to 20 years of age,  $M = 17.98$ ,  $SD = 0.89$ ) attending elite sport colleges in Norway consented to participate. Athletes competed in cross-country skiing ( $n = 122$ ), biathlon ( $n = 64$ ), ski jumping ( $n = 15$ ), alpine skiing ( $n = 63$ ), and Nordic combined ( $n = 7$ ). They had 1 to 16 years of competitive experience (CE;  $M = 7.86$  years,  $SD = 2.93$ ), and competed at international ( $n = 54$ ), national ( $n = 193$ ), or regional levels ( $n = 24$ ). Descriptive information was collected at T1. Athletes who only participated at T2 and/or T3 ( $n = 50$ ) did not report this information (T1  $n = 271$ ; T2  $n = 201$ ; and T3  $n = 197$ ; see Table 2).

Table 2

*Overall Response Rate Study III*

Time point	Total ( <i>n</i> )	Limited response rate ( <i>n</i> )
T1	271	
T2	201	17
T3	197	20
T1, T2	184	
T1, T2, T3	136	
T2, T3		13
T1, T3		17
Sum	321	

*Note.* T1, T2, and T3 = time point one, two, and three; Limited response rate = athletes who only participated at one or two time points; Sum = all athletes enrolled in the study (i.e., new athletes enrolled at T1, T2, and T3, as well as T2 and T3).

**Procedures**

Subsequent to approval by the Norwegian Centre for Research Data (see Appendix V), sport directors and coaches at elite sport colleges (recognized by the Norwegian Ski Federation) were contacted. Upon their approval, athletes were invited to participate (see Appendix V). We presented the study in writing and verbally, and visited colleges every fifth week for data collection, three times in total (prior to important national and international competitions, at the time of these competitions, and at the end of the competitive season when athletes were challenged by college exams). Thus, the data collection period included important events that challenge young athletes socially, psychologically, and physiologically. To increase response rates, athletes were offered participation incentives (i.e., three participants were randomly chosen to win a state of the art sport watch subsequent to the data collection period; Göritz, 2006). Athletes agreeing to participate provided written informed consent (see Appendix V). Answering questionnaires, they indicated the extent to which questions reflected their sport related thoughts and actions during the previous month (see

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Appendix IV for questionnaires). Data was collected using the online questionnaire system SurveyXact version 8.0 (QuickQuest).

### Measures

**Motivation.** A Norwegian version (Jordalen et al., 2016) of the SMS-II (Pelletier et al., 2013) was used to measure athletes' motivation regulations, and response options ranged from 1 (*does not correspond at all*) to 7 (*corresponds completely*). Reflecting on the last month, the athletes reported the extent to which the listed reasons for practicing their sport corresponded with their own personal reasons. Composite reliability (Rho [ $\rho$ ]; Raykov, 2009) and factor scores' validity coefficients (VC > .80; Brown, 2006) were used to evaluate scale reliability<sup>2</sup>. The six 3-item subscales measured intrinsic (e.g., "because it is very interesting to learn how I can improve"), integrated (e.g., "because participating in sport is an integral part of my life"), identified (e.g., "because I have chosen this sport as a way to develop myself"), introjected (e.g., "because I feel better about myself when I do"), external (e.g., "because people around me reward me when I do"), and amotivated (e.g., "it is not clear to me anymore; I don't really think my place is in sport").

**Self-control.** A Norwegian version (Toering & Jordet, 2015) of the BSCS (Tangney et al., 2004) assessed athletes' dispositional SC abilities (12 items, e.g., "I am good at resisting temptations"). Reflecting on the last month, athletes were asked to indicate how much each statement reflects how they typically act. Response options ranged from 1 (*not at all*) to 5 (*very much*).

**Exhaustion.** A five-item subscale (ABQE) from the Norwegian version (Lemyre et al., 2006) of the ABQ (Raedeke & Smith, 2001) was used to assess athletes' experiences of physical and emotional exhaustion (e.g., "I feel 'wiped out' from [sport]"). Athletes rated how often they experienced the statement of each item during the last month, and

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<sup>2</sup> For questionnaire and reliability details, see Paper III and IV.

response options ranged from 1 (*almost never*) to 5 (*almost always*). Next, based on the data collections in Study I-III, data analyses pertaining to Paper I-IV are presented.

### **Data Analyses**

Anchored in the post-positivistic paradigm, we combined quantitative and qualitative research methods to investigate the interaction between motivation and self-regulation aspects of elite level development. First, analyzing the interview data in Study I, a thematic analysis approach was used (Braun & Clarke, 2006). In this analysis, we explored motivation and self-regulation patterns of themes in athletes' stories (Smith & Caddick, 2012). Second, investigating the interplay between types of motivation and self-control competencies in association to sport participation outcomes in Study II and III, the quantitative data was analyzed by means of various statistical models. Papers II, III, and IV used respectively a simple mediation model (Jose, 2016), a cross-lagged panel model (e.g., Lonsdale & Hodge, 2011; Martinent et al., 2014), and simple and focused mediation models (Jose, 2016). The analyses were further based on structural equation modeling (SEM) using both frequentist and Bayesian statistics (e.g., van de Schoot et al., 2014; Zyphur & Oswald, 2015). The analytical methods employed are presented in Paper I (Study I), Paper II (Study II), and Paper III and IV (Study III).

### **Paper I**

Thematic analysis offers an accessible and flexible approach to analyzing qualitative data (Braun & Clarke, 2006). This approach can be regarded as both a methodology and method, and allows both inductive and deductive modalities (Braun & Clarke, 2006; Vaismoradi, Turunen, & Bondas, 2013). Further, thematic analysis is not constrained to any particular research tradition, and reflects great epistemological and methodological freedom and diversity (Braun & Clarke, 2006). Thus, by adopting a post-positivistic thematic analytic approach, we were influenced by the motivation and self-regulation theoretical frameworks

that founded this doctoral thesis. As such, we deductively analyzed our data, and the findings should be considered colored by our theoretical framework (Braun & Clarke, 2006; Creswell, 2013). This deductive approach was useful, as the general purpose of the current paper was to explore motivation and self-regulation in the context of elite level development. Thus, we wanted to provide a detailed analysis of these aspects of performance and the interplay between them.

Thematic analysis does not seek to quantify the frequency of different categories and themes, and keeps a low level of interpretation (Vaismoradi et al., 2013). Thus, thematic analysis provides a purely qualitative, detailed, and nuanced account of data, and is described as a method that identify, analyze, interpret, and report patterns (themes) within data (Braun & Clarke, 2006; Smith & Caddick, 2012). A theme in thematic analysis is the expression of latent or manifest content of data (Braun & Clarke, 2006). Manifest themes are at the descriptive level and explicitly express what is in the data (e.g., what a participant said), whereas a latent theme is at the interpretative level, goes beyond the surface meanings of data, and are usually quite abstract and therefore difficult to identify (Vaismoradi et al., 2013). Both latent and manifest content of data can be highlighted in thematic analysis (Braun & Clarke, 2006). However, a theme does not necessarily depend on its prevalence or quantity, but rather on the importance given in participants' stories and the research question (Braun & Clarke, 2006).

Braun and Clark (2006) offered clear guidelines for conducting a thematic analysis, and their six-step procedure was adapted to the current study to maximize trustworthiness in the preparation and analysis of data (see Table 2 and Paper I for details). Additionally, we experienced that the data analysis process is not linear progressing from one step to another in absolute terms. Rather, this process included frequent reviews moving back and forth in a recursive pattern, within and between the three authors of the current paper (Vaismoradi et al.,

2013). Eventually, we summarized the main research findings and identified athletes' stories in relation to the research question. Thus, a rich description of athletes' experiences of the interplay between motivation and self-regulation aspects of athletes' development from novice to elite performers was identified and reported.

Table 3

*Phases of Thematic Analysis*

Phase	Description of the process
1. Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

*Note.* The six steps of thematic analysis was adapted to analyze interview data from Study I, see Paper I for details. Retrieved from Braun and Clark (2006, p. 87).

**Evaluation of the analysis process.** Several steps were followed to enhance the trustworthiness of findings. However, judgments and guidelines of quality in qualitative research depends on the research tradition and philosophical underpinnings of a study (Sparkes & Smith, 2013). Developing a parallel criteria to quantitative terms of research quality, the following criteria have been suggested: credibility, transferability, dependability,

and confirmability (Guba & Lincoln, 1989; Lincoln & Guba, 1985). These criteria were followed accordingly, in addition to the following guidelines. First, the sport psychologist interviewing the athletes was familiar with the elite sport context, which facilitated the discussion and helped establish trust and rapport. The sport psychologist did not work with the current team, which may have reduced respondent bias such as social desirability and consistency motives (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). However, the findings and interpretations presented in Paper I was solely based on athletes' recall and perceptions, and the self-reported data collection method without triangulation (e.g., parents, coaches, or teammates confirming athletes' stories) may reduce trustworthiness of findings (Patton, 2015).

Prior to data analysis, we e-mailed the transcribed interviews to athletes. They verified the information and did not suggest further details or modifications. This process of member checking was part of the procedures to achieve the goal of credibility (Sparkes & Smith, 2013). Then, two researchers familiar with athletes' context and the theoretical framework evaluated inter-coder reliability (ICR). This ensured acceptable coding consistency (i.e., close to 80%; Miles & Huberman, 1994; Vaismoradi et al., 2013). Initially, coding consistency was not deemed satisfactory, and adjustments were made to the coding system to achieve satisfactory consistency (Miles & Huberman, 1994). In this process, we decreased the number of fourth level codes; for example, some intrinsic regulation codes (e.g., feeling competent) were removed (for details, see Paper I). This triangulation by means of multiple analysts should make the study less susceptible to individual bias (Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001). However, the value of inter-coder reliability has received some skepticism, as the results of this procedure are highly dependent on the information and training the second coder receives prior to checking. This merely instructs another person to think and apply the same subjective perspective to the text as the first analyst (Vaismoradi et



al., 2013). Furthermore, with prolonged engagement in research and applied practice with elite athletes, the co-authors engaged in ongoing peer debriefing and validated the analysis, research report, and the final paper (Vaismoradi et al., 2013). As the interviews were conducted in the athletes' mother tongue (i.e., Norwegian), quotes were translated by the first author and checked for accuracy by a bilingual researcher. Finally, we kept a detailed audit trail to document each step of the research process (Sparkes & Smith, 2013). This triangulation and auditing ensured confirmability of the first author's findings and interpretations (Sparkes & Smith, 2013). These are valuable tools to ensure trustworthiness, and the detailed audit trail provided the report dependability (Lincoln & Guba, 1985; Sparkes & Smith, 2013). Nonetheless, we encourage readers to reflect upon the findings and determine their transferability to other athletes and contexts (Sparkes & Smith, 2013).

**Reflexive self-awareness.** Along with the steps to ensure trustworthiness, researcher(s) need to explicitly include information according to their reflexivity and subjectivity in the research process (Sparkes & Smith, 2013). This, in turn, enables readers to judge the quality of the final report. We recognized the following biases and perspectives brought into the research process that may have influenced the analysis, interpretations, and final report. First, our athletic experience may have biased our interpretations of athletes' stories. Additionally, our background knowledge of study athletes (e.g., from media), might have influenced interpretations. Thus, we recognize a certain risk for subjective contributions, and encourage readers to scrutinize and reflect upon the research process.

### **Paper II, III, and IV**

In Papers II-IV, SEM analyses were used to test the hypothesized models, informed by both frequentist and Bayesian approaches to analyze data. Furthermore, these papers were based on cross-sectional (Paper II) and longitudinal data (Paper III and IV), and measurement invariance (MI) was investigated in Paper III and IV. Thus, main futures of these methods are

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presented, subsequent to a general description of the specific analyses in each paper (for details, see the respective papers).

### **Structural Equation Modeling**

In the current doctoral thesis, SEM was used to test the hypotheses in Papers II-IV, using the *Mplus* program version 7.31 (Muthén & Muthén, 1998-2016). Introduced in the 1970s, SEM has become a popular statistical technique important for a diverse range of fields, including sport psychology (McQuitty & Wolf, 2013; Ntoumanis & Myers, 2016). This technique seeks to explain the covariance between a set of variables, and allows testing associations between constructs cross-sectionally and longitudinally. Relationships between variables in the model are specified, and the model fit to the data are evaluated (Byrne, 2012; McQuitty & Wolf, 2013). Thus, it is possible to test a theory of predictions, or specify a new theoretical model. However, the former is recommended as theory should drive model development rather than statistical fit between the model and the current data (McQuitty & Wolf, 2013). In this manner SEM takes a confirmatory approach analyzing a structural theory (i.e., hypothesis testing; Byrne, 2012). Moreover, SEM is a system of equations that tests the structure of relationships between manifest (observed) and latent (unobserved) variables (McQuitty & Wolf, 2013). First, manifest variables (e.g., self-reported responses of planning) consist of indicators of the underlying construct (e.g., items concerning planning). Second, latent variables represent the latent phenomena that cannot be observed and measured directly (e.g., self-regulation; Byrne, 2012). Moreover, the latent variables comprised of multiple observed items represent the independent and dependent variables (McQuitty & Wolf, 2013).

When a statistical model is proposed, based on a theoretical framework and/or empirical research within the field, the independent variables are regressed on the dependent variables to obtain estimates of the structural paths that reflect the magnitude of the relationships between the variables (McQuitty & Wolf, 2013). In this analytic process, factor

loadings or standardized regression coefficients are also obtained as the variables are regressed on their respective items (McQuitty & Wolf, 2013). Consequently, the goodness of fit between the sample data and this hypothesized model is determined by various goodness-of-fit (GOF) indices. In Paper II, based on frequentist methods, we relied on both incremental and absolute GOF (Byrne, 2012). That is, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), and the comparative fit index (CFI) were used, and traditional cutoff criteria (i.e.,  $CFI \geq .90$ ,  $RMSEA \leq .08$ , and  $SRMR \leq .08$ ) indicated acceptable fit (Byrne, 2012; Little, 2013). In Papers III and IV, based on Bayesian methods, the posterior predictive  $p$  (PP $p$ ) value in combination with the 95% confidence interval reflected model fit (van de Schoot et al., 2014). A PP $p$  close to .50 and a symmetric 95% CI centering on zero indicate excellent fit (Muthén & Asparouhov, 2012). Additionally, a third category, predictive or parsimony-corrective indices of fit were used to compare nested models in Paper IV (e.g., Brown, 2006; Kline, 2011). Lower values on the Bayesian Information Criteria (BIC) and the Deviance Information Criterion (DIC) indicated a better fitting model (Asparouhov, Muthén, & Morin, 2015). As already mentioned, these different fit indices reflect the frequentist or Bayesian statistical approach used to analyze data, and a brief description of these approaches follows.

### **Statistics Approach**

There are two theories of probability that inform quantitative research methods, the frequentist and the Bayesian theories of probability (Zyphur & Oswald, 2015). Bayesian probability reflects degrees of knowledge or belief, whereas frequentist probability reflects “features of hypothetically observable systems ... associated with how often something happens in an infinite series of observations” (Zyphur & Oswald, 2015, p. 3). Thus, the interpretation of results in Bayesian credible intervals and frequentist confidence intervals differs. In a 95% credibility interval, there is a .95 probability that the parameter estimate is

falling within the intervals limits (Depaoli & van de Schoot, 2015). Credible intervals reflect uncertainty in the true value of parameter estimates obtained in the Bayesian posterior distribution, and the interval range shows the most probable values for the parameter (Zyphur & Oswald, 2015). Thus, Bayesian probability reflects directly the parameter estimate itself, and allows probabilistic statements about estimates based on observed data. Conversely, in frequentist statistics the parameter estimate are treated as fixed (Zyphur & Oswald, 2015). Over long-run frequencies, a 95% confidence interval would indicate that 95% of the intervals constructed under the same conditions would contain the true parameter estimate in the population (Depaoli & van de Schoot, 2015). Summarized, “Bayesian probability is belief or knowledge. Frequentist probability is the relative frequency of an event in a hypothetical infinite series of events” (Zyphur & Oswald, 2015, p. 5). An important advantage of Bayesian contrasted with frequentist methods, is the potential to deal with complex models (Rupp, Dey, & Zumbo, 2004; Zyphur & Oswald, 2015). Additionally, Bayesian statistics is advantageous when parameter estimates are not normally distributed and when the sample size is small (Muthén & Asparouhov, 2012).

Bayesian statistics is increasingly popular in all fields of science (Depaoli & van de Schoot, 2015), even though applications in sport psychology research are scarce (Stenling, Ivarsson, Johnson, & Lindwall, 2015). Traditionally, estimation and inference methods have relied on the frequentist approach (e.g., null hypothesis significance testing, confidence intervals, maximum likelihood estimation, and  $p$  values; Zyphur & Oswald, 2015). In this approach, first and second-order confirmatory factor analyses are tested relying on the restrictive independent cluster model which comprise zero cross-loading and residual covariances (Asparouhov et al., 2015). Hence, the model specification is quite strict viewing parameters as constants, and poor model fit may result in rejection of the model because multidimensional measures seldom load merely on one construct (Asparouhov & Muthén,

2009; Muthén & Asparouhov, 2012). These model specifications may thus lead to distorted structural relations (Asparouhov & Muthén, 2009; Marsh et al., 2009). However, models can be improved by freeing single parameters based on model modification indices, but this process runs the risk of capitalizing on chance (Muthén & Asparouhov, 2012). Conversely, Bayesian estimation parameters are viewed as variables where exact zero parameter specifications are replaced with approximate zeros informed by small-variance priors (Muthén & Asparouhov, 2012).

A prior refers to the parameter distribution, and is the (subjective) background knowledge of parameter estimates (Depaoli & van de Schoot, 2015; Muthén & Asparouhov, 2012). Thus, priors derived from former research will, together with the current data, lead to results in the posterior distribution, characterized as meta-analytic findings (Zyphur & Oswald, 2015). These three elements constitute the Bayes theorem (i.e., priors, current data, and the posterior distribution; Muthén & Asparouhov, 2012). By specifying priors, parameter specifications of exact zeros are replaced with approximate zeros that allow small item cross-loading and residual covariances (Muthén & Asparouhov, 2012). This helps researchers specify models and improve analyses to better reflect substantive theory. These priors can be informative, weakly informative, or noninformative, depending on the uncertainty reflected in the prior distribution (Muthén & Asparouhov, 2012). Informative priors contain strict information about the prior distribution, highly influence the model being estimated, and reflect a great degree of knowledge about the parameters being estimated (Depaoli & van de Schoot, 2015). Weakly informative priors contain weak information about the prior distribution, influence the model to a lesser degree, and help avoid inappropriate inferences made from noninformative priors (Depaoli & van de Schoot, 2015). Noninformative priors represent no information about the value of the estimated parameters, and place equal probabilities for the possible values under that distribution (Depaoli & van de Schoot, 2015).

Based on these characteristics of the type of prior, researchers need to carefully inspect the influence of the priors to obtain trustworthy results (Depaoli & van de Schoot, 2015; see also Stromeier, Miller, Sriramachandramurthy, & DeMartino, 2015). Furthermore, approximate MI is as a prerequisite for comparing Bayesian latent variable scores over time (van de Schoot et al., 2013). As for the longitudinal models in Papers III and IV, approximate MI was investigated.

### **Approximate Measurement Invariance**

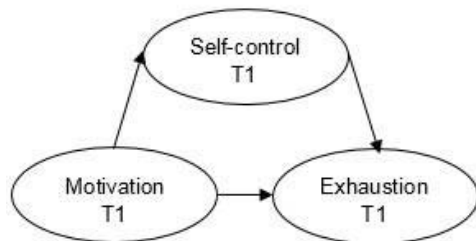
By establishing MI in self-report questionnaires, researchers confirm that respondents interpret questionnaires equally between groups and over time (Little, 2013; van de Schoot, Lugtig, & Hox, 2012). In this process, factor loadings, intercepts, and residual variances are constrained step-wise in the structural equation models, to examine whether respondents attribute the same meaning to the latent factor(s) and equality in the levels of underlying items between groups and different time points (van de Schoot et al., 2012). However, based on the Bayesian approach to factor analyses and SEM used in Paper III and IV, approximate MI tested constructs' approximate equivalence over time (van de Schoot et al., 2013). This method replaces strict MI, and allow for some wiggle room in respondents' responses over time and within groups. The constraints of zero differences in respondents interpretations in strict MI are considered unrealistic at times, and approximate MI is a good and interesting alternative (van de Schoot et al., 2013).

## **Paper II**

### **Testing Indirect Effects**

In Paper II, a specific hypothesis and ordering of variables was proposed based on reasoning in previous research (see *Figure 3*; Baumeister, 2016; Lemyre et al., 2006). The indirect effect of self-control in the motivation to burnout association was investigated in a

mediation model<sup>3</sup> based on cross-sectional data (Jose, 2016). This single-occasion model is one of the most commonly used mediation models (Jose, 2016; see also Podlog et al., 2015). The three variables are assessed at one single time point, and each variable are placed according to the hypothesis based on theory or following previous research findings (Jose, 2016). Choosing this model in the analyses of Paper II, we wanted to test a specific ordering of variables, and did not examine other alternative possibilities. Thus, the single-occasion data collection of Study I makes this a time-efficient approach testing our hypothesis, but due to the constraint of using a cross-sectional design we were restricted from arguing for a unique causal and temporal ordering of variables (Cole & Maxwell, 2003; Maxwell, Cole, & Mitchell, 2011). Based on prior research that shows that self-control directed by self-determined motivation is less depleting (Muraven, 2008), and that acts of self-control likely influence subsequent motivation (Inzlicht et al., 2014), the analyses in the current paper were not an atheoretical “fishing expedition” where we tested all possible concurrent orderings of variables, but rather reflected our theory based research question (Jose, 2016).



*Figure 3. The single-occasion mediation model in Paper II.*

T1 = time point one.

Testing this specific ordering of variables, we chose bootstrapping as the method for assessing direct and indirect effects (Hayes & Scharkow, 2013). This informative method is a

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<sup>3</sup> Even though a mediation model is a causal model based on longitudinal data, the term mediation model is also used when describing indirect effects based on cross-sectional data (Hayes, 2009; see also Zhang, Si, Chung, & Gucciardi, 2016)

recently developed and valid resampling procedure that tends to have high power, even with small sample sizes (Hayes, 2009; Hayes & Scharkow, 2013; Jose & Weir, 2013; Shrout & Bolger, 2002). In this method, the current sample is treated as a miniature representation of the population that is repeatedly resampled from the original sample (i.e., at least 5000 resamples are recommended; Hayes, 2009). In our model, a 95% bias-corrected bootstrap confidence interval was derived from 10,000 resamples (Hayes & Scharkow, 2013). When this confidence interval does not include zero, there is evidence that the indirect effect is not zero with 95% confidence (Hayes, 2009). Thus, the model paths are repeatedly resampled, and eventually the indirect effect and the size of this effect is estimated from the number of resamples made and by generating a confidence interval based on this number of estimates, respectively (Hayes, 2009). However, there has been some controversy about the requirements and terminology describing these effects. In the Baron and Kenny (1986) method,  $X$  and  $Y$  should be associated when examining the indirect effect of a third variable  $M$ ; while Hayes (2009) argues that this constraint is false, and  $X$  can indirectly affect  $Y$  in the absence of an initial direct (i.e., total) effect between the dependent and independent variable  $X$  and  $Y$ . Moreover, the terminology used to describe effects in mediation models differs, and Hayes (2009) states “call it what you want—mediation or otherwise” (414). However, in the current doctoral thesis the effects of this single-occasion model are referred to as direct, indirect, and total effects rather than mediation effects, as they did not involve the temporality of longitudinal data (Jose, 2016). Thus, the third paper elaborated on longitudinal associations between motivation and self-control, and the data analysis of Paper III follows.

### **Paper III**

In the third paper, by using Bayesian structural equation modeling (BSEM), we investigated cross-lagged and autoregressive effects between motivation and self-control over the three time points in Study III (see *Figures 4 and 5*).



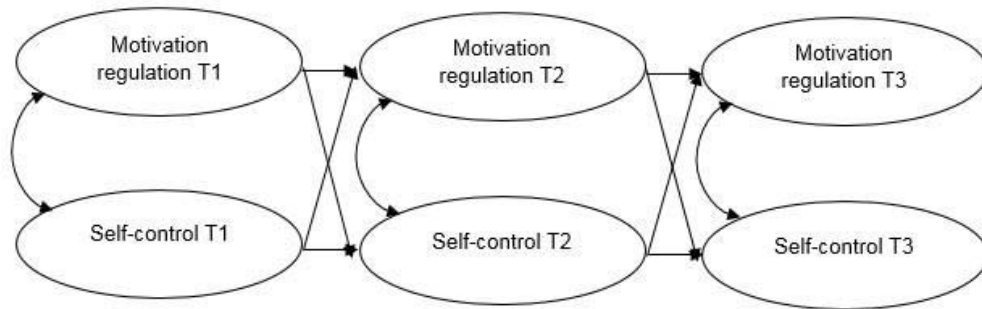


Figure 4. The cross-lagged panel model of motivation and self-control at three time points.

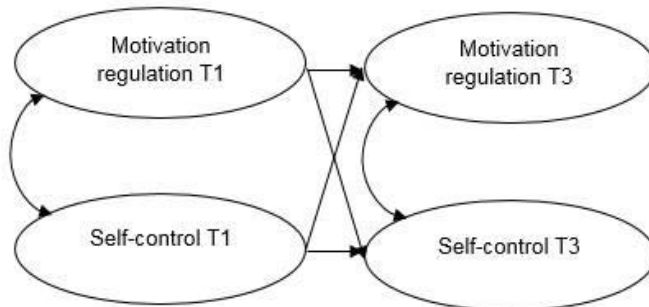


Figure 5. The cross-lagged panel model of motivation and self-control at two time points.

### Cross-Lagged Panel Models

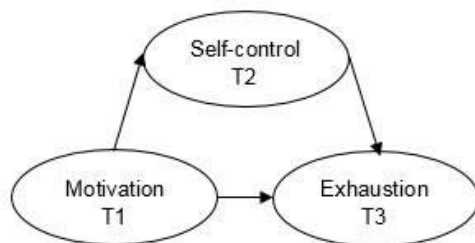
Numerous methods that investigate associations between constructs over time exist (Little, Preacher, Selig, & Card, 2007). However, traditional panel designs still remain popular as they “offer basic answers to questions that new methods do not directly address” (Little et al., 2007, p. 357). These models address questions regarding constructs’ (systematic) longitudinal stability of individual differences, direct temporal autoregressive and cross-lagged effects between constructs (i.e., change in causal structure), and the eventual change of the constructs’ means and variances over time (Little et al., 2007; Preacher, 2015). Thus, the cross-lagged models employed in this paper examined the temporal ordering of motivation regulations and self-control competencies. In these longitudinal models, researchers are encouraged to include variables prior assessment (i.e., the autoregressive effects; Maxwell et al., 2011). Compared to cross-sectional analyses that may over- or underestimate the

magnitude of a longitudinal effect, this model is intended to reveal the actual longitudinal cross-lagged and autoregressive effects (Selig & Preacher, 2009). However, the interpretation of effect sizes when controlling for stability effects in longitudinal autoregressive models is problematic, and no clear guidelines exist (Adachi & Willoughby, 2015). Consequently, these effect sizes should be interpreted with caution, as the inclusion of variables' prior assessments make considerable changes to effects in these models (Maxwell et al., 2011). In the current doctoral thesis, these autoregressive effects are relevant in the fourth paper as well, investigating two different mediation models in the longitudinal data from Study III.

#### **Paper IV**

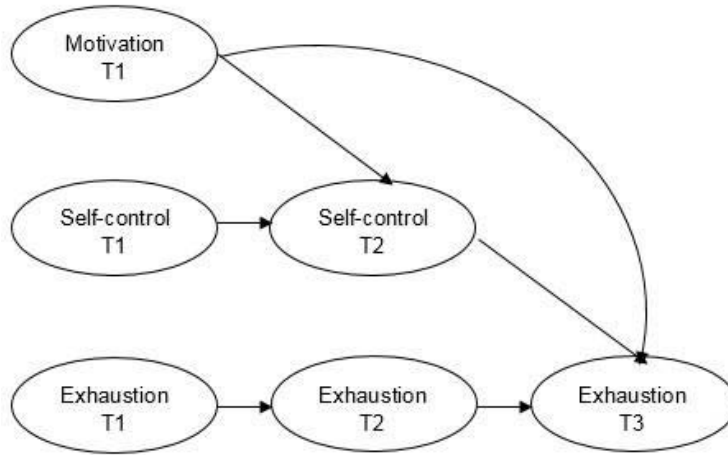
##### **Simple and Focused Mediation Models**

In the fourth paper, simple and focused mediation models investigated motivation to exhaustion associations mediated by self-control (see *Figures 6 and 7*). The simple mediation model consisted of three variables assessed at different time-points. In the focused mediation model the mediator and the outcome variables were residualized (Jose, 2016).



*Figure 6.* The longitudinal simple mediation model in Paper IV.

T1, T2, and T3 = time point one, two, and three.



*Figure 7. The longitudinal focused mediation model in Paper IV.*

T1, T2, and T3 = time point one, two, and three.

Thus, based on longitudinal data, the analyses in this paper investigated the single-occasion mediation model findings from Paper II. Even though there is no clear standard as to when and how to implement mediation as a method, there seems to be a general consensus that mediation models should include time (e.g., Cole & Maxwell, 2003; Jose, 2016; Maxwell et al., 2011). That is, mediation consists of causal processes that unfold over time, and should investigate whether the independent (predictor) variable occurs before the mediator, and the mediator occurs before the dependent (outcome) variable (Jose, 2016; Maxwell & Cole, 2007). Incorporating temporality, the simple mediation model investigated causal processes between variables, and the variables' placement guided the temporal relations (Jose, 2016). Moreover, mediation models based on cross-sectional data have been criticized, and are only justified when researchers are especially interested in one specific ordering of variables (i.e., the focus of Paper II; Jose, 2016). In summary, temporality between variables is the only true way to assess causality and make causal inferences (Jose, 2016). Additionally, to assess the change of prediction in these models, the mediator and the dependent variable should be residualized (Adachi & Willoughby, 2015; Jose, 2016; Maxwell et al., 2011). In these focused

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mediation models, the analyst will control for earlier assessments of these variables and assess whether the independent variable predicts change in the mediator, which subsequently predicts change in the dependent variable.

### **Missing Data**

In the current doctoral thesis, missing data were handled through various procedures. In Study II, athletes returned questionnaires and declaration of consent by mail. Missing data was handled using the full information maximum likelihood (FIML) estimation (Enders, 2010). This technique, used to address missing data within the latent variable modeling framework, dates back more than 50 years. Different combinations of population parameter values are repeatedly revised, and eventually the particular constellation of values that produces the best fit to the data is identified (Enders, 2010). Multiple imputation and FIML is considered “state of the art” missing data techniques, and are superior to other missing data methods (e.g., deletion and single imputation methods; Baraldi & Enders, 2010; Enders, 2011). That is, multiple imputation and FIML yield unbiased estimates under missing completely at random (MCAR) and missing at random (MAR) conditions (Enders, 2010, 2011). In Study III, data was collected by means of an online questionnaire system, and athletes were forced to answer each item before completing the survey, which would mean prevention of missing data, termination of the survey before completion, or the provision of fake responses (Denscombe, 2009). Even though computer-administered surveys do not seem to procure more complete responses compared to paper-and-pencil responses (Wood, Nosko, Desmarais, Ross, & Irvine, 2006), forced-choice questionnaires may provide more informative data (Clancy, Herring, & Campbell, 2017). Current study participants may have been absent due to competition related travels or important training sessions. Nonetheless, analyses were performed to examine the pattern of missing data (see Paper IV for details). Furthermore, the Bayesian alternative to FIML, the Gibbs sampler, was used to handle

missing data in Papers III and IV. This method treats missing observations as unknown values to be estimated, and yields unbiased results under MCAR and MAR conditions (Asparouhov & Muthén, 2010). Furthermore, an overview of ethical concerns in human research related to the three studies are presented in the following section.

### **Ethical Considerations**

Studies I-III were approved by the Norwegian Centre for Research Data (see Appendices I, III, and V), and guidelines to protect participants were followed accordingly. It was important to keep athletes' anonymity and confidentiality, especially athletes in Study I who are high-profile athletes (Odendahl & Shaw, 2001). Confidentiality has been defined as not reporting on private data identifying participants (Kvale, 1996). Thus, sensitive information that would reveal athletes' identity is not included in the doctoral thesis and respective papers; rather, information reflecting the whole group of athletes who participated is presented. In Study II, we exchanged information with sport directors, who in turn informed athletes and arranged the data collection. Thus, we did not have direct contact with athletes who participated, except when athletes returned the declaration of consent. This declaration was securely kept in a locked cabinet in the main supervisor's office, and destroyed two years after the data collection period was completed. In Study III, we contacted the administration of the online questionnaire system, and received a contract signed with the Norwegian School of Sport Sciences that ensured athletes protection. In this study, athletes' e-mail addresses were used to randomly choose participants who got participation incentives, and to pair responses at time point one, two, and three. Nevertheless, when survey data was transferred from SPSS to Mplus, e-mail addresses were deleted and not included in the files used for analyses. In sum, the ethical considerations in the current PhD project ensured the protection of participants.

## Results

The following section will present a summary of major findings in Paper I-IV in relation to the research questions. For detailed descriptions of the results, see the respective papers.

### **Paper I      Interplay of Motivation and Self-Regulation throughout the Development of Elite Athletes**

Jordalen, G., Lemyre, P.-N., & Durand-Bush, N. (submitted)

Five female Olympic and World Championship medalists were interviewed and the data revealed how motivation and self-regulation competencies interchangeably influenced their career trajectories in a non-synchronously fashion. Study findings from this thematic analysis focused on the interplay between motivation and self-regulation and illustrate the importance of these two constructs throughout athletes' development of elite level performance.

During the younger years, athletes' engagement was mainly characterized by intrinsic motivation and low self-regulation. All athletes recalled that they enjoyed and were genuinely interested in their sporting activities, guided but not controlled by parents and coaches. At this young age, athletes did not recall having sport-specific goals, and they did not consciously exert self-regulatory efforts to perform well. Driven by eagerness, they invested time in several activities, and participated in competitive sports from about six years of age. From the age of 11 years, they were ranked against their peers. Due to this competitive involvement and their desire to succeed, they recalled a shift in motivation. This influenced their self-regulation strategies, especially goal setting and planning skills. At this age, they did not reflect on or evaluate their performances.

In their early adolescent years, athletes were especially driven by integrated, introjected, and external types of motivation. They used planning self-regulation skills and co-regulated with their coaches. However, they felt somewhat controlled by their coaches' directive style as they decided on the training program and content. The young athletes deliberately focused on sport activities, and they developed an inclination for self-directedness and competitiveness as they were increasingly influenced by mastery and results. At this age, they did not experience particular pressure from significant others to perform well (e.g., coaches, parents), but experienced self-initiated expectations and a somewhat internalized external focus. However, as they grew older and became junior athletes at the age of 16, they expressed that external, introjected, and integrated regulations, and to a lesser extent intrinsic regulation, characterized their motivation. Athletes fully focused on sports, and made decisions that increased their chance of success. They were successful at this age, recognized for their high-level of competencies as they reached the junior elite levels of performance. In their accomplishments, they especially used planning and self-control competencies, and eventually self-monitored and reflected on their sport activities. However, some challenges and conflicts were associated with these activities, and athletes experienced being controlled by significant others and the elite sport context. In this situation, their competitiveness and willpower to succeed was important, and this extrinsic drive fueled their self-regulation competencies. They identified with the importance of surpassing themselves and others, and their feelings of self-efficacy were highly contingent on good results. At this point, they realized that their reflection skills were not aligned with the competition level, and they recalled suffering from mistakes and setbacks.

Reaching the senior elite level of performance, athletes' motivation and self-regulation profiles were more nuanced; especially reflected by a combination of introjected, external, identified, and integrated motivation regulations, and self-control, self-monitoring, and self-

reflection competencies. The external pressure they once perceived decreased, and athletes reported successful co-regulation with their coach. They became more aware of important mental characteristics of performance, especially willpower, perseverance, and focus. Their confidence was still contingent on mastery, and this competitive focus and normative awareness helped them adjust different performance variables. Possibly caused by this external drive, athletes reported experiencing a series of maladaptive sport participation outcomes. As such, they still developed their self-regulation competencies to recognize the need for adjustments. Thus, these situations triggered their competencies and led to athletic improvements and great performances. In sum, these findings emphasized the interrelations between various types of motivation and self-regulation competencies as athletes developed from novice to elite levels (Baumeister, 2016; Inzlicht et al., 2014). Their performances were fueled by a complex motivation profile, and they seemed to benefit from self-determined as well as controlled types of motivation (Gillet et al., 2012; Langan et al., 2016). Athletes' self-regulation was repeatedly challenged and adapted to serve this motivation profile, and especially self-control competencies progressively directed their elite level performances (Toering & Jordet, 2015).



**Paper II      Exhaustion Experiences in Junior Athletes: The Importance of Motivation and Self-Control Competencies**

Jordalen, G., Lemyre, P.-N., & Durand-Bush, N. (2016)

In Paper II, cross-sectional indirect effects of self-control competencies were examined in the association between motivation and burnout indices in six SEM analyses (see *Figure 3*). Each analysis included one motivation regulation. Noteworthy, the ABQD showed non-acceptable fit and was excluded from the analyses (see Little, 2013). Based on conceptual arguments from the self-control depletion literature (e.g., Baumeister et al., 2007), the ABQR was excluded as well, allowing for an investigation of the motivation regulation → self-control → emotional and physical exhaustion relationship.

In the mediation models, indirect effects were negative and significant in the intrinsic, integrated, and identified regulation analyses, and positive and significant in the introjected, external, and amotivation regulation analyses. Total effects were negative and significant in the intrinsic regulation analysis, and positive and significant in the external and amotivation regulation analyses. Furthermore, direct effects were positive and significant in the external regulation analysis. In sum, these results showed that associations between motivation, self-control, and exhaustion were conceptually consistent (e.g., Inzlicht et al., 2014; Lemyre et al., 2006; Muraven, 2008). That is, self-determined and controlled motivation mediated by self-control competencies negatively and positively predicted athletes' perceived exhaustion, respectively. Additionally, results showed that a careful investigation of the questionnaires used in this paper is required—the current analyses revealed some limitations when it comes to reliability of the motivation questionnaire subscales and the factor structure of the ABQ subscales and the BSCS (e.g., see Gustafsson, Lundkvist, Podlog, & Lundqvist, 2016; Maloney, Grawitch, & Barber, 2012; Toering & Jordet, 2015, for similar findings).

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**Paper III    The Temporal Ordering of Motivation Regulations and Self-Control: A Cross-Lagged Effects Model**

Jordalen, G., Lemyre, P.-N., Durand-Bush, N., & Ivarsson, A. (submitted)

In Paper III, autoregressive and cross-lagged effects between six types of motivation regulations and self-control competencies were investigated in three-wave and two-wave BSEM cross-lagged panel model analyses (see *Figures 4 and 5*; Little, 2013). More specifically, autoregressive paths and stability over time (e.g., T1 → T2 intrinsic regulation) as well as cross-lagged paths and temporal causality (e.g., T1 external regulation → T2 self-control → T3 external regulation) were investigated.

Initial analyses confirmed longitudinal approximate MI (van de Schoot et al., 2013). This implies that respondents interpret constructs equally over time, and attribute the same meaning to the latent factor(s) and equality in the levels of underlying items at different time points (van de Schoot et al., 2012). In the three-wave and two-wave models, strong credible effects were found for autoregressive paths. However, analyses revealed some instability of constructs over time, such as motivation regulations higher T2 → T3 compared to T1 → T2 autoregressive paths. In the three-wave models, credible T1 self-control → T2 motivation cross-paths were found in the intrinsic, integrated, and amotivation regulation analyses, and a credible T2 self-control → T3 motivation cross-path was found in the integrated regulation analysis. Additionally, credible T2 motivation → T3 self-control cross-paths were found in the intrinsic, integrated, and amotivation analyses. In the two-wave models, credible T1 motivation → T3 self-control effects were found in the introjected and amotivation analyses, and the T1 self-control → T3 motivation effects size was moderate though barely non-credible in the integrated regulation analysis. Hence, study findings emphasized that self-control initiated the cross-paths between self-control and motivation over shorter periods (i.e.,

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five weeks in the three time point models) and motivation initiated the cross-paths over time (i.e., 10 weeks in the two time point models). This suggests that athletes' motivation is directed by powerful self-control competencies (e.g., Inzlicht et al., 2014). However, in line with the strength model of self-control (Baumeister, 2016; Baumeister & Vohs, 2007), motivation directs self-control competencies over time. Additionally, findings confirmed the strength of autoregressive effects in longitudinal models (Adachi & Willoughby, 2015), and the divergent results in the three-wave and two-wave model analyses underlined the importance of evaluating the length of longitudinal studies when examining change processes (Stenling, Ivarsson, & Lindwall, 2017).

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**Paper IV     The Role of Self-Control and Motivation on Exhaustion in Youth Athletes:  
A Longitudinal Perspective**

Jordalen, G., Lemyre, P.-N., Solstad, B. E., & Ivarsson, A. (submitted)

In Paper IV, the longitudinal interplay between various types of motivation and symptoms of exhaustion via self-control competencies was examined in six different BSEM analyses (Muthén & Asparouhov, 2012) through two different mediation models (see *Figures 6 and 7*). One motivation regulation, self-control, and exhaustion represented one analysis, examined in simple and focused mediation models (see Jose, 2016). These models showed good fit to the data, and analyses confirmed acceptable reliability and validity coefficients (Brown, 2006; Raykov, 2009).

Initially, analyses confirmed longitudinal approximate MI (van de Schoot et al., 2013). Missing data analysis results offered no differences between athletes who participated at three compared to less than three time points, and data missing at random (Enders, 2010). In the simple mediation models, negative indirect effects in the intrinsic, integrated, and identified regulation analyses were credible, whereas positive indirect effects in the external and amotivation regulation analyses were credible. Total effects were credible and negative in the intrinsic and integrated regulation analyses, and credible and positive in the external and amotivation regulation analyses. Additionally, the direct effect between amotivation and exhaustion was credible and positive, and a small and medium amount of variance explained T2 self-control and T3 exhaustion, respectively. In the focused mediation models, no mediation effects were found. However, the total effect between amotivation and exhaustion was credible and positive. In these models, the autoregressive effects were strong, positive, and credible. Additionally, variables were credibly related within and between time points, and substantial amount of variance explained T2 self-control and T2 and T3 exhaustion.

## Results

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Hence, the two mediation models showed different results, possibly due to the strong autoregressive effects (Adachi & Willoughby, 2015). In both models, and confirming findings in Paper II, findings revealed conceptual consistent associations (Inzlicht et al., 2014; Muraven, 2008). Specifically, self-determined and controlled motivation interacted with self-control and respectively predicted perceived exhaustion negatively and positively.

**Discussion**

In the discussion of the present findings, a brief theoretical introduction is offered, preceded by a short discussion of Papers I-IV findings. Next, major methodological and conceptual themes are discussed, such as the influence of time and the interaction between motivation and self-regulation. Finally, theoretical and practical implications, limitations, future research, and conclusions are presented.

From the introduction of the SDT and social cognitive theories of self-regulation during the 1980s (e.g., Deci & Ryan, 1985; Zimmerman, 1989), research emphasized that motivational and cognitive processes are interrelated and interdependent (e.g., Inzlicht et al., 2014; Muraven, 2008). Moreover, in his presidential address at the annual conference of the Society for the Study of Motivation in 2014, Baumeister (2016) claimed the need to construct a general theory of motivation including self-regulation constructs. Such a theory should integrate the basic processes of motivation and cognition, and present these two indispensable psychological concepts simultaneously within an integrative framework. Thus far, sport psychology research explicitly investigating the interaction between motivational and cognitive facets of performance in high-level athletes is scarce.

In research investigating the role of motivation and self-regulation, Zimmerman and Campillo (2003) presented a self-regulation phase model in which forethought phase processes include self-motivational beliefs. Based on this model, research states that intrinsic interest and value of the task increase athletes' self-regulation capacity (e.g., Dubuc-Charbonneau & Durand-Bush, 2015). In research based on the phase model of self-regulation, the motivational component is often defined "as the extent to which learners are self-efficaciously, autonomously, and intrinsically motivated to attain a specific goal" (Jonker et al., 2010, p. 1606). Further, this component is measured in terms of effort and self-efficacy (e.g., Toering, Elferink-Gemser, Jonker, van Heuvelen, & Visscher, 2012). The effortful

aspect of self-regulation helps student-athletes to increase their overall self-regulation ability (Dubuc-Charbonneau & Durand-Bush, 2015). However, the aforementioned studies investigated motivational outcome variables (i.e., effort) and motivational beliefs (i.e., self-efficacy), and did not specifically investigate various types of motivation. For example, these studies did not investigate explicitly associations between athletes' types of motivation (e.g., motivation regulations) and their self-regulation competencies (e.g., planning, reflection, and self-control) simultaneously. This thesis aimed to investigate the interaction between the quality of motivation and self-regulation competencies in the development of athletes on their way to elite performance levels.

The thesis' four papers investigated various self-determined and controlled types of motivation and self-regulation competencies associated with sport participation outcomes in high-level and elite athletes. In Paper I, we investigated the role of different types of motivation and self-regulation competencies as athletes developed from novice to elite. The findings of this paper led to the examination of high-level youth athletes' motivation and self-control competencies associated with sport participation outcomes (Paper II). However, by merging motivation and self-regulation theory frameworks, the rationale that placed the ordering of these concepts was not clear. Therefore, the temporal ordering of motivation and self-control throughout high-level youth athletes' competitive season was investigated (Paper III). Finally, based on the dynamic nature of psychological constructs (Gelman, 2015), we investigated motivational antecedents of self-control depletion over time in high-level youth athletes (Paper IV). That is, we investigated the cross-sectional findings of Paper II with longitudinal data in simple and focused mediation models. Overall, the results showed that the interaction of different types of motivation and various self-regulation competencies may influence athletes differently. A brief discussion of major findings of each paper follows.

In Paper I, unique types of motivation and self-regulation competencies were found at different ages in athletes' development, especially the importance of extrinsic types of motivation and athletes' delayed use of self-regulation competencies was highlighted. These findings are novel as they somewhat differ from SDT's main tenets claiming that intrinsic and self-determined forms of motivation are thought to generate the most positive development (Ryan & Deci, 2000), although some prior findings have suggested that elite-level athletes may show a complex motivation profile that is characterized by self-determined and controlled types of motivation simultaneously (e.g., Gillet et al., 2012). Findings also showed the crucial role of athletes' willpower and self-control competencies, as the senior level athletes recognized the importance of their self-regulation competencies in order to avoid negative sport participation outcomes (Mischel et al., 2011).

Findings from Paper I prompted an in-depth investigation of the associations between athletes' various types of motivation, their self-control competencies, and symptoms of burnout. In Paper II, the indirect effect of self-control was found in all motivation regulation analyses except the introjected regulation analysis. In line with former research findings, results showed that self-determined types of motivation (i.e., intrinsic, integrated, and identified) positively interacted with self-control competencies, and negatively predicted exhaustion experiences (Muraven, 2008). Thus, results suggest that self-control depletion is counteracted when self-control competencies are served by self-determined types of motivation. These findings are somewhat different than what was anticipated. In their process model of depletion, Inzlicht and colleagues (2014) suggest that self-control failure (i.e., ego-depletion) refers to when individuals experience a shift in motivation from "have-to" tasks (i.e., introjected regulation) to "want-to" (intrinsic motivation) tasks during subsequent acts of self-control. Self-control efforts are then prone to failure because the individual is more focused on "want-to" tasks and gratifications rather than "have-to" tasks and the external



demands that follow. As such, this process model suggests that acts of self-control influence individuals' motivation, which is contrary to the central tenets of SDT, namely that motivation consistently drives human behavior (Ryan & Deci, 2000). Furthermore, investigating the strength model of self-control in various contexts, research findings suggest that individuals' inherent motivation directs acts of self-control (e.g., Briki, 2016; Muraven, 2008). Based on these inconsistent research findings, we investigated the temporal ordering of SDT's motivation regulations and athletes' self-control competencies in high-level athletes throughout one competitive season.

In Paper III, cross-paths and autoregressive effects between motivation regulations and self-control competencies were investigated in two-wave and three-wave cross-lagged panel models. The longitudinal design of this final study was deemed necessary to address dynamic and causal effects between the psychological concepts (Gelman, 2015; Jose, 2016). Additionally, a Bayesian approach to analyze data was undertaken to allow small-variance cross-loadings and residual covariances between and within each construct at different time points (Muthén & Asparouhov, 2012). This approach to analyze data facilitates model identification, as parameter specifications of exact zero are replaced with approximate zeros, and the method is especially helpful when dealing with small sample sizes (Depaoli & van de Schoot, 2015; Muthén & Asparouhov, 2012). In this paper, the temporal ordering of motivation and self-control in the two-wave and three-wave models was different. In the three-wave models measuring effects between variables at three measurement time points (i.e., a 5-week time-lag), self-control initiated the causal paths between the two constructs, whereas in the two-wave models measuring effects between variables at two time points (i.e., a 10-week time-lag), motivation regulations mainly initiated the causal paths between the constructs. Findings suggest that causal paths between these constructs evolve over time, and despite using a longitudinal approach the data collection period was likely not long enough

for consistent interaction effects to emerge (Martinent & Decret, 2015; Stenling et al., 2017). Based on the influence of time when investigating the causality between constructs, and guided by a strong theoretical framework and recent research findings, the long-term influence of motivation on exhaustion via self-control was investigated in the next paper.

In Paper IV, long-term associations between motivation regulations and symptoms of exhaustion mediated by self-control competencies were investigated in six mediation models, each pertaining to one motivation regulation. As such, we explored the causal processes that unfold over time between the predictor, mediator, and outcome variables (Jose, 2016). Simple and focused mediation models were used, and the latter model accounted for autoregressive effects of self-control and exhaustion (Adachi & Willoughby, 2015). Thus, past levels on the outcome and mediator variables were controlled for (i.e., stability effects were investigated) in order to predict change in levels of the outcome (Adachi & Willoughby, 2015). Simple mediation model findings confirmed the results from Paper II, but focused mediation model findings did not confirm any mediation effects of self-control in the motivation to exhaustion association. However, the direction of effects was consistent in the cross-sectional and longitudinal models. That is, self-control negatively predicted exhaustion when directed by self-determined motivation, and conversely, positively predicted exhaustion when directed by controlled motivation. These results emphasize fundamental motivation forces influencing the initiation, direction, magnitude, perseverance, and the quality of human behavior (Maehr & Zusho, 2009; in Roberts, 2012). In addition, the results further reflect that the basic distinction between self-determined and controlled types of motivation (Deci & Ryan, 2000) is mirrored in athletes' cognitive self-control competencies and sport participation outcomes.

In summary, the methodological and conceptual findings of Papers I-IV emphasize the influence of time investigating causality between psychological constructs, the motivation

forces of self-control depletion, and the interaction between these dynamic constructs in high performance settings. These major themes are discussed in the following sections.

### **The Influence of Time Investigating Causality**

Athletes' longitudinal retrospective perceptions in Study I, as well as the cross-sectional and longitudinal designs of Study II and III, were in differing degrees influenced by time (George & Jones, 2000). In the interview study, elite athletes recalled their motivation and self-regulation aspects of development and maintenance of elite-level performances. The retrospective nature of these interviews might reduce the significance of findings to grasp only approximations of athletes' stories and thereby represent an imprecise characterization of their trajectories to the elite-level (Coutinho, Mesquita, & Fonseca, 2016). However, various steps to enhance trustworthiness of findings were followed, for example, member checks of the transcribed interviews, inter-coder reliability, and we kept a detailed audit trail (see Paper I for details; Sparkes & Smith, 2013). Nevertheless, reflections will always be retrospective, and research findings will mirror the consciousness respondents posit in relation to their experiences (Creswell, 2013). The qualitative nature of this first study contrasts time-related aspects of the cross-sectional and longitudinal studies (Study II and III).

Based on the data collected in Study II, the results of Paper II showed indirect effects of self-control in the motivation to exhaustion association (see *Figure 3*). A possible limitation of these findings is the cross-sectional data collection of Study II (e.g., Hagger & Chatzisarantis, 2009; Stenling et al., 2017). A majority of mediation analyses is based on this 'snap-shot' method, justified on the basis of a theoretical framework guiding the distinct ordering of variables (Mathieu & Taylor, 2006). However, one cannot draw any causal conclusions based on this single-occasion data collection (Maxwell & Cole, 2007). Thus, we named findings in these analyses indirect, direct, and total effects, rather than the causally oriented term mediation. Notwithstanding, the causality notion of mediation could also be

interpreted as inaccurate. Preacher and Hayes (2004) contended that significant mediation effects imply that the total effect  $X \rightarrow Y$  initially is significant. Conversely, a significant indirect effect does not require this initial significant total effect. Thus, they concluded, “Whether or not the effect also represents mediation should be judged through examination of the total effect” (p. 719). This conforms to descriptions that an intervening variable transmits the effect of a predictor variable to an outcome variable (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), whereas mediation effects “accounts for the relation between the predictor and the criterion” (Baron & Kenny, 1986, p. 176). Based on these latter contentions, Paper II’s findings should have been described as indirect effects in the integrated, identified, and introjected regulation analyses, partial mediation in the external regulation analyses, and full mediation in the intrinsic and amotivation regulation analyses (Preacher & Hayes, 2004). However, based on the hypothesized specific ordering of variables and the fact that mediation effects require longitudinal data, we chose the concepts indirect, direct, and total effects (see e.g., Mathieu & Taylor, 2006, for a detailed discussion of indirect vs. mediation effects). Conversely, emphasizing the aspect of time through longitudinal studies, individuals’ change processes and the causality among constructs can be investigated (George & Jones, 2000; Jose, 2016; Stenling et al., 2017). We attempted to increase the understanding of the interplay between athletes’ motivation regulations and self-control competencies through a 10-week longitudinal data collection period in athletes’ competitive season (i.e., Study III; Stenling et al., 2017).

The longitudinal design of Study III was chosen in order to explain the psychological and dynamic causal determinants of the associations between motivation regulations, self-control, and symptoms of exhaustion throughout athletes’ competitive season (Jose, 2016; Selig & Preacher, 2009; Stenling et al., 2017). Based on longitudinal data, we investigated simple mediation models (Paper IV; see *Figure 6*) and two different autoregressive models

(i.e., three- and two-wave cross-lagged panel models in Paper III, see *Figure 4* and *5*; and focused mediation models in Paper IV, see *Figure 7*). By investigating both simple and focused mediation models, we revealed that models that do or conversely do not control for previous levels of variables may yield different results (i.e., without controlling for previous levels, the model paths may be over- or underestimated; Selig & Preacher, 2009). Thus, controlling for autoregressive effects, the analyses will reveal the true association between constructs over time (Adachi & Willoughby, 2015). Longitudinal data is a prerequisite when investigating autoregressive effects (i.e., stability effects) and longitudinal inter-individual difference changes in the outcome variable (Adachi & Willoughby, 2015; Selig & Preacher, 2009). Moreover, accounting for stability effects in the model reduces the amount of unexplained variance in the outcome variable (Adachi & Willoughby, 2015).

Generally, and in the current thesis, the results from these analyses show large stability effects and small cross-path effects, as changes in psychological outcome variables are often gradual (Adachi & Willoughby, 2015; Selig & Preacher, 2009). The cross-lagged model analyses and the mediation analyses also showed various results when investigating effects between different time-lags. In the mediation model results, this might reflect the static cross-sectional nature of the simple mediation models and the dynamic longitudinal nature of the focused mediation models (Stenling et al., 2017). Thus, cross-sectional data is not sufficient when investigating dynamic, process-based models, the magnitude of effects is not necessarily the same between time point intervals (Selig & Preacher, 2009), and it is important to acknowledge that individuals change over time (Gelman, 2015; Stenling et al., 2017). However, infinitely adding measurement time points does not necessarily add information to detect important effects and also costs time and money. Thus, researchers need to carefully consider the gains of adding measurement occasions (Stenling et al., 2017). These

uncertainties and the lack of guidelines in the interpretation of longitudinal effect models thus need careful consideration (Adachi & Willoughby, 2015).

The lack of guidelines often leads to erroneous interpretations of longitudinal effects in autoregressive effect models (Adachi & Willoughby, 2015). Longitudinal effects often fall below the current guidelines, even though they are still meaningful. In the interpretation of these effects, however, Adachi and Willoughby (2015) state that general guidelines would be impractical and this “should involve a more dynamic method than simply citing universal guidelines for small, medium, and large effects” (p. 126). This is because the models investigated differ in terms of examined waves and number of predictors and covariates. Thus, in the interpretation of these effects, it is important to always have a larger perspective of the model results, and simultaneously highlight the impact of stability and cross-lagged effects as well as the bivariate correlation for the predictive effect. As such, longitudinal analyses of data should account for the dynamic nature of psychological constructs over time (Adachi & Willoughby, 2015; Gelman, 2015). In summary, researchers need to carefully consider methodological issues prior to and during data collection and analyses, for example, the time-lag between measurement occasions and the length of causal intervals (Stenling et al., 2017). Longitudinal data is necessary when investigating individual change processes, three or more waves are recommended, and the researcher(s) should consider the relevant time span over which effects will occur (Stenling et al., 2017). Based on these recommendations and the fact that the various models in the current PhD project showed different results, the interplay between motivation and self-regulation competencies should be further examined. A discussion of the major findings in the current thesis related to this interplay follows.

### **The Interaction between Motivation and Cognition**

Motivational aspects of performance have been emphasized in cognitive theories of human behavior, for example intrinsic motivation and value of the task (Zimmerman & Campillo, 2003) and the role of motivation in self-control depletion (Vohs, Baumeister, & Schmeichel, 2012). However, the motivation fueling self-regulation processes has been underestimated and understudied (Baumeister & Vohs, 2007). There is a lack of research that explicitly investigates associations between social cognitive and self-control aspects of self-regulation and the multidimensional characteristics of motivation. However, there is evidence that broader types of motivation (i.e., self-determined and controlled motivation) largely influence self-regulation and self-control aspects of performance and subsequent health-related outcomes (e.g., well-being; Briki, 2016; Muraven, 2008). This interaction was also evident in this thesis' findings. Namely, self-determined and controlled types of motivation interacted with self-control, while also being negatively and positively associated with symptoms of exhaustion, respectively (see Papers II and IV). Findings from our qualitative study also confirmed that more self-determined motivation and self-regulation competencies jointly characterized elite athletes' successful development when they co-regulated with their coaches and were less concerned with external stressors.

Baumeister and Vohs (2007) stated, "Self-regulation is often employed to restrain motivations, but the motivation to self-regulate is often crucial to the success of engaging in self-regulation" (116). The contention that self-regulation helps to restrain motivation is well-documented, especially in the self-control and delay of gratification literature (Mischel, 2014; Tangney et al., 2004). Recent research also suggests that motivation will change during subsequent acts of self-control, leading to a temporary depletion of the self-control capacity (Inzlicht & Schmeichel, 2012). However, the statement that motivation directs successful self-regulation was addressed in Baumeister's (2016) call for a grand theory of motivation. He suggested that human motivation is served by cognitive competencies, and according to SDT,

motivation moves people to act and it also facilitates persistence, performance, healthy and positive development, and feelings of vitality (Deci & Ryan, 2008b; Ryan & Deci, 2000).

When emphasizing the motivational aspect of cognitive efforts in congruence with SDT, it is important to emphasize the type or quality of individuals' motivation rather than solely the total amount (Deci & Ryan, 2008b). Baumeister's (2016) proposal for a grand theory of motivation addressed two meanings of motivation, and referred to motivation broadly as a driving force and specifically as an instantiated impulse. He explained the distinction between the two by saying "... people may have a basic drive for sex, which in specific occasions takes the form of targeted impulses to engage in particular sexual activities" (Baumeister, 2016, p. 2). These meanings of motivation encapsulate properties of the individual largely independent of the specific situation (e.g., drive for sex), as well as an emergent impulsive interaction between the person and the situation that evokes specific impulses (e.g., sudden impulses to engage in particular sexual activities). However, the motivational component of this grand theory should elaborate on the underlying mechanisms of motivation (i.e., type of motivation and its associated regulatory processes, goals, and attitudes), and show the interplay that exists between motivation and cognitive facets of human behavior and performance. Findings of the current doctoral thesis showed that both self-determined and controlled types of motivation interacted with self-control and self-regulation facets of performance, which suggests that intrinsic and extrinsic motives simultaneously direct athletes' cognitive competencies and determine their overall quality of motivation (Ryan & Deci, 2007). Thus, instead of emphasizing motivational and cognitive facets of self-control depletion individually, a grand theory would address the motivation of cognitive resources from an overarching organismic dialectic perspective in correspondence with SDT. This would involve environmental or situational forces and drives and emotions



within the individual, the dialectic between the individual and the environment, and the integration of these forces to the self (Ryan & Deci, 2017).

### **Motivational Aspects of Self-Control Depletion**

The strength model of self-control conceptualizes self-control as “the capacity for altering one’s own responses, especially to bring them into line with standards such as ideals, values, morals, and social expectations, and to support the pursuit of long-term goals” (Baumeister et al., 2007, p. 351). The practical implications of this concept have been studied in many contexts, and especially the limited resource account of self-control has received great attention (e.g., Hagger et al., 2010b). This suggests that self-control is limited, and subsequent acts of self-control lead to self-control depletion (i.e., ego-depletion; Baumeister et al., 2007; Hagger et al., 2010b). This ego-depletion effect has been thoroughly examined, and there are some inconsistent findings (see e.g., Baumeister & Vohs, 2016; Hagger & Chatzisarantis, 2016). Interestingly, self-control executed on several tasks simultaneously does not necessarily lead to ego-depletion, as the same brain areas direct self-control at the same time (Tuk, Zhang, & Sweldens, 2015). Conversely, when these brain areas are activated in sequential tasks over longer periods without recovery, they will be depleted. Thus, research does confirm the ego-depletion effect, and various motivational processes underpinning this effect have been examined (Muraven, 2008; Rouse, Ntoumanis, & Duda, 2013).

Generally, motivation is an important prerequisite for self-control (e.g., Huizenga, van der Molen, Bexkens, Bos, & van den Wildenberg, 2012; Lee, Chatzisarantis, & Hagger, 2016). Less motivated individuals are thought to restrain their self-control efforts and not engage in self-control tasks, thus failing to alter unfavorable habitual or impulsive responses. However, the extent to which self-control and ego-depletion are influenced by and also influence motivation depends on the degree of depletion (Vohs et al., 2012). When individuals are slightly depleted, intrinsic incentives, visiting family and friends, or going to a

movie might recharge their energy resources; though, when depletion is severe, the influence of other variables diminishes. The experience of depletion is also reflected in individuals' perception of their resources (Job, Dweck, & Walton, 2010). For example, thinking about willpower as limited rather than unlimited will increase the vulnerability of depletion experiences. That is, peoples' implicit beliefs about personal willpower and fundamental motivational strength influence whether ego-depletion and exhaustion occur subsequent to self-regulatory exercises and demanding tasks (Baumeister & Vohs, 2007; Job, Bernecker, Miketta, & Friese, 2015). A recent alternative explanation for the mechanisms behind self-control failure is that motivation moderates depletion (Inzlicht & Schmeichel, 2012). In the process model of depletion, acts of self-control lead to a shift in attention, emotion, and motivation, which undermines subsequent self-control efforts. Repetitive acts of self-control will reduce and increase the motivation to exert control and act on impulse, respectively (Inzlicht et al., 2014). Interestingly, the switch in motivation and task priorities serve the adaptive function of redirecting behaviors toward activities with increasing inherent utility. Initial acts of self-control are motivated by a sense of duty or obligation and in order to avoid feelings of guilt and shame, such as introjected and identified motivation regulations, whereas subsequent acts of self-control are motivated by interest and enjoyment and correspond to athletes' intrinsic motivation regulation. As such, motivation toward these latter tasks are maintained longitudinally, whereas motivation toward former tasks continuously need energy to be sustained (Inzlicht et al., 2014).

In summary, current literature suggests that individuals' motivation highly influences the conscious efforts of self-control. The cross-lagged panel models in Paper III investigated the temporal ordering of motivation and self-control based on these various models and explanations of the ego-depletion effect. The current thesis' findings confirm the existence of ego-depletion, and especially suggest that individuals' motivation directs their self-control

efforts. Results presented in Paper III do not suggest one unique ordering of variables, as the ordering depended on the number of waves investigated (see discussion of ‘the influence of time ...’ above). Furthermore, the mediation model proposed in the current thesis has never been investigated with high-level athletes (see Papers II and IV). However, investigating a sample of physically active individuals, Briki (2016) found that self-control mediated the associations between motivation and well-being. Specifically, self-control interacted with self-determined and controlled motivation, and partially and fully mediated associations to well-being, respectively. Together, these findings emphasize the importance of investigating various types of motivation, especially the differentiation between self-determined and controlled types, rather than the total amount, directing acts of self-control.

### **Theoretical and Practical Implications**

Self-determined and controlled types of motivation characterize competitive athletes (Gillet et al., 2012; Langan et al., 2016). Generally, these broader types of motivation are negatively and positively associated with symptoms of burnout and exhaustion in the current doctoral thesis (see Paper II and IV), even though elite athletes also seemed to benefit from both extrinsic and intrinsic sport participation motives (see Paper I). That is, athletes’ initial engagement was characterized by intrinsic motives, such as intrinsic interest and enjoyment. However, the competitive aspect of sport early evoked extrinsic sport participation motives, such as winning and outperforming others. Hence, it is important to acknowledge that the competitive nature of elite sport may influence the development of a complex and multidimensional motivational profile. Furthermore, associations between motivation and self-regulation may diverge from other, less competitive contexts. According to the process model of depletion (Inzlicht et al., 2014), athletes’ ongoing efforts and investments toward the elite-level will not necessarily lead to a shift in motivation subsequent to acts of self-control. Driven by extrinsic motives, they will experience varying forms of gratifications based on

their improvements and increased capacities. When combined with more self-determined motives, this will facilitate their self-control efforts and elite sport development. However, elite athletes who participated in Study I did experience setbacks possibly due to low self-regulation, especially through reflection on and evaluation of training practices (see Paper I). Based on these findings, it is important to encourage significant others (e.g., coaches, parents, team members) to facilitate co-regulation and self-regulation in athletes (e.g., Collins & Durand-Bush, 2010; Dubuc-Charbonneau & Durand-Bush, 2015). This may prevent maladaptive sport participation outcomes (e.g., injuries and exhaustion experiences), and also help athletes stay motivated in their long-term development.

Athletes' self-control efforts influenced sport participation outcomes positively and negatively, dependent on the type of motivation (see Papers II and IV). In addition, the temporal ordering of motivation and self-control was influenced by the time-lag between measurement time points. Self-control best predicted motivation in the 5-week time-lag analyses, whereas the opposite direction was evident in the 10-week time-lag analyses (see Paper III). Thus, these concepts seem to reciprocally influence each other, emphasizing the close interplay between motivation and cognition (Baumeister, 2016). These findings both support the strength model of self-control (Baumeister et al., 2007) and the process model of depletion (Inzlicht et al., 2014), and suggest that athletes' self-determined motivation that is characterized by intrinsic interest, enjoyment, value of the task, and personal importance enhances their self-regulation competencies. Furthermore, when athletes are externally controlled and motivated by external rewards, their motives negatively influence self-regulation competencies, possibly due to increased other-regulation. According to the process model, acts of self-control may change athletes' motivation especially when they are depleted, and they will prefer activities that are more gratifying rather than activities requiring cognitive efforts. In the competitive context of elite sport, self-control and self-regulation competencies

are especially important, as athletes need to consistently pay attention to and choose the best opportunities for success. In addition, youth athletes will experience educational, psychological, physical, and social stressors and demands in the youth sport context and their ongoing efforts to become an elite athlete (Kristiansen & Houlihan, 2015; Martinet & Decret, 2015). Thus, athletes and significant others should be aware of and facilitate development of self-regulation competencies that help athletes persist through difficulties, increase the chances for success, and serve their motivation positively.

Investigating motivational and self-regulation psychological constructs with new statistical methods that allow detailed investigations of questionnaires and their composition (e.g., SEM and BSEM; McQuitty & Wolf, 2013; Muthén, 2010) may reveal fragile instruments. Recent research findings, for example concerned with the composition of the BSCS (e.g., Maloney et al., 2012; Toering & Jordet, 2015), the conceptualization and composition of athlete burnout (e.g., Gustafsson et al., 2016), and also the current thesis' findings (see especially Paper II) reveal a need to assess and re-evaluate the BSCS and ABQ. Based on findings in the current thesis, it seems especially important to develop context specific measures and also pay attention to translation procedures when adapting questionnaires to various languages and cultures (Benítez, Padilla, Hidalgo Montesinos, & Sireci, 2016). Additionally, analyses in the current thesis showed that reverse-coded items caused difficulties, and may be a source of method bias (Podsakoff et al., 2003). Thus, researchers should carefully pay attention to the choice of questionnaires, and consequently attempt to choose recommended measures (see Future Direction for further details).

### **Limitations**

Behavioral science research will always be susceptible to methodological limitations (Podsakoff et al., 2003; Podsakoff, MacKenzie, & Podsakoff, 2012). Current study findings are based on self-report data, carrying a certain degree of method bias such as social

desirability, consistency motif, and the fact that respondents provide measures for predictor and criterion variables simultaneously (Podsakoff et al., 2003). However, various procedural and statistical techniques (e.g., the detailed analyses used to investigate measures) may reduce the extent of these biases, and various triangulation methods (e.g., observation, interviewing significant others) may confirm or refute athletes' responses. However, the current study did not triangulate research methods, which should be addressed in future research. Additionally, we did not investigate gender differences in the three studies. Coaches and sport directors emphasized how athletes matured between the ages of 16 to 20, and gender differences may be linked to variation in maturity, again leading to different patterns in the use of self-regulation competencies. Future studies should address this possible limitation.

Additionally, despite inviting a large percentage of high-level athletes competing in winter sports in Norway, it is noteworthy that the quantitative studies presented in the current thesis investigated complex mechanisms in relatively small samples (Kline, 2011). In addition, not all participants responded at each measurement time point, even though participation incentives were used (see Ethical Considerations). Thus, future research should attempt to study complex interactions between motivation and self-regulation in larger populations, and consider alternative methods to keep participants throughout data collection periods. However, we used "state of the art" missing data techniques (i.e., FIML and the Gibbs sampler) in the current thesis, which yielded unbiased estimates (Enders, 2010).

Self-report bias may also influence qualitative study findings (e.g., consistency motif), but major limitations of Study I are most likely related to the retrospective nature of the interviews (e.g., causing recall bias; Coutinho et al., 2016; Patton, 2015). However, reflections in qualitative interview studies will always be retrospective, and this should be highlighted to allow readers' evaluation of findings. Finally, the current thesis focused on winter-sport athletes and the study samples represented the most popular winter sports in

Norway. However, we did not examine the most popular sport among youth athletes within the global and Norwegian context (i.e., soccer; Larsen et al., 2015; Tjomsland et al., 2016), or other team sports. Future research should address these limitations.

### **Future Research**

To date, motivation theory research has primarily used perspectives investigating self-determined versus controlled motivation (Cresswell & Eklund, 2005b), using a self-determination index (e.g., Lemyre et al., 2006; Lonsdale et al., 2009), or studying various compositions of motivational profiles where each regulation is latent (e.g., Gillet et al., 2012; Martinent & Decret, 2015). Findings in the current thesis emphasize the importance of looking at antecedents and consequences of the various motivation regulations within these broader types of motivation, in addition to their associated cognitive processes (e.g., self-control). Furthermore, within the elite sport setting, athletes are driven by different types of motivation and more extrinsic and controlled types lead to better performance (Chantal, Guay, Dobreva-Martinova, & Vallerand, 1996). The motivational atmosphere in the elite sport setting is complex and multifaceted (Keegan, Spray, Harwood, & Lavallee, 2010), and the combination of high levels of various types of motivation seems to result in the best performance (Gillet et al., 2012). Future research should explore the complex and multifaceted composition of motivation in high-level and elite athletes, and elaborate on their characteristics, antecedents, associated cognitive processes, and consequences in various performance settings.

The founders of SDT, Deci and Ryan (2008a), stated the following:

Although, clearly, motivational processes can be studied in terms of underlying mechanisms in people's brains and physiology, the vast amount of variance in human

motivation is not a function of such mechanisms but is instead a function of the more proximal sociocultural conditions in which actors find themselves. (p. 14)

However, motivation theories need to emphasize the motivational role of cognition, emotion, agency, and other psychological processes (Baumeister, 2016). Behavioral scientists have developed motivational theories for more than a century, and have become increasingly aware of the neuroscience of motivation and the influence of various brain areas on motivation processes (Ryan & Di Domenico, 2017). SDT's six motivation regulations reflect motivation stemming from three core brain circuits (i.e., the reward circuit, the valuation pathway, and the self-regulation/self-control network; Kim et al., 2017). That is, the neuroscientific strand in motivational research has recently highlighted that the organization and control of behaviors are influenced by the interplay between multiple brain systems (e.g., the goal directed self-regulation/self-control network engaged in the regulation of motivation through cognitive control; Kim et al., 2017). As such, behaviors can be driven by various motives, for example wanting without liking, and more or less flexible motivation regulations (Ryan & Di Domenico, 2017). Motivation theories need to expand, in order to develop an understanding of how these motivational forces evolve, and how individuals select actions even though they oppose inherent desires (Kim et al., 2017). In the development and maintenance of elite-level performances, athletes develop an interconnection between neurological, psychological, and behavioral strategies, located in overlapping areas of the brain. Future research should combine different perspectives and strengthen the neuroscience of motivation, thus include information about athletes' cognitive processes (e.g., metacognitive thinking, planning, and self-control) in the assessment of motivation quality.

Experimental research in motivation neuroscience is severely limited due to for example the timescale (Kim et al., 2017). Motivational processes evolves over time, and



current brain activation measurements in just a few seconds will not grasp the long-term development and changes in motivation and its associated processes. Future research should delve into methods that record fluctuations in athletes' brain activations over time, for example through training sessions, competitions, and throughout in and off season periods. Moreover, based on the discussion of time and causality in sport psychology research, the dynamic nature of psychological constructs, and the fact that the majority of mediation models use cross-sectional data (Gelman, 2015; Jose, 2016; Stenling et al., 2017), we suggest that future sport psychology research employs longitudinal designs to better grasp the how, when, and why of human behavior change (Stenling et al., 2017). In addition, the questionnaires used in the current thesis showed some limitations when investigated with new statistical methods (e.g., SEM and BSEM; McQuitty & Wolf, 2013; Muthén, 2010), and future research should consider these measures in detail as they showed some limitations.

The current thesis employed the SMS-II (Pelletier et al., 2013), the BSCS (Tangney et al., 2004), and the ABQ (Raedeke & Smith, 2001). These are fairly new, though well-used questionnaires that show some limitations. Generally, future research should investigate the cultural and context specific qualities of these questionnaires to avoid misinterpretations regarding the questionnaires' original version. Further, SMS-II is the revised version of the sport motivation scale (Pelletier et al., 1995), and the main difference between these scales is that the SMS-II included items for integrated regulation and collapsed the three intrinsic motivation subscales. However, there have been difficulties when empirically distinguishing the various regulations (see e.g., Mullan, Markland, & Ingledew, 1997; Teixeira, Carraça, Markland, Silva, & Ryan, 2012), and some reliability coefficients in the current thesis were marginal (see e.g., Paper I). Thus, future research should investigate and validate the questionnaire in detail in various cultural settings, which is also relevant for the athlete burnout and self-control questionnaires.

In their recent article, Gustafsson, Lundkvist, Podlog, and Lundqvist (2016) claimed that the widely used Raedeke (1997) definition of athlete burnout and the theory conceptualizing the construct, is problematic. For example, the temporal relations between the subscales have been questioned, and to what extent reduced sense of accomplishment measure athlete burnout as it shows considerable conceptual overlap with other psychological constructs (e.g., self-efficacy, personal competence, and productivity). Additionally, Gustafsson and colleagues questioned that the three subscales have been condensed into a total burnout score, which needs to be theoretically addressed. Even though the current study showed good internal validity scores for the ABQ, the ABQD showed non-acceptable model fit thus bad psychometric properties in the SEM analyses (see Paper II). Based on this result and conceptual arguments, we decided to exclude the reduced sense of accomplishment too, and solely investigated the emotional and physical exhaustion subscale. In addition, other studies have questioned the validity of the Norwegian version of the scale (Lemyre et al., 2007), and suggest that this is due to cultural ambiguities as athlete burnout may be experienced differently by individuals in different cultures (Pines, 2004). In conclusion, future research should investigate the composition and validity of the scale. In addition, the composition of the self-control scale has recently been examined, criticized, and re-organized (e.g., Maloney et al., 2012; Toering & Jordet, 2015). Findings suggest different compositions of the scale, and in the current thesis especially the reverse-coded items caused difficulties (Podsakoff et al., 2003). Based on suggestions to incorporate the motivation behind cognitive competencies (Baumeister, 2016), future research should explore a self-control measure that accounts for the motivational forces behind self-control in sport-specific settings. The BSCS used in the current thesis, was developed to assess individuals dispositional self-control (e.g., resist temptations; Tangney et al., 2004). A new measure that accounts for athletes' motives of self-control efforts would recognize the motivational forces fueling this self-regulation

process (Baumeister & Vohs, 2007). In line with the process model of depletion, this measure could then include information regarding the various task priorities and switching of motivation related to self-control efforts possibly leading to self-control failure (Inzlicht et al., 2014).

### **Conclusions**

This doctoral thesis investigated the relative importance of motivation and self-regulation constructs and their reciprocal interaction in the development of elite-level winter sport athletes. Adopting a post-positivistic paradigm, we employed both quantitative and qualitative research methods and the thesis included four scientific peer reviewed papers.

Findings suggest a strong interrelationship between motivation and self-regulation throughout the development of young high-level athletes. This interrelationship seems to evolve in a non-synchronously fashion throughout athletes' career. At the start of their career, high levels of intrinsic motivation and low self-regulation characterize young athletes. However, likely as a result of the competitive nature of sport, their motivation and self-regulation profiles changes over time. Driven by more extrinsic motives, athletes appear to be challenged to self-regulate. More specifically, during the transition period from junior to senior levels, athletes seem to fail to reflect upon their training sessions and competitions. As they become more mature, elite athletes have had the opportunity to develop a multidimensional motivation and self-regulation profile, where different types of motivation are balanced with an advanced composition of self-regulation competencies. At this stage, deliberate and effortful self-control is important. This specific interaction between different types of motivation and self-control was further investigated in subsequent papers.

The mental effort associated with acts of self-control is hypothesized to depend on limited resources, and over time this cognitive capacity can be depleted (Baumeister et al., 2007). However, individuals' motivation plays a crucial role in this process. Self-determined

motivation prevents depletion, and conversely, acts of self-control will likely lead to shifts in motivation (Inzlicht et al., 2014; Muraven, 2008). To better grasp this complex interaction, we examined the longitudinal temporal ordering of these constructs throughout an important period of 10 weeks in athletes' competitive season (Paper III). This study offers a novel approach to the context of high-level sports. Findings revealed that the ordering of motivation and self-control was dependent on the time-lag between measurement time points. That is, self-control best predicted motivation in the shortest causal interval (i.e., five weeks), and conversely, motivation best predicted self-control in the longest causal interval (i.e., 10 weeks). In line with both self-regulation (e.g., Baumeister, 2016) and motivation (e.g., Ryan & Deci, 2000) theory frameworks, findings clearly suggest that the inherent motivational forces directed athletes' self-control over time.

Based on the crucial interaction between motivation and self-regulation hypothesized to influence athletes' development, a cross-sectional approach (Paper II) and a longitudinal approach (Paper IV) were used to investigate mediation models assessing the role of self-control in the relationship between different motivational regulations and exhaustion. The quantitative analyses were based on different statistical approaches. Paper II presented a strict frequentist methodology, whereas Papers III and IV used Bayesian methods, which allowed cross-loadings and residual covariances. Thus, this latter approach aids model identification, and is especially beneficial when dealing with small sample sizes (Depaoli & van de Schoot, 2015). The major finding in these mediation analyses was the conceptually consistent direction of effects. That is, self-control interacted with self-determined and controlled types of motivation and negatively and positively predicted exhaustion, respectively. However, three different mediation models (i.e., single-occasion, simple longitudinal, and focused longitudinal) offered unique findings. Especially the two former models reflected similar results, whereas the latter showed strong autoregressive effects and small, though meaningful,

## Discussion

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mediation model effects. The different results emphasized one tenet of mediation models. Namely, the requirement of longitudinal data investigating causal paths, as these paths are possibly over- or underestimated in cross-sectional analyses (Selig & Preacher, 2009). In summary, study findings indicated that highly competitive athletes possess a multidimensional motivation and self-regulation profile. This emphasizes the importance of investigating various types rather than total amounts of motivation and self-regulation competencies. Furthermore, detailed findings highlighted the beneficial aspect of self-determined motivation and the close interrelationship between motivation and cognition in the development of high-level athletes. Additionally, results suggested that longitudinal research is needed to investigate causal relations and changes in psychological constructs, and that there is a need to ensure acceptable psychometric properties of measurement instruments to successfully study these constructs.

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## **Paper I-IV**



## **Paper I**

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## **Paper II**

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# Exhaustion Experiences in Junior Athletes: The Importance of Motivation and Self-Control Competencies

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Quality of motivation, self-control competencies, as well as past performance experience influence sport participation outcomes in developing athletes. Studies have shown that junior athletes high in self-determined motivation are less prone to experience burnout, while self-control competencies help developing athletes to be conscious and deliberate in their self-regulatory efforts toward elite sport performances and avoid negative sport participation outcomes. Combining the self-determination theory framework and psychosocial theories of self-regulation, the aim of this cross-sectional study was to examine how various types of motivation and self-control competencies together are associated with the development of burnout symptoms in junior athletes. High-level Norwegian winter-sport athletes from elite sport academies ( $N = 199$ ; female  $n = 72$ ; 16–20 years of age) consented to participate. Associations between six types of motivational regulation, self-control, and indices of exhaustion were investigated. We hypothesized that athletes' self-control competencies are important to operate successfully, and influenced by different types of motivation, they are expected to help athletes avoid negative sport participation outcomes such as emotional and physical exhaustion. Structural equation modeling analyses were conducted to analyze these relationships, and results revealed some multifaceted associations. When identifying antecedents of sport participation exhaustion and burnout, there is a need to go beyond the unique framework of motivation theories, and explore what cognitive competencies ensure fulfillment of motivation desires. In the current study, differences in junior athletes' quality of motivation influenced self-control competencies when predicting exhaustion. Interestingly, young athletes driven by self-determined (intrinsic, integrated, and identified), and controlled (introjected and amotivation) regulations in association with self-control offered the strongest negative and positive associations with exhaustion, respectively. Findings clearly indicate that motivation and self-control competencies are meaningfully interrelated when assessing burnout propensity in young developing athletes.

**Keywords:** motivation regulations, self-control, exhaustion, ego-depletion, junior athletes, elite sport development

## INTRODUCTION

In Norway, talented junior athletes often attend elite sport academies (e.g., The Norwegian College of Elite Sport), to help facilitate the combination of education and elite sport development, while also preventing overload and maladaptive outcomes such as burnout. Within these academies, athletes belong to an environment focusing on development of expertise and psychological competencies necessary for competing at the highest level. The beginning of the winter-sport season is a key time point where athletes focus on demonstrating competencies. That is, they try to establish themselves as contenders in their sport. This also corresponds to the end of the high school semester where major tests and exams are scheduled. As academies are located in different parts of the country, athletes will often experience challenging situations with limited family support. Hence, the quality of motivation to pursue a sporting career will likely affect developmental outcomes and performance level during these years of athletic development (Ericsson, 2007).

Self-determination theory (SDT; Deci and Ryan, 1985; Ryan and Deci, 2000) states that athletes can be moved and inspired to practice sports by two broader types of motivation, namely self-determined and controlled forms of motivation. Within these broader types, SDT describes motivational regulations along a continuum, ranging from three types of self-determined regulations namely intrinsic, integrated, and identified; two types of controlled regulations, namely introjected and external; and one referring to the absence of regulation namely amotivation. Self-determined forms of motivation refer typically to engagement in an activity driven by fun, genuine interest, personal values, and importance of the activity. More controlled forms of motivation refer to individuals driven by pressure, prods, and external reward (Ryan and Deci, 2000).

Full-time engagement in sport is time-consuming and strenuous, and the importance of engagement due to self-determined reasons is key to healthy youth sport development (Ryan and Deci, 2000). When driven by controlled forms of motivation over a long period of time in combination with increasing signs of amotivation, athletes become more at risk for negative sport participation outcomes such as overtraining and burnout (Lemyre et al., 2007). Though, research agrees that higher levels of self-determined forms of motivation generally increase chances to succeed and reach the elite level of sports (Gillet et al., 2013), some findings prove that title and medal holders can also be driven by higher levels of non-self-determined forms of motivation and amotivation in comparison to less successful athletes (Chantal et al., 1996). Thus, there is an ongoing need to explore the multidimensionality and complexity of motivation and acknowledge the contribution of different motivational regulations within athletes' motivational profiles believed to influence long-term development. For example, Gillet et al. (2012) found that a profile high in self-determined and controlled forms of motivation resulted in the best performances, but this profile co-occurred with higher levels of exhaustion. As such, motivational profiles composed of moderate to high levels of self-determined and moderate levels of controlled forms of motivation might engender both high-level performances

and the best psychological adjustment over time (Martinet and Decret, 2015). However, it is important to note that a pure self-determined motivation profile may not exist in highly competitive and achievement driven sports contexts (Gillet et al., 2009). An examination of the functionality of each motivational regulation relative to other psychological competencies is warranted to predict success. For example, self-regulatory competencies are important for having a long-term perspective and stay focused through prolonged efforts for reaching personal goals (Tangney et al., 2004). Nurtured by motivational feelings and beliefs, self-regulatory competencies refer to athletes thoughts, feelings, and actions developed for the achievement of personal goals (Zimmerman, 1989). Specifically, autonomously motivated self-regulation involves less contradictory thoughts and feelings of conflict and are likely more energizing, whereas feeling pressured to self-regulate may provoke depletion and experiences of exhaustion longitudinally (Muraven, 2008; Tuk et al., 2015).

Self-regulation has been conceptualized as the interplay between controlled and impulsive processes, and has often been confused with self-control (Milyavskaya et al., 2015). Self-control is the effortful subset of self-regulation (Baumeister et al., 2007), defined as the effortful inhibition of impulses or the overcoming of temptations (Milyavskaya et al., 2015). Differences in degree of self-control may lead to both positive (e.g., happiness, more healthy living) and negative (e.g., psychopathological symptoms) outcomes (Tangney et al., 2004). Thus, self-control describes individuals' capacity to consciously adjust responses toward self- or other-imposed standards (Baumeister et al., 2007). As such, it often represents a conflict between the two closely interacting brain systems controlling emotional and reflexive versus cognitive and reflective thoughts, respectively (Mischel, 2014). When confronted with conflicts between these systems, only one of them can be satisfied at a time, and an exhausting self-control dilemma may emerge. Conversely, a successful resolution of these conflicts enable athletes to effectively resist temptations and conform to requirements in the efforts to accomplish important goals. Athletes' capacity to engage in effective self-control (e.g., stay true to future plans, work toward goals) varies (Tangney et al., 2004), it requires a great deal of mobilization and energy, and thus may be depleted like a working "muscle" (Baumeister et al., 2007; Fujita, 2011). As such, self-control is likely dependent of limited resources, potentially inducing short-term impairments (ego-depletion) in subsequent self-control efforts. Ego-depletion followed by inadequate recovery has been linked to major negative outcomes such as underachievement and decreased performance, as people within this state may be unable to control themselves effectively (Baumeister and Vohs, 2016). Attaining certain goals by mean of self-control competencies may not necessarily lead to adaptive or functional athletic development (Fujita, 2011). For example, controlling oneself to consistently practice sports without adequate preparation and recovery will likely result in maladaptive development over time. Severely tired athlete will express lower self-control capacity and are more vulnerable to fatigue and ultimately burnout (Baumeister et al., 2007).

Investigating the effects of a self-regulation intervention in student-athletes, Dubuc-Charbonneau and Durand-Bush (2015) found that higher self-regulatory capacity was associated with reduced symptoms of burnout. Burnout in sport has been conceptualized as a multidimensional construct consisting of three dimensions: (a) emotional/physical exhaustion, (b) reduced sense of accomplishment, and (c) sport devaluation (Raedeke and Smith, 2001). These dimensions are characterized by feelings of emotional and physical fatigue caused by training and competition stressors; inefficacy and a tendency to evaluate oneself negatively; and finally negative and detached attitudes toward sports and lack of sport and performance quality concerns, respectively. Associations between athletes' motivational regulations and burnout propensity have been carefully investigated (e.g., Lemyre et al., 2006; Lonsdale et al., 2009), and negative motivational trends have been associated with increased burnout scores. Being driven by high quality motivation will help developing athletes to flourish and excel, especially when engaged in high-level sports and education simultaneously (Martinent and Decret, 2015). Research has suggested that young student-athletes are at risk for burnout due to the high emotional, physical, and psychosocial demands inherent to their situation (Isoard-Gautheur et al., 2013). Adequate self-control competencies combined with optimal forms of motivation may help athletes avoid burnout symptoms as they get more practice experiences in the ongoing pursuit toward elite level performances.

Relevant practice experiences over time influences athletes' development and chances to successfully reach the elite level (Ericsson, 2013). Interestingly, some people with unique qualities have been found to reach world-class performance within 6 years (Ericsson, 2006). In addition to practice experiences, the nature of elite competitions and competitive experiences provide athletes with psychological skills necessary for success (Gould et al., 2002). These skills develop throughout an athlete's career, as athletes with more competitive experiences have a greater chance of learning key psychological skills necessary for success (e.g., appropriate focus, self-control). In Norway, children are allowed to compete at the age of six, while they cannot be ranked before they are 11 years old in most sports. Hence, from the age of eleven they will acquire the more genuine experiences of skiing competitions in Norway. However, junior athletes developing exceptional skills will likely struggle without motivation as well as self-control to train and compete at the highest level. These concepts have been extensively studied in the sport context, but

no study has addressed the complexity of athletes' motivation in association with the quality of self-control competencies to predict sport participation outcomes. As such, the current study examines associations between the type of motivation, self-control, and symptoms of burnout in junior Norwegian winter sport athletes (Figure 1). We hypothesized that the associations between athletes' self-control competencies and symptoms of burnout are dependent on different motivational regulations. That is, more self-determined types of motivation will energize self-control competencies, and when combined they will yield a negative association to burnout. On the other hand, more controlled forms of motivation will induce ego-depletion and offer a positive association to burnout.

## MATERIALS AND METHODS

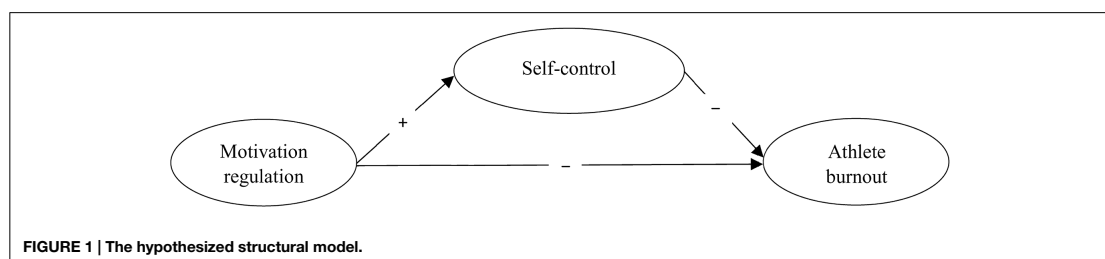
### Participants

A total of 199 winter sport athletes (123 male, 72 female, and 4 did not report gender; 16–20 years of age,  $M = 17$ ,  $SD = 0.97$ ) attending elite sport colleges in Norway consented to participate. Participants provided written informed consent in accordance with the Declaration of Helsinki. Athletes competed in cross-country skiing ( $n = 51$ ), biathlon ( $n = 68$ ), ski jumping ( $n = 53$ ), alpine skiing ( $n = 22$ ), and some athletes ( $n = 5$ ) did not indicate their main sport. Competitive experiences ranged from 1 to more than 15 years ( $M = 6.83$  years), and athletes competed at international ( $n = 23$ ), national ( $n = 153$ ), or regional levels ( $n = 17$ ).

### Measures

#### Motivation

The Sport Motivation Scale II (SMS-II; Pelletier et al., 2013) measured athletes' motivational regulations, and response options ranged from 1 (*does not correspond at all*) to 7 (*corresponds completely*). The questionnaire was translated using the translation-back translation method (Brislin, 1970). That is, the first author familiar with both languages translated the original questionnaire, and two bilingual colleagues performed back translation. Then, the back translated questionnaires were compared, checked for equivalence to the original questionnaire, and necessary adjustments were made. Further, latent variable modeling was used to evaluate scale reliability [coefficient  $\rho$ ], and validity coefficients in the structural equation modeling (SEM) analyses added reliability information (see Table 1; Brown,



**TABLE 1 | Descriptive statistics and correlations for the study variables<sup>2</sup>.**

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
(1) INT	5.98	0.92	0.91							
(2) INE	5.63	1.03	0.78***	0.91						
(3) IDE	5.45	1.05	0.72***	0.69***	0.89					
(4) INR	4.40	1.24	0.40**	0.64***	0.44**	0.87				
(5) EXT	2.32	1.04	-0.18	0.06	0.03	0.54***	0.91			
(6) AMO	2.39	1.51	-0.55***	-0.48***	-0.10	0.13	0.55***	0.93		
(7) SC	3.60	0.64	0.42***	0.23*	0.21	-0.29*	-0.41***	-0.51***	0.92	
(8) EX	1.98	0.77	-0.31**	-0.18	0.04	0.14	0.40***	0.41***	-0.51***	0.94

INT, Intrinsic regulation; INE, Integrated regulation; IDE, Identified regulation; INR, Introjected regulation; EXT, External regulation; AMO, Amotivation; SC, Self-control; EX, Exhaustion. Motivation regulation, self-control, and exhaustion mean validity coefficients at the diagonal (recommended score >0.80; Brown, 2006). \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

<sup>2</sup>Correlations were performed in Mplus version 7.31. Means of latent variables are zero in cross-sectional studies; hence, descriptive statistics was performed in IBM SPSS Statistics 21.

2006; Raykov, 2009). Assumptions for alpha reliability are likely violated in empirical research (Raykov, 2009; Yang and Green, 2011), thus alternative reliability scores were evaluated in the current study as more accurate reflections of reliability. The assessed regulations were intrinsic (three items,  $\rho = 0.73$ ; 95% CI = [0.64–0.81]; SE = 0.04; e.g., “because it is very interesting to learn how I can improve”), integrated (three items,  $\rho = 0.68$ ; 95% CI = [0.57–0.78]; SE = 0.06; e.g., “because participating in sport is an integral part of my life”), identified (three items,  $\rho = 0.72$ ; 95% CI = [0.63–0.80]; SE = 0.04; e.g., “because I have chosen this sport as a way to develop myself”), introjected (three items,  $\rho = 0.61$ ; 95% CI = [0.51–0.71]; SE = 0.05; e.g., “because I feel better about myself when I do”), external (three items,  $\rho = 0.65$ ; 95% CI = [0.52–0.75]; SE = 0.05; e.g., “because people around me reward me when I do”), and amotivated (three items,  $\rho = 0.82$ ; 95% CI = [0.76–0.87]; SE = 0.03; e.g., “it is not clear to me anymore, I don’t really think my place is in sport”).

### Self-Control (SC)

A Norwegian version of the Brief Self-Control Scale (BSCS; Tangney et al., 2004) assessed the athletes’ dispositional SC abilities (12 items,  $\rho = 0.83$ ; 95% CI = [0.79–0.87]; SE = 0.02; e.g., “I am good at resisting temptations”). Response options ranged from 1 (*not at all*) to 5 (*very much*). Items 2, 3, 4, 5, 7, 9, 10, 12, and 13 were reverse scored (Tangney et al., 2004). Item 6 was deleted due to low factor loading (< 0.50; Kline, 2011).

### Athlete Burnout

A Norwegian version (Lemyre et al., 2006) of the Athlete Burnout Questionnaire (ABQ; Raedeke and Smith, 2001) assessed athlete burnout. The ABQ is a sport-specific multidimensional measure composed of three subscales measuring emotional and physical exhaustion (ABQE; five items,  $\rho = 0.85$ ; 95% CI = [0.81–0.90]; SE = 0.02; e.g., “I feel ‘wiped out’ from [sport]”), reduced sense of accomplishment (ABQR; five items,  $\rho = 0.72$ ; 95% CI = [0.64–0.79]; SE = 0.04; e.g., “I am not achieving much in [sport]”), and sport devaluation (ABQD; five items,  $\rho = 0.77$ ; 95% CI = [0.72–0.82]; SE = 0.03; e.g., “I’m not into [sport] like I used to be”). Response options ranged from 1 (*almost never*) to 5 (*almost always*). Items 1 and 14 were reverse scored.

### Procedures

Subsequent to approval by the Norwegian Centre for Research Data (NSD), national ethical standard procedures were followed for the protection of research participants. In the recruitment phase, sports directors at elite sport colleges in Norway were contacted, and following approval from these directors athletes were invited to participate. The information letter, declaration of consent, and questionnaires were delivered and returned by e-mail and mail, and the survey was arranged at the beginning of the competitive season. Hence, data collection was completed when athletes experienced a challenging period (e.g., they wanted to prove sport performance progress) and the concepts under study are especially meaningful.

### Statistical Analyses

Confirmatory Factor Analyses (CFA) in Mplus Version 7.31 (Muthén et al., 1998–2016) were performed, and variables’ model fit evaluated. That is, six motivational regulations tested individually, self-control composed of six parcels, and athlete burnout composed of three indicators’ (i.e., emotional and physical exhaustion, reduced sense of accomplishment, and sport devaluation) represented the latent variables motivation, self-control, and burnout. Parceling self-control items to manifest indicators by means of the balancing approach is advantageous due to psychometric characteristics and model estimation procedures (Little, 2013). Model identification was achieved by fixing one item-factor loading per latent variable to 1.0, and model fit was determined by various Goodness-of-fit (GOF) indices (Kline, 2011; Byrne, 2012): the  $\chi^2$ , RMSEA combined with its 90% CI, CFI, and the SRMR. Traditional cutoff criteria (CFI: 0.90–0.99, RMSEA: 0.08–0.05, and SRMR  $\leq$  0.08) indicated acceptable fit (Brown, 2006; Little, 2013, p. 109). However, researchers must use caution using these GOF indices, aiming for modification indices (MI) < 10, and ideally, factor loadings > 0.50 (Brown, 2006; Kline, 2011; Byrne, 2012). Missing data (< 5.0%) were handled using the full information maximum likelihood (FIML) estimation, and analyses were performed using the robust MLR-estimator (Enders, 2010).

First, using SEM analyses, we examined associations between motivational regulations, self-control and athlete burnout among

athletes in the total sample, testing the indirect effect of self-control in the motivation to burnout association. Though, it has been debated whether a mediation model based on cross-sectional data without the possibility of looking at longitudinal causal effects is valuable (Jose, 2016). However, the ordering of variables is based on previous research (e.g., Lemyre et al., 2006; Mischel, 2014). That is, self-determined types of motivation are likely to increase athletes' self-control capacity and hence result in decreased symptoms of burnout, and conversely, controlled types of motivation are likely to decrease athletes' self-control capacity and hence result in negative development and increased symptoms of burnout. Additionally, the resampling procedure called bootstrapping used in the current study has recently showed valid results (Hayes, 2009), and is preferred above the Sobel's test because it is more informative (Hayes and Scharkow, 2013; Jose, 2016).

## RESULTS

In the SEM analyses, three indicators were specified defining the motivation regulations and burnout latent constructs, thereby meeting indicator requirements for one-factor models (Brown, 2006). Evaluating fit indices for the six motivational regulations model resulted in acceptable fit,  $\chi^2(120) = 209.91, p < 0.05$ , RMSEA = 0.06, 90% CI [0.05, 0.08], SRMR = 0.08, and CFI = 0.90. However, due to this model's complexity and the sample size of the current study, the motivation regulations were evaluated individually in six different models (Kline, 2011). In the resulting six one-factor models for motivation regulations the GOF evaluation does not apply because these models are just-identified (Brown, 2006). However, models were evaluated based on interpretability and strength of parameter estimates (factor loadings), ranging from 0.39 to 0.90, explaining 15–80% of the variance. The latent construct representing self-control (parcels)<sup>1</sup> showed good fit,  $\chi^2(9) = 15.87, p > 0.05$ , RMSEA = 0.06, 90% CI [0.00, 0.11], SRMR = 0.03, and CFI = 0.97. Evaluating model fit for the burnout subscales individually, the exhaustion and reduced sense of accomplishment burnout subscales showed acceptable fit,  $\chi^2(5) = 9.32, p > 0.05$ , RMSEA = 0.07, 90% CI [0.00, 0.13], SRMR = 0.03, and CFI = 0.98; and,  $\chi^2(5) = 10.98, p > 0.05$ , RMSEA = 0.08, 90% CI [0.00, 0.14], SRMR = 0.05, and CFI = 0.94, respectively. However, the devaluation subscale showed non-acceptable fit,  $\chi^2(5) = 29.05, p < 0.05$ , RMSEA = 0.16, 90% CI [0.11, 0.22], SRMR = 0.06, and CFI = 0.86, and hence was excluded from further analyses. Thus, based on conceptual arguments that self-control is more related to depletion patterns (Baumeister and Vohs, 2016), the reduced sense of accomplishment burnout subscale was excluded from the analyses, and motivation regulation → self-control → emotional and physical exhaustion associations were evaluated.

Table 1 presents correlations between the study variables and descriptive statistics. Self-control and intrinsic, integrated, and

identified regulations were positively associated; and negatively associated with exhaustion. Introjected and external regulations, and amotivation were negatively associated with self-control; and positively associated with exhaustion. Additionally, self-control and exhaustion were negatively associated. Further, mean scores were high for intrinsic, integrated, and identified regulations; moderate for introjected regulation and self-control; and low for external regulation, amotivation, and exhaustion.

Model fit results for the structural equation models are presented in Table 2. This table additionally presents model fit results for the 95% bias-corrected CI derived from 10,000 resamples (Hayes and Scharkow, 2013), examining direct and indirect effects between latent construct. Total effects are reported as the unmediated associations between motivation and exhaustion, direct effects as the mediated associations between motivation and exhaustion, and indirect effects as the estimated effect of self-control in the motivation → exhaustion association (Jose, 2016). Further, effects evaluated in the current study are often evident only in the estimate's confidence interval and not in the *p*-value. Thus, note that *p*-values are sample size sensitive and researchers need to evaluate additional criteria when judging the importance of findings (Ivarsson et al., 2013). In the first SEM analysis testing intrinsic regulation → self-control → exhaustion associations, standardized showed significant total and indirect effects (estimate = -0.28, SE = 0.11, 95% CI [-0.49, -0.05], *p* = 0.014; and estimate = -0.19, SE = 0.06, 95% CI [-0.35, -0.10], *p* = 0.002; respectively), and a non-significant direct effect (estimate = -0.09, SE = 0.13, 95% CI [-0.34, 0.16], *p* = 0.508). In the second structural model testing integrated regulation → self-control → exhaustion associations, standardized results showed non-significant total and direct effects (estimate = -0.17, SE = 0.10, 95% CI [-0.36, 0.04], *p* = 0.095; and estimate = -0.06, SE = 0.10, 95% CI [-0.24, 0.13], *p* = 0.546, respectively), though a significant indirect effect

TABLE 2 | Structural and bootstrapped model results.

Model	$\chi^2(df)$	<i>p</i> -value	RMSEA	90% CI	SRMR	CFI
1 Structural	110.92(74)	0.0035	0.05	[0.03, 0.07]	0.06	0.95
1 Bootstrapped	125.44(74)	0.0002	0.06	[0.04, 0.08]	0.06	0.95
2 Structural	113.52(74)	0.0021	0.05	[0.03, 0.07]	0.05	0.95
2 Bootstrapped	119.58(74)	0.0006	0.06	[0.04, 0.07]	0.05	0.95
3 Structural	92.94(74)	0.0675	0.04	[0.00, 0.06]	0.05	0.98
3 Bootstrapped	98.17(74)	0.0316	0.04	[0.01, 0.06]	0.05	0.97
4 Structural	115.67(74)	0.0014	0.05	[0.03, 0.07]	0.07	0.94
4 Bootstrapped	126.62(74)	0.0001	0.06	[0.04, 0.08]	0.07	0.94
5 Structural	95.04(74)	0.0503	0.04	[0.00, 0.06]	0.05	0.97
5 Bootstrapped	103.59(74)	0.0132	0.05	[0.02, 0.06]	0.05	0.97
6 Structural	96.67(74)	0.0397	0.04	[0.01, 0.06]	0.05	0.97
6 Bootstrapped	104.84(74)	0.0106	0.05	[0.02, 0.07]	0.05	0.97

Model 1, Intrinsic regulation → Self-control → Exhaustion; Model 2, Integrated regulation → Self-control → Exhaustion; Model 3, Identified regulation → Self-control → Exhaustion; Model 4, Introjected regulation → Self-control → Exhaustion; Model 5, External regulation → Self-control → Exhaustion; Model 6, Amotivation → Self-control → Exhaustion. We used the MLR-estimator in Structural models, and 95% bias-corrected bootstrap CI derived from 10,000 resamples in bootstrapped models.

<sup>1</sup>The original version of the self-control scale showed non-acceptable fit,  $\chi^2(54) = 118.60, p < 0.05$ , RMSEA = 0.08, 90% CI [0.06, 0.10], SRMR = 0.06, and CFI = 0.86.



(estimate =  $-0.11$ , SE =  $0.06$ , 95% CI [ $-0.24$ ,  $-0.02$ ],  $p = 0.040$ ). In the third structural model testing identified regulation  $\rightarrow$  self-control  $\rightarrow$  exhaustion associations, standardized results showed non-significant total and direct effects (estimate =  $0.05$ , SE =  $0.10$ , 95% CI [ $-0.14$ ,  $0.24$ ],  $p = 0.586$ ; and estimate =  $0.17$ , SE =  $0.09$ , 95% CI [ $-0.02$ ,  $0.35$ ],  $p = 0.075$ , respectively), and a significant indirect effect (estimate =  $-0.11$ , SE =  $0.07$ , 95% CI [ $-0.26$ ,  $-0.01$ ],  $p = 0.083$ ). In the fourth structural model testing introjected regulation  $\rightarrow$  self-control  $\rightarrow$  exhaustion associations, standardized results showed non-significant total and direct effects (estimate =  $0.15$ , SE =  $0.12$ , 95% CI [ $-0.06$ ,  $0.39$ ],  $p = 0.206$ ; and estimate =  $-0.01$ , SE =  $0.11$ , 95% CI [ $-0.20$ ,  $0.22$ ],  $p = 0.907$ , respectively), though a significant indirect effect (estimate =  $0.16$ , SE =  $0.06$ , 95% CI [ $0.06$ ,  $0.32$ ],  $p = 0.013$ ). In the fifth structural model testing external regulation  $\rightarrow$  self-control  $\rightarrow$  exhaustion associations, standardized results showed significant total, direct, and indirect effects (estimate =  $0.41$ , SE =  $0.09$ , 95% CI [ $0.24$ ,  $0.58$ ],  $p = 0.000$ ; estimate =  $0.25$ , SE =  $0.11$ , 95% CI [ $0.03$ ,  $0.46$ ],  $p = 0.023$ ; and estimate =  $0.16$ , SE =  $0.05$ , 95% CI [ $0.08$ ,  $0.29$ ],  $p = 0.002$ , respectively). Finally, in the sixth structural model testing amotivation  $\rightarrow$  self-control  $\rightarrow$  exhaustion associations, standardized results showed significant total and indirect effects (estimate =  $0.39$ , SE =  $0.09$ , 95% CI [ $0.21$ ,  $0.56$ ],  $p = 0.000$ ; and estimate =  $0.21$ , SE =  $0.06$ , 95% CI [ $0.10$ ,  $0.36$ ],  $p = 0.001$ , respectively), though non-significant direct effects (estimate =  $0.19$ , SE =  $0.12$ , 95% CI [ $-0.06$ ,  $0.43$ ],  $p = 0.134$ ).

## DISCUSSION

In the current study, motivational regulations and self-control competencies were combined to look at the association with emotional and physical exhaustion. Direct associations among motivation and burnout subscales have been tested previously (e.g., Lemyre et al., 2006), and the depletion effect of self-control has recently been extensively debated (e.g., Carter et al., 2015; Baumeister and Vohs, 2016; Hagger and Chatzisarantis, 2016). Interestingly, there has been suggestions that ego-depletion effects following acts of self-control are related to individuals type of motivation (e.g., Inzlicht and Schmeichel, 2012). However, these associations have not been studied in-depth. An examination of the indirect effect of self-control on the motivation to exhaustion association offers the potential to extend our current state of knowledge on processes affecting burnout propensity in young developing athletes. As such, analyses investigated whether the functionality of self-control was dependent on types of motivation regulation (e.g., intrinsic vs. external), and whether associations between motivation and self-control competencies generate negative outcomes such as exhaustion experiences in junior athletes.

In general, athletes reported high levels of self-control and self-determined motivation (i.e., intrinsic, integrated, and identified regulations), moderate levels of introjected regulation, and low levels of external regulation, amotivation, and exhaustion. Consistent with former research (Li et al., 2013), higher levels

of self-determined regulations were negatively associated with exhaustion, whereas more controlled types of motivational regulation (amotivation, introjected, and external regulations) were positively associated with exhaustion. Noteworthy, the identified motivation regulation was positively associated with exhaustion. This is not in line with previous research (e.g., Lonsdale et al., 2009), and reflects that highly competitive elite sport performers may show a different motivational profile compared to performers in other contexts (Gillet et al., 2009).

Direct motivation to exhaustion associations remained, respectively, negative and positive when testing self-determined (intrinsic and integrated) and controlled (external and amotivation) forms of motivation regulation. Further, the identified and introjected regulations were, respectively, positively and negatively associated with exhaustion in the direct association. These results are conceptually (Ryan and Deci, 2000) and scientifically (e.g., Lonsdale et al., 2009) different from former publications, reasonably due to the powerful self-control indirect effect. Combined with self-determined forms of motivation (i.e., intrinsic, integrated, and identified regulations) self-control was negatively associated with exhaustion, and combined with controlled forms of motivation, self-control was positively associated with exhaustion. Interestingly, the external regulation persistently showed a significant negative direct association to exhaustion, whereas the intrinsic, integrated, identified, introjected, and amotivation regulations were more complex as they showed the most powerful and significant associations with exhaustion through self-control. The most and the least self-determined types of motivation are strong predictors and reflect humans' natural propensity to learn and assimilate, on the one side, and to be externally controlled without true self-regulation, on the other (Ryan and Deci, 2000). The most self-determined forms of motivation are characterized by fun, intrinsic interest, and enjoyment, while the least self-determined forms of motivation are associated with a lack of control and intention, and engagement due to external reward. Even though these types of motivation are strong individual predictors, it seems that in the current study they are more influenced by athletes' cognitive competencies and not solely responsible for an athlete's initiatives. Conversely, integrated, identified, and introjected regulations are characterized by personal importance, conscious valuing, and engagement due to internal reward (Ryan and Deci, 2000). Intuitively and in accordance with current study findings, they seem to be more influenced by self-control competencies, reflecting the necessity of self-regulatory efforts to successfully operate. Thus, as self-control competencies combined with self-determined motivation are negatively related to exhaustion, this might suggest that self-control does not automatically cause depletion patterns (Carter et al., 2015; Baumeister and Vohs, 2016; Hagger and Chatzisarantis, 2016).

Extensive interest in studying self-control among social psychologists began in the early 2000s (Inzlicht and Schmeichel, 2012), when Baumeister et al. (1998) introduced the strength model of self-control. In their model, self-control is relying on limited physiological and cognitive resources, thus acts of self-control lead to depletion (i.e., ego-depletion). However, recent research has questioned the ego-depletion effect, and

findings suggest that this effect seems clearer when self-control is executed sequentially rather than executed on several tasks simultaneously (Tuk et al., 2015). Furthermore, studying psychological phenomena in laboratory experimental research settings might have been limiting and may be the cause for some vague findings (Carter et al., 2015; Baumeister and Vohs, 2016). Thus, research needs to provide a more nuanced picture on whether self-control and executive functions deplete individuals' physiological and cognitive resources, and the suggestion that patterns of depletion are influenced by individuals' motivational regulations appear promising (Inzlicht and Schmeichel, 2012). In the current study, self-control combined with more controlled forms of motivation (introjected, external, and amotivation) were linked to symptoms of exhaustion and eventually depletion patterns. These findings suggest that high self-control capacity combined with self-determined forms of motivation helps junior athletes avoid maladaptive experiences of overload and burnout. Athletes may experience more successful recovery and lower levels of stress due to self-control and other cognitive competencies, which enables a better adjustment and possibly lower vulnerability of burnout experiences (Martinent and Decret, 2015). Thus, athletes high in self-determined forms of motivation and self-control may resist temptations and stay with practice activities and long-term goals in order to achieve delayed gratifications in the form of good health, development, and eventually great performances (Tangney et al., 2004). However, understanding the complexity of motivation needs further elaborations on exploring the various forms of motivation regulation in detail. For example, why does the direct link between introjected and identified regulations with exhaustion end up slightly negative and positive, and why did indirect effects of self-control result in positive and negative associations toward the maladaptive outcome of exhaustion? Results seem to emphasize that in order to understand how self-control is facilitated by motivational desires require a detailed and inclusionary examination of these related concepts (Baumeister, 2016). In summary, results confirm our hypothesis that self-control competencies seem to depend on the type of motivation initiating behaviors, and when investigating patterns of human motivation researchers need to consider humans' executive functioning (Vohs et al., 2014).

Exercised successfully, individuals' self-control capacity seems to be dependent on the type of motivation initiating behaviors. This underlines the complexity of motivation in highly competitive samples. For example, how controlled types of motivation inspire self-control competencies and increase the vulnerability for exhaustion experiences (Gillet et al., 2009, 2012). This complexity may originate in the fact that athletes' performance motivation contain self-determined and controlled forms of motivation simultaneously (Martinent and Decret, 2015). On the one side, athletes strive to reach the elite level of performance because it is intrinsically interesting and fun, and on the other side, they want to prove that they are skillful and strive for acceptance and recognition from others (Ryan and Deci, 2000). As such, successful athletes seem to use the interaction between various forms of motivation and cognitive competencies in their ongoing drive for outstanding results. Athletes' type of

motivation originates in basic drives to develop successfully, and self-control and other cognitive competencies further facilitate athletes' motivation (Hofmann et al., 2012; Baumeister, 2016). Though, experiences of burnout may develop over time (Madigan et al., in press), and the contribution of various motivational regulations combined with self-control competencies reflects that athletes are walking a fine line when it comes to developmental outcomes. Thus, high levels of motivation might increase the risk for exhaustion and burnout experiences over time (Lemyre et al., 2008). Athletes driven by moderate levels of self-determined and controlled motivation simultaneously might be especially vulnerable for psychological maladjustment, as they might experience more sport-specific stress, symptoms of burnout, and additionally poor overall recovery (Martinent and Decret, 2015).

In summary, results from the current study reaffirm the importance of quality of motivation when examining exhaustion experiences and athlete burnout (Cresswell and Eklund, 2005), and show important contributions of self-control in the relationship between these facets of performance. In a more nuanced perspective, findings suggest that self-determined types of motivation energize athletes' cognitive competencies and negatively predict exhaustion, though the order and direction of these associations need to be further evaluated through longitudinal research. The relationship between motivation and burnout may be reciprocal, and are likely influenced by athletes' personal disposition (Madigan et al., in press). As such, motivation and self-control competencies should be considered in junior athlete development in order to prevent maladaptive sport participation outcomes.

## Limitations

While this study makes a unique contribution to the literature, findings should be interpreted with caution given the study's cross-sectional nature, its limited sample size, and self-reported data (Breckler, 1990; Podsakoff et al., 2003; Jose, 2016). Based on the cross-sectional data, the causality of effects investigated could not be stated (Jose, 2016). That is, temporality between variables is the only true way to assess causality, as the independent variable occurs before the mediator, and the mediator occurs before the dependent variable. However, the preferred ordering presented in this article is based on prior research investigating associations between motivation and athlete burnout (e.g., Lemyre et al., 2006), and the evidence that self-control capacity may result in successful or unsuccessful development (Tangney et al., 2004; Mischel, 2014). Further, translation of the SMS-II may have caused linguistic or cultural misinterpretations (Benítez et al., 2016), and the wording of items is not necessarily suitable in a highly competitive Norwegian winter sport context (e.g., item 1, "because it gives me pleasure to learn more about my sport"). In addition, the self-control and ABQs included reverse scored items and may cause method bias (Podsakoff et al., 2003); and some subscales' validities were questionable (3 out of 10 reliability coefficients were marginal, ranging from 0.61 to 0.68; see "Materials and Methods" section). The self-control and the sport devaluation subscale of the ABQ showed some limitations when it comes to factor structure, as they initially

did not reflect acceptable model fit. A careful investigation of these questionnaires in junior athletes is wanted. The BSCS's unidimensionality and validity has previously been investigated (e.g., Maloney et al., 2012; Toering and Jordet, 2015), however, results from the current study suggest that further revisions might be needed. In the current study, high factor determinacies (ranging from 0.87 to 0.94; recommended value >0.80) reflected that the factors (i.e., latent constructs) were well measured and acceptable (Muthén et al., 1998-2016; Brown, 2006).

### Future Directions

The model investigated in the current study is novel, but its cross-sectional nature leads to some limitations. Future research needs to investigate associations longitudinally, involving temporality in the mediation analysis. Only then, the causal processes among variables will be truly investigated, and the placement of variables will guide the temporal relations (Jose, 2016). Additionally, examining factor structures of established questionnaires' reliability and validity may reveal fragile instruments (Clark and Watson, 1995), and based on results from the current study the athlete burnout and self-control questionnaires need to be further evaluated and validated in a Norwegian youth sport setting. Investigating the combination of motivation regulations and cognitive competencies, and going beyond laboratory settings to investigate the self-control depletion phenomenon in elite sport natural settings, is important to understand the complexity of youth sport development (Baumeister, 2016; Baumeister and Vohs, 2016). Further, findings from the current study suggest that athletes' motivation will benefit from well-developed self-control competencies. As such, longitudinal studies in the domain of individual and team sports are required to extend these findings, and look into athletes' self-control

competencies to better understand the causes of self-control depletion.

### CONCLUSION

This study showed that various types of motivation combined with self-control competencies are central concepts when identifying antecedents of exhaustion and ego-depletion experiences in junior athletes. The outcome of exercising self-control seems to depend on the type of motivation initiating behaviors, and research needs to consider both a nuanced picture of athletes' motivation and their cognitive competencies to capture the complexity of youth sport development. Interestingly, the association between motivation, self-control competencies, and exhaustion was more significant compared to the association between motivation and exhaustion directly. As such, well-developed self-control competencies driven by self-determined motivation seem to offer great benefits for junior athletes.

### AUTHOR CONTRIBUTIONS

All authors listed, have made substantial, direct and intellectual contribution to the work, and approved it for publication.

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**Conflict of Interest Statement:** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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### **Paper III**

Jordalen, G., Lemyre, P.-N., Durand-Bush, N., & Ivarsson, A. (2017). *The temporal ordering of motivation and self-control: A cross-lagged effects model*. Manuscript submitted for publication.

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#### **Paper IV**

Jordalen, G., Lemyre, P.-N., Solstad, B. E., & Ivarsson, A. (2017). *The role of self-control and motivation on exhaustion in youth athletes: A longitudinal perspective*. Manuscript submitted for publication.

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## **Appendices**



## **Appendix I**

### Study I

Application to the Norwegian Centre for Research Data

Approval by the Norwegian Centre for Research Data

Information letter to participants and declaration of consent

*Note.* We concealed athletes' sport to keep anonymity.



## MELDESKJEMA

Meldeskjema (versjon 1.4) for forsknings- og studentprosjekt som medfører meldeplikt eller konsesjonsplikt (jf. personopplysningsloven og helseregisterloven med forskrifter).

1. Prosjekttittel		
Tittel	The Contribution of Motivation and Self-Regulatory Competencies to Elite Level Performances in Norwegian [REDACTED]	
2. Behandlingsansvarlig institusjon		
Institusjon	Norges idrettshøgskole	Velg den institusjonen du er tilknyttet. Alle nivå må oppgis. Ved studentprosjekt er det studentens tilknytning som er avgjørende. Dersom institusjonen ikke finnes på listen, vennligst ta kontakt med personvernombudet.
Avdeling/Fakultet	Seksjon for coaching og psykologi	
Institutt		
3. Daglig ansvarlig (forsker, veileder, stipendiat)		
Fornavn	Gro	Før opp navnet på den som har det daglige ansvaret for prosjektet. Veileder er vanligvis daglig ansvarlig ved studentprosjekt.  Veileder og student må være tilknyttet samme institusjon. Dersom studenten har ekstern veileder, kan biveileder eller fagansvarlig ved studiestedet stå som daglig ansvarlig. Arbeidssted må være tilknyttet behandlingsansvarlig institusjon, f.eks. underavdeling, institutt etc.  NB! Det er viktig at du oppgir en e-postadresse som brukes aktivt. Vennligst gi oss beskjed dersom den endres.
Etternavn	Jordalen	
Akademisk grad	Høyere grad	
Stilling	Stipendiat	
Arbeidssted	Norges Idrettshøgskole	
Adresse (arb.sted)	Postboks 4014 Ullevål Stadion	
Postnr/sted (arb.sted)	0806 Oslo	
Telefon/mobil (arb.sted)	23262351 / 99778965	
E-post	gro.jordalen@nih.no	
4. Student (master, bachelor)		
Studentprosjekt	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
5. Formålet med prosjektet		
Formål	Formålet med prosjektet er å undersøke betydningen av utøveres motivasjon og evne til selv-regulering for optimal utvikling og opprettholdelse av eliteprestasjoner.	Redegjør kort for prosjektets formål, problemstilling, forskningsspørsmål e.l.  Maks 750 tegn.
6. Prosjektomfang		
Velg omfang	<input type="radio"/> Enkel institusjon <input checked="" type="radio"/> Nasjonalt samarbeidsprosjekt <input type="radio"/> Internasjonalt samarbeidsprosjekt	Med samarbeidsprosjekt menes prosjekt som gjennomføres av flere institusjoner samtidig, som har samme formål og hvor personopplysninger utveksles.
Oppgi øvrige institusjoner	Norges teknisk-naturvitenskapelige universitet (NTNU) Olympiatoppen (OLT)	
Oppgi hvordan samarbeidet foregår	Studien det søkes godkjenning for er del av en doktorgrad (pnr. 35975). Studien er videre del av et større prosjekt i samarbeid med NTNU og OLT [REDACTED] og skal undersøke psykologiske faktorer for utvikling mot og opprettholdelse av eliteprestasjoner i [REDACTED]. Prosjektet forøvrig undersøker fysiologiske faktorer for utvikling av eliteprestasjoner, og studiene vil komplementere hverandre og bidra til mer helhetlig forståelse av utviklingen mot elitenivå innen idrett.	
7. Utvalgsbeskrivelse		

Utvalget	Toppidrettsutøvere på høyt internasjonalt nivå i ██████████	Med utvalg menes dem som deltar i undersøkelsen eller dem det innhentes opplysninger om. F.eks. et representativt utvalg av befolkningen, skoleelever med lese- og skrivevansker, pasienter, innsatte.
Rekruttering og trekking	Stipendiat under veiledning av førsteamanuensis Pierre-Nicolas Lemyre ved NIH vil rekruttere deltakere gjennom kontakt med OLT og NTNU.	Beskriv hvordan utvalget trekkes eller rekrutteres og oppgi hvem som foretar den. Et utvalg kan trekkes fra registre som f.eks. Folkeregisteret, SSB-registre, pasientregistre, eller det kan rekrutteres gjennom f.eks. en bedrift, skole, idrettsmiljø, eget nettverk.
Førstegangskontakt	Stipendiat og veileder vil begge delta i førstegangskontakt, dette ved å kontakte de aktuelle deltakere per e-post, og deretter med oppfølging per telefon.	Beskriv hvordan førstegangskontakten opprettes og oppgi hvem som foretar den.  Les mer om dette på våre temasider.
Alder på utvalget	<input type="checkbox"/> Barn (0-15 år) <input type="checkbox"/> Ungdom (16-17 år) <input checked="" type="checkbox"/> Voksne (over 18 år)	
Antall personer som inngår i utvalget	5	
Inkluderes det myndige personer med redusert eller manglende samtykkekompetanse?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Begrunn hvorfor det er nødvendig å inkludere myndige personer med redusert eller manglende samtykkekompetanse.
Hvis ja, begrunn		Les mer om Pasienter, brukere og personer med redusert eller manglende samtykkekompetanse

## 8. Metode for innsamling av personopplysninger

Kryss av for hvilke datainnsamlingsmetoder og datakilder som vil benyttes	<input type="checkbox"/> Spørreskjema <input checked="" type="checkbox"/> Personlig intervju <input type="checkbox"/> Gruppeintervju <input type="checkbox"/> Observasjon <input type="checkbox"/> Psykologiske/pedagogiske tester <input type="checkbox"/> Medisinske undersøkelser/tester <input type="checkbox"/> Journaldata <input type="checkbox"/> Registerdata <input type="checkbox"/> Annen innsamlingsmetode	Personopplysninger kan innhentes direkte fra den registrerte f.eks. gjennom spørreskjema, intervju, tester, og/eller ulike journaler (f.eks. elevmapper, NAV, PPT, sykehus) og/eller registre (f.eks. Statistisk sentralbyrå, sentrale helseregistre).
Annen innsamlingsmetode, oppgi hvilken		
Kommentar		

## 9. Datamaterialets innhold

Redegjør for hvilke opplysninger som samles inn	Opplysninger om utøvers motivasjon og evne for selv-regulering, og betydningen av dette for å nå og opprettholde eliteprestasjoner.	Spørreskjema, intervju-/temaguide, observasjonsbeskrivelse m.m. sendes inn sammen med meldeskjemaet.  NB! Vedleggene lastes opp til sist i meldeskjema, se punkt 16 Vedlegg.
Samles det inn direkte personidentifiserende opplysninger?	Ja <input checked="" type="radio"/> Nei <input type="radio"/>	Dersom det krysses av for ja her, se nærmere under punkt 11 Informasjonssikkerhet.
Hvis ja, hvilke?	<input type="checkbox"/> 11-sifret fødselsnummer <input checked="" type="checkbox"/> Navn, fødselsdato, adresse, e-postadresse og/eller telefonnummer	Les mer om hva personopplysninger er
Spesifiser hvilke	Navn, e-postadresse, telefonnummer,	NB! Selv om opplysningene er anonymiserte i oppgave/rapport, må det krysses av dersom direkte og/eller indirekte personidentifiserende opplysninger innhentes/registreres i forbindelse med prosjektet.
Samles det inn indirekte personidentifiserende opplysninger?	Ja <input checked="" type="radio"/> Nei <input type="radio"/>	En person vil være indirekte identifiserbar dersom det er mulig å identifisere vedkommende gjennom

Hvis ja, hvilke?	Kjønn, alder, sport, antall år engasjert i idrett, prestasjonsnivå, prestasjoner,	bakgrunnsopplysninger som for eksempel bostedskommune eller arbeidsplass/skole kombinert med opplysninger som alder, kjønn, yrke, diagnose, etc.
Samles det inn sensitive personopplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvis ja, hvilke?	<input type="checkbox"/> Rasemessig eller etnisk bakgrunn, eller politisk, filosofisk eller religiøs oppfatning <input type="checkbox"/> At en person har vært mistenkt, siktet, tiltalt eller dømt for en straffbar handling <input type="checkbox"/> Helseforhold <input type="checkbox"/> Seksuelle forhold <input type="checkbox"/> Medlemskap i fagforeninger	
Samles det inn opplysninger om tredjeperson?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Med opplysninger om tredjeperson menes opplysninger som kan spores tilbake til personer som ikke inngår i utvalget. Eksempler på tredjeperson er kollega, elev, klient, familiemedlem.
Hvis ja, hvem er tredjeperson og hvilke opplysninger registreres?		
Hvordan informeres tredjeperson om behandlingen?	<input type="checkbox"/> Skriftlig <input type="checkbox"/> Muntlig <input type="checkbox"/> Informeres ikke	
Informeres ikke, begrunn		
<b>10. Informasjon og samtykke</b>		
Oppgi hvordan utvalget informeres	<input checked="" type="checkbox"/> Skriftlig <input checked="" type="checkbox"/> Muntlig <input type="checkbox"/> Informeres ikke	Vennligst send inn informasjonsskrivet eller mal for muntlig informasjon sammen med meldeskjema.
Begrunn		<p>NB! Vedlegg lastes opp til sist i meldeskjemaet, se punkt 16 Vedlegg.</p> <p>Dersom utvalget ikke skal informeres om behandlingen av personopplysninger må det begrunnes.</p> <p>Last ned vår veiledende mal til informasjonsskriv</p>
Oppgi hvordan samtykke fra utvalget innhentes	<input checked="" type="checkbox"/> Skriftlig <input type="checkbox"/> Muntlig <input type="checkbox"/> Innhentes ikke	Dersom det innhentes skriftlig samtykke anbefales det at samtykkeerklæringen utformes som en svarslipp eller på eget ark. Dersom det ikke skal innhentes samtykke, må det begrunnes.
Innhentes ikke, begrunn		
<b>11. Informasjonssikkerhet</b>		
Direkte personidentifiserende opplysninger erstattes med et referansenummer som viser til en atskilt navneliste (koblingsnøkkel)	Ja <input checked="" type="radio"/> Nei <input type="radio"/>	Har du krysset av for ja under punkt 9 Datamaterialets innhold må det merkes av for hvordan direkte personidentifiserende opplysninger registreres.
Hvordan oppbevares navnelisten/koblingsnøkkelen og hvem har tilgang til den?	Liste med referansenummer/-navn og personidentifiserende opplysninger oppbevares i låst skap ved Norges Idrettshøgskole	NB! Som hovedregel bør ikke direkte personidentifiserende opplysninger registreres sammen med det øvrige datamaterialet.
Direkte personidentifiserende opplysninger oppbevares sammen med det øvrige materialet	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvorfor oppbevares direkte personidentifiserende opplysninger sammen med det øvrige datamaterialet?		
Oppbevares direkte personidentifiserbare opplysninger på andre måter?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Spesifiser		



Hvordan registreres og oppbevares datamaterialet?	<input type="checkbox"/> Fysisk isolert datamaskin tilhørende virksomheten <input type="checkbox"/> Datamaskin i nettverkssystem tilhørende virksomheten <input checked="" type="checkbox"/> Datamaskin i nettverkssystem tilknyttet Internett tilhørende virksomheten <input type="checkbox"/> Fysisk isolert privat datamaskin <input type="checkbox"/> Privat datamaskin tilknyttet Internett <input type="checkbox"/> Videoopptak/fotografi <input checked="" type="checkbox"/> Lydopptak <input type="checkbox"/> Notater/papir <input type="checkbox"/> Annen registreringsmetode	<p>Merk av for hvilke hjelpemidler som benyttes for registrering og analyse av opplysninger.</p> <p>Sett flere kryss dersom opplysningene registreres på flere måter.</p>
Annen registreringsmetode beskriv		
Behandles lyd-/videoopptak og/eller fotografi ved hjelp av datamaskinbasert utstyr?	Ja <input checked="" type="radio"/> Nei <input type="radio"/>	<p>Kryss av for ja dersom opptak eller foto behandles som lyd-/bildefil.</p> <p>Les mer om behandling av lyd og bilde.</p>
Hvordan er datamaterialet beskyttet mot at uvedkommende får innsyn?	<p>PC som brukes er beskyttet med brukernavn og passord. PC står på låst kontor når stipendiat ikke er tilstede.</p> <p>PC med datamateriale blir lagret adskilt fra referanseliste med personidentifiserende opplysninger.</p>	<p>Er f.eks. datamaskintilgangen beskyttet med brukernavn og passord, står datamaskinen i et låsbart rom, og hvordan sikres bærbare enheter, utskrifter og opptak?</p>
Dersom det benyttes mobile lagringsenheter (bærbare datamaskin, minnepenn, minnekort, cd, eksterne harddisk, mobiltelefon), oppgi hvilke	PC som benyttes er mobil lagringsenhet. Dette er en hp-maskin som disponeres av stipendiat.	NB! Mobile lagringsenheter bør ha mulighet for kryptering.
Vil medarbeidere ha tilgang til datamaterialet på lik linje med daglig ansvarlig/student?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvis ja, hvem?		
Overføres personopplysninger ved hjelp av e-post/Internett?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	F.eks. ved bruk av elektronisk spørreskjema, overføring av data til samarbeidspartner/databehandler mm.
Hvis ja, hvilke?		
Vil personopplysninger bli utlevert til andre enn prosjektgruppen?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvis ja, til hvem?		
Samles opplysningene inn/behandles av en databehandler?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	<p>Dersom det benyttes eksterne til helt eller delvis å behandle personopplysninger, f.eks. Questback, Synovate MMI, Norfakta eller transkriberingsassistent eller tolk, er dette å betrakte som en databehandler. Slike oppdrag må kontraktsreguleres</p> <p>Les mer om databehandleravtaler her</p>
Hvis ja, hvilken?		
<b>12. Vurdering/godkjenning fra andre instanser</b>		
Søkes det om dispensasjon fra taushetsplikten for å få tilgang til data?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	<p>For å få tilgang til taushetsbelagte opplysninger fra f.eks. NAV, PPT, sykehus, må det søkes om dispensasjon fra taushetsplikten. Dispensasjon søkes vanligvis fra aktuelt departement.</p> <p>Dispensasjon fra taushetsplikten for helseopplysninger skal for alle typer forskning søkes</p> <p>Regional komité for medisinsk og helsefaglig forskningsetikk</p>
Kommentar		
Søkes det godkjenning fra andre instanser?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	F.eks. søke registreier om tilgang til data, en ledelse om tilgang til forskning i virksomhet, skole, etc.
Hvis ja, hvilke?		

13. Prosjektperiode		
Prosjektperiode	Prosjektstart:09.06.2014 Prosjektstutt:28.05.2017	Prosjektstart Vennligst oppgi tidspunktet for når førstegangskontakten med utvalget opprettes og/eller datainnsamlingen starter.  Prosjektstutt Vennligst oppgi tidspunktet for når datamaterialet enten skal anonymiseres/slettes, eller arkiveres i påvente av oppfølgingsstudier eller annet. Prosjektet anses vanligvis som avsluttet når de oppgitte analyser er ferdigstilt og resultatene publisert, eller oppgave/avhandling er innlevert og sensurert.
Hva skal skje med datamaterialet ved prosjektstutt?	<input checked="" type="checkbox"/> Datamaterialet anonymiseres <input type="checkbox"/> Datamaterialet oppbevares med personidentifikasjon	Med anonymisering menes at datamaterialet bearbejdes slik at det ikke lenger er mulig å føre opplysningene tilbake til enkeltpersoner.NB! Merk at dette omfatter både oppgave/publikasjon og rådata.  Les mer om anonymisering
Hvordan skal datamaterialet anonymiseres?	Liste med referansenummer og personidentifiserende opplysninger makuleres etter datainnsamling (juli 2014).	Hovedregelen for videre oppbevaring av data med personidentifikasjon er samtykke fra den registrerte.
Hvorfor skal datamaterialet oppbevares med personidentifikasjon?		Arsaker til oppbevaring kan være planlagte oppfølgingsstudier, undervisningsformål eller annet.
Hvor skal datamaterialet oppbevares, og hvor lenge?		Datamaterialet kan oppbevares ved egen institusjon, offentlig arkiv eller annet.  Les om arkivering hos NSD
14. Finansiering		
Hvordan finansieres prosjektet?	Prosjektet finansieres av Norges Idrettshøgskole, Seksjon for coaching og psykologi	
15. Tilleggsopplysninger		
Tilleggsopplysninger		
16. Vedlegg		
Antall vedlegg	2	



Gro Jordalen  
Seksjon for coaching og psykologi Norges idrettshøgskole  
Postboks 4014 Ullevål Stadion  
0806 OSLO

Vår dato: 23.05.2014

Vår ref: 38847 / 3 / LT

Deres dato:

Deres ref:

## TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 21.05.2014. Meldingen gjelder prosjektet:

38847                      *The Contribution of Motivation and Self-Regulatory Competencies to Elite  
Level Performances in Norwegian ██████████*  
*Behandlingsansvarlig              Norges idrettshøgskole, ved institusjonens øverste leder*  
*Daglig ansvarlig                      Gro Jordalen*

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstillter kravene i personopplysningsloven.

Personvernombudets vurdering 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, 28.05.2017, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Lis Tenold

Kontaktperson: Lis Tenold tlf: 55 58 33 77

Vedlegg: Prosjektvurdering

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

*Avdelingskontorer / District Offices*

*OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. nsd@uio.no*

*TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. kyrre.svarva@svt.ntnu.no*

*TROMSØ: NSD, SVF, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. nsdmaa@sv.uit.no*

## Personvernombudet for forskning



### Prosjektvurdering - Kommentar

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Prosjektnr: 38847

Utvalget informeres skriftlig og muntlig om prosjektet og samtykker til deltakelse. Informasjonsskrivet er godt utformet.

Personvernombudet legger til grunn at forsker etterfølger Norges idrettshøgskole sine interne rutiner for datasikkerhet. Dersom personopplysninger skal lagres på mobile enheter, bør opplysningene krypteres tilstrekkelig.

Forventet prosjektslutt er 28.05.2017. Ifølge prosjektmeldingen skal innsamlede opplysninger da anonymiseres. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved å:

- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. bosted/arbeidssted, alder og kjønn)
- slette lydopptak

Prosjektet gjennomføres i samarbeid med Norges teknisk-naturvitenskapelige universitet (NTNU) Olympiatoppen (OLT). Norges idrettshøgskole er behandlingsansvarlig institusjon. Personvernombudet forutsetter at ansvaret for behandlingen av personopplysninger er avklart mellom institusjonene. Vi anbefaler at det inngås en avtale som omfatter ansvarsfordeling, ansvarsstruktur, hvem som initierer prosjektet, bruk av data og eventuelt eierskap.

Forespørsel om deltakelse i forskningsprosjektet

*The Contribution of Motivation and Self-Regulatory Competencies to Elite Level Performances  
in Norwegian* [REDACTED]

Du inviteres til å delta i denne unike retrospektive studien nettopp fordi du er den som kan gi oss verdifull informasjon gjennom dine erfaringer som toppidrettsutøver – informasjon som vil bidra til økt forståelse for hva som er avgjørende for å oppnå og holde internasjonalt elitenivå innen [REDACTED]

Din deltakelse innebærer et personlig intervju som blir gjort lydopptak av, med beregnet varighet ca. 45-90 minutter. Formålet med studien er å undersøke betydningen av motivasjon samt evne til å bruke selv-regulering (f.eks. planlegging, refleksjon og evaluering) for å sikre utvikling i din idrett, og for å oppnå optimale prestasjoner overtid.

Det er frivillig å delta i studien. Du kan når som helst trekke deg uten å oppgi grunn og dine data vil bli slettet. Du vil anonymiseres ved hjelp av et referansenummer/-navn. Oversikt over referansenummer/-navn knyttet til ditt navn og lydfiler fra intervju, oppbevares adskilt på et låst kontor og vil makuleres og slettes etter levert avhandling i 2017. Kun undertegnede har tilgang til data, og forskere er underlagt taushetsplikt. Studien er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelige datatjeneste AS, og finansieres av Seksjon for coaching og psykologi ved Norges idrettshøgskole (NIH). Studien er del av min doktorgrad ved NIH under veiledning av førsteamanuensis Pierre-Nicolas Lemyre (NIH), og gjennomføres i samarbeid med Norges Teknisk-Naturvitenskapelige Universitet (NTNU) og Olympiatoppen (OLT).

Vennligst signer vedlagte samtykkeerklæring dersom du ønsker å delta. Dersom du har spørsmål til studien kontakt gjerne undertegnede.

Med vennlig hilsen

Gro Jordalen  
Stipendiat, Seksjon for coaching og  
psykologi, Norges idrettshøgskole  
E-post: gro.jordalen@nih.no  
Tlf.: 23 26 23 51 / 99 77 89 65

Pierre-Nicolas Lemyre  
Førsteamanuensis  
Leder, Seksjon for coaching og psykologi  
Leder, Forskningscenter for barne- og  
ungdomsidrett  
Norges idrettshøgskole  
E-post: nicolas.lemyre@nih.no  
Tlf.: 23 26 24 22

Samtykkeerklæring for deltakelse i studien

*“The Contribution of Motivation and Self-Regulatory Competencies to Elite Level Performances  
in Norwegian ██████████*

Jeg har mottatt og lest informasjonen om studien.

Jeg ønsker å delta.

Jeg samtykker i at sitat fra intervjuet kan brukes i artikler for publisering.

\_\_\_\_\_  
Sted

\_\_\_\_\_  
Dato

\_\_\_\_\_  
Underskrift utøver

## **Appendix II**

Study I

Interview guide

Forskningsspørsmål:

- Studien skal belyse betydningen av motivasjon og evne for selv-regulering for utvikling, oppnåelse, og opprettholdelse av maksimale prestasjoner blant norske eliteutøvere.

Før intervjuet starter:

- Forklar deltakere formål med intervju (se *Informasjonsskriv til utøvere*).

Informere om

- Opplysninger i *Informasjonsskriv til utøvere*.
- At dette er et semi-strukturert intervju, og hvordan det skal gjennomføres. Deltaker må gjerne be forsker utdype/forklare nærmere om de ikke forstår spørsmålene.
- Spørsmål som ikke er direkte knyttet til intervju spørsmålene, tas etter intervjuet er avsluttet!
- Intervjuets varighet er ca. 45-90 minutt.
- Dette intervjuet er en studie i forskers doktorgrad, og vil gi informasjon om hva som er viktig å forske på videre.
- Intervjuet vil resultere i internasjonale publikasjoner.
- Deltaker kan gjerne kontakte forsker etter intervjuet er gjennomført per telefon/mail.
- Hvordan deltakere får tilgang til studiens resultat.
- Forklar hvordan deltakernes svar vil bli analysert.
- Spør om deltaker har spørsmål før intervjuet starter, og om det er ok at du tar opp intervjuet med opptaker. Informer at opptaket vil bli slettet (senest etter levert avhandling 2017).



### Introduksjonstema

Fortell om livet som utøver, en utøvers' hverdag.

- Stikkord: trening, treningsfasiliteter, mennesker å trene sammen med, klubb/lag, konkurranse, fritid, familie, jobb/skole, reise, treningsopphold, sponsing, osv. Nåtid først!

### Satsing som idrettsutøver

- Hvordan ble lek og idrett introdusert for deg?
  - Hvordan var ble det tilrettelagt for idrettsaktivitet?
  - Hvordan opplevdes denne aktiviteten?
  - Hva var viktig for/gjorde at du fortsatte denne aktiviteten?
- Hvordan startet du med organisert trening og konkurranser?
  - Hva motiverte til dette?
  - Hvem var involverte/viktige støttespillere?
- Hvordan var du som var utøver med på å bestemme deltakelse?
  - Hvordan opplevdes denne rollen?
- Hvordan har ditt første møte med idrett påvirket din senere utvikling og satsing?
- Hvilke personlige egenskaper har vært viktig for utvikling mot elitenivå?
- Som ung utøver, hvordan så du på din egen innsats på trening/i konkurranser?
  - Var det andre som vurderte din innsats? (f.eks. trenere, foreldre, laget)
  - Hvordan gjorde du/andre dette (denne vurderingen)?
- Hvordan har måten du planlegger og reflekterer over idrettsaktivitet forandret seg fra ung til mer etablert utøver?
  - Hvilken betydning har trener, støtteapparat, familie, venner eller andre hatt?
  - Hvordan har dette vært avgjørende for utviklingen mot/det å holde elitenivå?

### Siste sesong

- Hvordan har siste sesong vært?
  - Betydningsfulle opplevelser, høydepunkter?
  - Avgjørende faktorer for satsing (personlige, finansielle, taktiske, osv.)
  - Betydningsfulle andre (trener, lag/klubb, team/støtteapparat, familie, venner),
- Hva motiverer deg i trening og prestasjon mot sesongen?
  - I sesongen?
- Hvordan har glede og interesse for idretten vært for deg siste sesong?
  
- Hvem var involvert i planlegging av trening og konkurranse?
  - Hvordan?
  - Hvilken rolle hadde du som utøver?
    - Hadde du et bevisst forhold til/kontrollerte aktiviteten på trening?
    - Hvordan?
    - Hvordan ble aktivitet før og under konkurranse planlagt og gjennomført?
      - Av deg som utøver, av andre?
  - Hvordan opplevdes det å ha denne rollen?
    - I hvilken grad var det viktig at du/andre var delaktig i dette?
- Hvordan ble din innsats på trening og i konkurranse evaluert?
  - Var det du som utøver som gjorde denne evalueringen?
    - Var det andre som kom med viktige innspill?
- Hvordan reflekterer du nå over innsatsen du gjorde opp mot og i siste sesong?
  - Hvordan reflekterer du over treningen før/under sesongen?
  - Hvordan ser du på innsatsen i og opplegget rundt konkurranser?
  - Var det spesielle faktorer som påvirker trening og konkurranseaktivitet?
    - Hvilke?
  - Har andre hatt betydning for disse refleksjonene?
- Tror du, at det at du selv har en rolle i planlegging, evaluering, og refleksjon i forhold til aktivitet, har vært av betydning for å holde elitenivå?
  - Hvordan?

### Refleksjoner over en idrettskarriere

- Hvilke personlige egenskaper har vært avgjørende for idrettskarrieren din?
- Hva har påvirket din motivasjon for satsing som idrettsutøver?
  - Hvordan?
- Hvordan har denne motivasjonen for idrettsaktivitet endret seg gjennom karrieren?
  - Hvem (utøver/andre) har motivert?
  - Hva har motivert (f.eks. prestisje, berømmelse, status, budsjett, sponsorer)?
  - I hvilken grad har disse/dette motivert deg?
- Hvordan har du opplevd glede i idrett gjennom karrieren?
- Hvordan har din interesse for idrett vært gjennom karrieren?
  
- Hvordan har du som utøver planlagt idrettsaktiviteten og hverdagen som utøver?
  - Hvordan har du vært mentalt tilstede og bevisst i forhold til din aktivitet?
  - Har dette endret seg gjennom karrieren? (f.eks. har du blitt mer/mindre bevisst i forhold til idretten og det som påvirker aktiviteten?)
- Hvordan har din aktivitet i idrett blitt evaluert?
  - Hvordan har din rolle vært i denne evalueringen?
  - Har andre vært viktige i denne evalueringen?
  - Har din evne til å evaluere aktiviteten endret seg gjennom karrieren?
- Hvordan reflekterer du som utøver over ditt engasjement innen idrett gjennom karrieren?
- Hvilken betydning tror du det har, det å reflektere over idrettsengasjement, for å utvikle og holde elitenivå i din idrett?
  - Hvordan har du fått fordeler/blitt begrenset av dette?



## **Appendix III**

### Study II

Application to the Norwegian Centre for Research Data

Approval by the Norwegian Centre for Research Data

Information letter to institution and participants, and declaration of consent participants

## MELDESKJEMA

Meldeskjema (versjon 1.4) for forsknings- og studentprosjekt som medfører meldeplikt eller konsesjonsplikt (jf. personopplysningsloven og helseregisterloven med forskrifter).

1. Intro		
Samles det inn direkte personidentifiserende opplysninger?	Ja ● Nei ○	En person vil være direkte identifiserbar via navn, personnummer, eller andre personentydige kjennetegn.
Hvis ja, hvilke?	<input type="checkbox"/> Navn <input type="checkbox"/> 11-sifret fødselsnummer <input type="checkbox"/> Adresse <input type="checkbox"/> E-post <input type="checkbox"/> Telefonnummer <input checked="" type="checkbox"/> Annet	Les mer om hva personopplysninger.  NB! Selv om opplysningene skal anonymiseres i oppgave/rapport, må det krysses av dersom det skal innhentes/registreres personidentifiserende opplysninger i forbindelse med prosjektet.
Annet, spesifiser hvilke	Navn, e-postadresse	
Skal direkte personidentifiserende opplysninger kobles til datamaterialet (koblingsnøkkel)?	Ja ● Nei ○	Merk at meldeplikten utløses selv om du ikke får tilgang til koblingsnøkkel, slik fremgangsmåten ofte er når man benytter en databehandler
Samles det inn bakgrunnsopplysninger som kan identifisere enkeltpersoner (indirekte personidentifiserende opplysninger)?	Ja ● Nei ○	En person vil være indirekte identifiserbar dersom det er mulig å identifisere vedkommende gjennom bakgrunnsopplysninger som for eksempel bostedskommune eller arbeidsplass/skole kombinert med opplysninger som alder, kjønn, yrke, diagnose, etc.
Hvis ja, hvilke	Kjønn, alder, sport, utdanning, antall år engasjert i idretten, prestasjonsnivå	NB! For at stemme skal regnes som personidentifiserende, må denne bli registrert i kombinasjon med andre opplysninger, slik at personer kan gjenkjennes.
Skal det registreres personopplysninger (direkte/indirekte/via IP-/e-post adresse, etc.) ved hjelp av nettbaserte spørreskjema?	Ja ○ Nei ○	Les mer om nettbaserte spørreskjema.
Blir det registrert personopplysninger på digitale bilde- eller videoopptak?	Ja ● Nei ○	Bilde/videoopptak av ansikter vil regnes som personidentifiserende.
Søkes det vurdering fra REK om hvorvidt prosjektet er omfattet av helseforskningsloven?	Ja ○ Nei ○	NB! Dersom REK (Regional Komité for medisinsk og helsefaglig forskningsetikk) har vurdert prosjektet som helseforskning, er det ikke nødvendig å sende inn meldeskjema til personvernombudet (NB! Gjelder ikke prosjekter som skal benytte data fra pseudonyme helseregistre).  Dersom tilbakemelding fra REK ikke foreligger, anbefaler vi at du avventer videre utfylling til svar fra REK foreligger.
2. Prosjektittel		
Prosjektittel	Development of excellence in young norwegian athletes The importance of self-determined motivation and self-regulated behaviors	Oppgi prosjektets tittel. NB! Dette kan ikke være «Masteroppgave» eller liknende, navnet må beskrive prosjektets innhold.
3. Behandlingsansvarlig institusjon		
Institusjon	Norges idrettshøgskole	Velg den institusjonen du er tilknyttet. Alle nivå må oppgis. Ved studentprosjekt er det studentens tilknytning som er avgjørende. Dersom institusjonen ikke finnes på listen, har den ikke avtale med NSD som personvernombud. Vennligst ta kontakt med institusjonen.
Avdeling/Fakultet	Seksjon for coaching og psykologi	
Institutt		
4. Daglig ansvarlig (forsker, veileder, stipendiat)		

Fornavn	Gro	<p>Før opp navnet på den som har det daglige ansvaret for prosjektet. Veileder er vanligvis daglig ansvarlig ved studentprosjekt.</p> <p>Daglig ansvarlig og student må i utgangspunktet være tilknyttet samme institusjon. Dersom studenten har ekstern veileder, kanbiveileder eller fagansvarlig ved studiestedet stå som daglig ansvarlig.</p> <p>Arbeidssted må være tilknyttet behandlingsansvarlig institusjon, f.eks. underavdeling, institutt etc.</p> <p>NB! Det er viktig at du oppgir en e-postadresse som brukes aktivt. Vennligst gi oss beskjed dersom den endres.</p>
Etternavn	Jordalen	
Stilling	Stipendiat	
Telefon	23262351	
Mobil	99778965	
E-post	gro.jordalen@nih.no	
Alternativ e-post		
Arbeidssted	Norges idrettshøgskole	
Adresse (arb.)	Postboks 4014 Ullevål Stadion	
Postnr./sted (arb.sted)	0806 Oslo	
<b>5. Student (master, bachelor)</b>		
Studentprosjekt	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Dersom det er flere studenter som samarbeider om et prosjekt, skal det velges en kontaktperson som føres opp her. Øvrige studenter kan føres opp under pkt 10.
<b>6. Formålet med prosjektet</b>		
Formål	Formålet med PhD-prosjektet er å undersøke assosiasjoner mellom motivasjon og evne til selv-regulering, og hvordan dette påvirker idrettsutøveres utvikling, samt kvalitet og kvantitet i trening og konkurranser. Det skal også undersøkes om høyere grad av selv-kontroll og evne til å jobbe mot store mål med en "forsinket belønning", vil gi bedre prestasjoner.	Redegjør kort for prosjektets formål, problemstilling, forskningsspørsmål e.l.
<b>7. Hvilke personer skal det innhentes personopplysninger om (utvalg)?</b>		
Kryss av for utvalg	<input type="checkbox"/> Barnehagebarn <input type="checkbox"/> Skoleelever <input type="checkbox"/> Pasienter <input type="checkbox"/> Brukere/klienter/kunder <input type="checkbox"/> Ansatte <input type="checkbox"/> Barnevernsbarn <input type="checkbox"/> Lærere <input type="checkbox"/> Helsepersonell <input type="checkbox"/> Asylsøkere <input type="checkbox"/> Andre	
Beskriv utvalg/deltakere	Toppidrettsutøvere og unge utøvere på høyt nasjonalt nivå innen ulike vinter- (alpint, langrenn, skiskyting, hopp) og sommeridretter (orientering). Utøvere i ballett og turn vil også rekrutteres.	Med utvalg menes dem som deltar i undersøkelsen eller dem det innhentes opplysninger om.
Rekruttering/trekking	Utvalg, rekruttering og førstegangskontakt vil variere mellom de 4 studiene som er planlagt. Stipendiat under veiledning av førsteamanuensis Pierre-Nicolas Lemyre ved NIH foretar rekruttering. Utøvere vil rekrutteres ved å kontakte skoler (f.eks NTG), forbund, og Olympiatoppen.	Beskriv hvordan utvalget trekkes eller rekrutteres og oppgi hvem som foretar den. Et utvalg kan trekkes fra registre som f.eks. Folkeregisteret, SSB-registre, pasientregistre, eller det kan rekrutteres gjennom f.eks. en bedrift, skole, idrettsmiljø eller eget nettverk.
Førstegangskontakt	Stipendiat og veileder vil begge delta i førstegangskontakt, dette ved å kontakte de aktuelle respondenter per e-post (med informasjonsskriv), og deretter en oppfølging på telefon.	Beskriv hvordan kontakt med utvalget blir opprettet og av hvem. Les mer om dette på temasidene.
Alder på utvalget	<input type="checkbox"/> Barn (0-15 år) <input checked="" type="checkbox"/> Ungdom (16-17 år) <input checked="" type="checkbox"/> Voksne (over 18 år)	Les om forskning som involverer barn på våre nettsider.
Omtrentlig antall personer som inngår i utvalget	Studie 1: 300 utøvere innen vinteridretter, tverrsnittsstudie Studie 2: 5 toppidrettsutøvere vinteridretter, kvalitativt intervju Studie 3: 200 utøvere innen vinteridretter, longitudinell studie Studie 4: 50 utøvere innen ballett og turn, longitudinell studie	
Samles det inn sensitive personopplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Les mer om sensitive opplysninger.

Hvis ja, hvilke?	<input type="checkbox"/> Rasemessig eller etnisk bakgrunn, eller politisk, filosofisk eller religiøs oppfatning <input type="checkbox"/> At en person har vært mistenkt, siktet, tiltalt eller dømt for en straffbar handling <input type="checkbox"/> Helseforhold <input type="checkbox"/> Seksuelle forhold <input type="checkbox"/> Medlemskap i fagforeninger	
Inkluderes det myndige personer med redusert eller manglende samtykkekompetanse?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Les mer om pasienter, brukere og personer med redusert eller manglende samtykkekompetanse.
Samles det inn personopplysninger om personer som selv ikke deltar (tredjepersoner)?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Med opplysninger om tredjeperson menes opplysninger som kan spores tilbake til personer som ikke inngår i utvalget. Eksempler på tredjeperson er kollega, elev, klient, familiemedlem.
<b>8. Metode for innsamling av personopplysninger</b>		
Kryss av for hvilke datainnsamlingsmetoder og datakilder som vil benyttes	<input checked="" type="checkbox"/> Papirbasert spørreskjema <input checked="" type="checkbox"/> Elektronisk spørreskjema <input checked="" type="checkbox"/> Personlig intervju <input type="checkbox"/> Gruppeintervju <input type="checkbox"/> Observasjon <input type="checkbox"/> Deltakende observasjon <input type="checkbox"/> Blogg/sosiale medier/internett <input type="checkbox"/> Psykologiske/pedagogiske tester <input type="checkbox"/> Medisinske undersøkelser/tester <input type="checkbox"/> Journaldata (medisinske journaler)	<p>Personopplysninger kan innhentes direkte fra den registrerte f.eks. gjennom spørreskjema, intervju, tester, og/eller ulike journaler (f.eks. elevmapper, NAV, PPT, sykehus) og/eller registre (f.eks. Statistisk sentralbyrå, sentrale helseregistre).</p> <p>NB! Dersom personopplysninger innhentes fra forskjellige personer (utvalg) og med forskjellige metoder, må dette spesifiseres i kommentar-boksen. Husk også å legge ved relevante vedlegg til alle utvalgs-gruppene og metodene som skal benyttes.</p> <p>Les mer om registerstudier her.</p> <p>Dersom du skal anvende registerdata, må variabelliste lastes opp under pkt. 15</p>
	<input type="checkbox"/> Registerdata	
	<input checked="" type="checkbox"/> Annen innsamlingsmetode	
Oppgi hvilken	Olympiatoppens treningsdagbok vil brukes for å samle data i forhold til treningsbelastning.	
Tilleggsopplysninger		
<b>9. Informasjon og samtykke</b>		
Oppgi hvordan utvalget/deltakerne informeres	<input checked="" type="checkbox"/> Skriftlig <input checked="" type="checkbox"/> Muntlig <input type="checkbox"/> Informeres ikke	<p>Dersom utvalget ikke skal informeres om behandlingen av personopplysninger må det begrunnes.</p> <p>Les mer her.</p> <p>Vennligst send inn mal for skriftlig eller muntlig informasjon til deltakerne sammen med meldeskjema.</p> <p>Last ned en veiledende mal her.</p> <p>NB! Vedlegg lastes opp til sist i meldeskjemaet, se punkt 15 Vedlegg.</p>
Samtykker utvalget til deltakelse?	<input checked="" type="radio"/> Ja <input type="radio"/> Nei <input type="radio"/> Flere utvalg, ikke samtykke fra alle	<p>For at et samtykke til deltakelse i forskning skal være gyldig, må det være frivillig, uttrykkelig og informert.</p> <p>Samtykke kan gis skriftlig, muntlig eller gjennom en aktiv handling. For eksempel vil et besvart spørreskjema være å regne som et aktivt samtykke.</p> <p>Dersom det ikke skal innhentes samtykke, må det begrunnes.</p>
Innhentes det samtykke fra foreldre for ungdom mellom 16 og 17 år?	Ja <input type="radio"/> Nei <input type="radio"/>	Les mer om forskning som involverer barn og samtykke fra unge.
Hvis nei, begrunn		
<b>10. Informasjonssikkerhet</b>		
Hvordan oppbevares navnelisten/ koblingsnøkkelen og hvem har tilgang til den?	Liste med referansenummer og personidentifiserende opplysninger oppbevares i låst skap Norges idrettshøgskole.	
Oppbevares direkte personidentifiserbare opplysninger på andre måter?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Spesifiser		NB! Som hovedregel bør ikke direkte personidentifiserende opplysninger registreres sammen med det øvrige datamaterialet.



Hvordan registreres og oppbevares personopplysningene?	<input type="checkbox"/> På server i virksomhetens nettverk <input type="checkbox"/> Fysisk isolert PC tilhørende virksomheten (dvs. ingen tilknytning til andre datamaskiner eller nettverk, interne eller eksterne) <input checked="" type="checkbox"/> Datamaskin i nettverkssystem tilknyttet Internett tilhørende virksomheten <input type="checkbox"/> Privat datamaskin <input type="checkbox"/> Videoopptak/fotografi <input checked="" type="checkbox"/> Lydopptak <input type="checkbox"/> Notater/papir <input checked="" type="checkbox"/> Mobile lagringsenheter (bærbar datamaskin, minnepenn, minnekort, cd, ekstern harddisk, mobiltelefon) <input type="checkbox"/> Annen registreringsmetode	<p>Merk av for hvilke hjelpemidler som benyttes for registrering og analyse av opplysninger.</p> <p>Sett flere kryss dersom opplysningene registreres på flere måter.</p> <p>Med «virksomhet» menes her behandlingsansvarlig institusjon.</p> <p>NB! Som hovedregel bør data som inneholder personopplysninger lagres på behandlingsansvarlig sin forskningsserver.</p> <p>Lagring på andre medier - som privat pc, mobiltelefon, minnepinne, server på annet arbeidssted - er mindre sikkert, og må derfor begrunnes. Slik lagring må avklares med behandlingsansvarlig institusjon, og personopplysningene bør krypteres.</p>
Annen registreringsmetode beskriv		
Hvordan er datamaterialet beskyttet mot at uvedkommende får innsyn?	PC som brukes er beskyttet med brukernavn og passord. PC står på låst kontor når stipendiat ikke er tilstede. PC med datamateriale blir lagret adskilt fra referanseliste med personidentifiserende opplysninger.	Er f.eks. datamaskintilgangen beskyttet med brukernavn og passord, står datamaskinen i et låsbart rom, og hvordan sikres bærbare enheter, utskrift og opptak?
Samles opplysningene inn/behandles av en databehandler (ekstern aktør)?	Ja • Nei ○	Dersom det benyttes eksterne til helt eller delvis å behandle personopplysninger, f.eks. Questback, transkriberingsassistent eller tolk, er dette å betrakte som en databehandler. Slike oppdrag må kontraktreguleres.
Hvis ja, hvilken	Opplysninger samles inn/behandles via Olympiatoppens treningsdagbok og Questback.	
Overføres personopplysninger ved hjelp av e-post/Internett?	Ja ○ Nei •	F.eks. ved overføring av data til samarbeidspartner, databehandler mm.
Hvis ja, beskriv?		Dersom personopplysninger skal sendes via internett, bør de krypteres tilstrekkelig. Vi anbefaler for ikke lagring av personopplysninger på nettskytjenester. Dersom nettskytjeneste benyttes, skal det inngås skriftlig databehandleravtale med leverandøren av tjenesten.
Skal andre personer enn daglig ansvarlig/student ha tilgang til datamaterialet med personopplysninger?	Ja • Nei ○	
Hvis ja, hvem (oppgi navn og arbeidssted)?		
Utleveres/deles personopplysninger med andre institusjoner eller land?	<input checked="" type="checkbox"/> Nei <input type="checkbox"/> Andre institusjoner <input type="checkbox"/> Institusjoner i andre land	F.eks. ved nasjonale samarbeidsprosjekter der personopplysninger utveksles eller ved internasjonale samarbeidsprosjekter der personopplysninger utveksles.
<b>11. Vurdering/godkjenning fra andre instanser</b>		
Søkes det om dispensasjon fra taushetsplikten for å få tilgang til data?	Ja ○ Nei •	For å få tilgang til taushetsbelagte opplysninger fra f.eks. NAV, PPT, sykehus, må det søkes om dispensasjon fra taushetsplikten. Dispensasjon søkes vanligvis fra aktuelt departement.
Hvis ja, hvilke		
Søkes det godkjenning fra andre instanser?	Ja • Nei ○	F.eks. søke registereier om tilgang til data, en ledelse om tilgang til forskning i virksomhet, skole.
Hvis ja, hvilken	Søker ledelse ved Olympiatoppen om tilgang til treningsdagbøker.	
<b>12. Periode for behandling av personopplysninger</b>		
Prosjektstart	20.11.2013	Prosjektstart Vennligst oppgi tidspunktet for når kontakt med utvalget skal gjøres/datainnsamlingen starter.
Planlagt dato for prosjektslutt	28.05.2017	Prosjektslutt: Vennligst oppgi tidspunktet for når datamaterialet enten skal anonymiseres/slettes, eller arkiveres i påvente av oppfølgingsstudier eller annet.
Skal personopplysninger publiseres (direkte eller indirekte)?	<input type="checkbox"/> Ja, direkte (navn e.l.) <input type="checkbox"/> Ja, indirekte (bakgrunnsopplysninger) <input type="checkbox"/> Nei, publiseres anonymt	NB! Dersom personopplysninger skal publiseres, må det vanligvis innhentes eksplisitt samtykke til dette fra den enkelte, og deltakere bør gis anledning til å lese gjennom og godkjenne sitater.

Hva skal skje med datamaterialet ved prosjektslutt?	<input checked="" type="checkbox"/> Datamaterialet anonymiseres <input type="checkbox"/> Datamaterialet oppbevares med personidentifikasjon	<p>NB! Her menes datamaterialet, ikke publikasjon. Selv om data publiseres med personidentifikasjon skal som regel øvrig data anonymiseres. Med anonymisering menes at datamaterialet bearbeides slik at det ikke lenger er mulig å føre opplysningene tilbake til enkeltpersoner.</p> <p>Les mer om anonymisering.</p>
<b>13. Finansiering</b>		
Hvordan finansieres prosjektet?	Prosjektet finansieres av Norges idrettshøgskole, Seksjon for coaching og psykologi	
<b>14. Tilleggsopplysninger</b>		
Tilleggsopplysninger		



Gro Jordalen  
Seksjon for coaching og psykologi Norges idrettshøgskole  
Postboks 4014 Ullevål Stadion  
0806 OSLO

Vår dato: 29.10.2013

Vår ref: 35975 / 2 / LT

Deres dato:

Deres ref:

## TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 20.10.2013. Meldingen gjelder prosjektet:

35975                      *Development of excellence in young norwegian athletes. The importance of self-determined motivation and self-regulated behaviors*  
Behandlingsansvarlig    *Norges idrettshøgskole, ved institusjonens øverste leder*  
Daglig ansvarlig        *Gro Jordalen*

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstillende i forhold til kravene i personopplysningsloven.

Personvernombudets vurdering 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, 28.05.2017, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Vigdis Namtvedt Kvalheim

Lis Tenold

Kontaktperson: Lis Tenold tlf: 55 58 33 77

Vedlegg: Prosjektvurdering

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

Avdelingskontorer / District Offices

OSLO: NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. [nsd@uio.no](mailto:nsd@uio.no)

TRONDHEIM: NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. [kyrre.svarva@svt.ntnu.no](mailto:kyrre.svarva@svt.ntnu.no)

TROMSØ: NSD, SVF, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. [nsdmaa@svt.uit.no](mailto:nsdmaa@svt.uit.no)

## Personvernombudet for forskning



### Prosjektvurdering - Kommentar

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Prosjektnr: 35975

Meldeskjemaet omfatter kun melding om delstudie 1, jf. telefonsamtale med prosjektleder Jordalen 24.10.2013.

Det gis skriftlig informasjon og samtykke for deltakelse er ensbetydende med returnering av skjema. Personvernombudet finner i utgangspunktet skrevet godt utformet, men forutsetter at følgende endres/tilføyes;

- setningen "Oversikt over referansenummer....." da rettes 2013 til våren 2017
- setningen "Dersom du ønsker å delta i prosjekter, returner spørreskjema og samtykkeerklæring" endres til "Dersom du ønsker å delta fyller du ut skjema og returnerer".

Personvernombudet legger til grunn for sin godkjenning at revidert skriv ettersendes personvernombudet@nsd.uib før det tas kontakt med utvalget (merk eposten med prosjektnummer).

Questback er databehandler for prosjektet. Personvernombudet forutsetter at det foreligger en databehandleravtale mellom Questback og Norges idrettshøgskole for den behandling av data som finner sted, jf. personopplysningsloven § 15. For råd om hva databehandleravtalen bør inneholde, se Datatilsynets veileder på denne siden: <http://datatilsynet.no/verktøy-skjema/Skjema-maler/Databehandleravtale---mal/>

Datamaterialet anonymiseres ved prosjektslutt, 28.05.2017 ved at verken direkte eller indirekte personidentifiserbare opplysninger fremgår, verken hos Questback eller forsker. Adresser og logger slettes.

Personvernombudet anbefaler at for studie 2, 3 og 4 sendes det inn egne meldinger.

Til *navn institusjon*

*v/leder*

*adresse*

Oslo, 18.10.2013

Anmodning om å få gjennomføre en undersøkelse ved *eksempel navn institusjon*

Vi ønsker å invitere utøvere ved *navn institusjon* til deltakelse i forskningsprosjektet «*Avgjørende faktorer for utvikling av toppidrettsutøvere i Norge*». Prosjektet vil se på motivasjon blant unge utøvere, med formål om å studere utviklingen på veien mot elite prestasjoner og en toppidrettskarriere. Prosjektet skal gjennomføres ved start av vintersesongen 2013-2014, og vil bestå av en tverrsnittsundersøkelse som inneholder et demografisk spørreskjema samt 2 standardiserte internasjonale spørreskjemaer oversatt til norsk. Antatt varighet for besvarelse er ca. 10 minutter.

Det er frivillig å delta i prosjektet, og deltakere kan når som helst trekke seg fra prosjektet uten å oppgi grunn. Data for deltakere som velger å trekke seg, vil bli anonymisert og slettet. Alle data behandles med konfidensialitet, og deltakere vil være anonyme. Kun undertegnede har tilgang til data, og forsker er underlagt taushetsplikt. Foresatte/verge for utøvere under 18 år har rett til å se spørreskjemaer på forhånd dersom det er ønskelig.

Prosjektet er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S, og finansieres av Seksjon for coaching og psykologi ved Norges Idrettshøgskole (NIH). Resultatene vil være tilgjengelig for alle deltakere ved å kontakte undertegnede etter forventet levert avhandling våren 2017. Som stipendiat ved NIH 2013-2017, skal forskningsprosjektet være grunnlaget for min doktorgrad, under veiledning av førsteamanuensis Pierre-Nicolas Lemyre ved NIH.

Siden *navn institusjon* ved *leder* er ansvarlig for trening og oppfølging av utøvere, rettes denne anmodningen til dere/hit. På forhånd har jeg tatt kontakt med ??? ved *navn institusjon*, som har uttrykt velvilje for prosjektet. Det vil bli gitt utfyllende informasjon om prosjektet til ansatte og utøvere. For *navn institusjon* vil deltakelse i prosjektet innebære, i samarbeid med forsker, formidling av informasjon, spørreskjema og samtykkeerklæring. Jeg håper at *navn institusjon* stiller seg positive til deltakelse i undersøkelsen.

Ved spørsmål, kontakt gjerne undertegnede.

Med vennlig hilsen,

Gro Jordalen  
Stipendiat, Seksjon for coaching og psykologi, Norges idrettshøgskole  
E-post: [gro.jordalen@nih.no](mailto:gro.jordalen@nih.no)  
Tlf: 23 26 23 51 / 99 77 89 65

Pierre-Nicolas Lemyre  
Førsteamanuensis og leder, Seksjon for coaching og psykologi  
Leder Forskningscenter for trening og prestasjon  
Norges idrettshøgskole  
E-post: [nicolas.lemyre@nih.no](mailto:nicolas.lemyre@nih.no)  
Tlf: 23 26 24 22

Forespørsel om å delta i forskningsprosjektet

*«Avgjørende faktorer for utvikling av toppidrettsutøvere i Norge»*

Vi ønsker å invitere deg til deltakelse i et spennende forskningsprosjekt. Prosjektet vil se på motivasjon blant unge utøvere, og formålet er å studere utvikling på veien mot elite prestasjoner og en toppidrettskarriere. Prosjektet gjennomføres ved start av vintersesongen 2013-2014, og vil være en tverrsnittsundersøkelse som inneholder et demografisk spørreskjema samt 2 standardiserte internasjonale spørreskjemaer oversatt til norsk. Antatt varighet for besvarelse er ca. 10 minutter.

Det er frivillig å delta i prosjektet, du kan når som helst trekke deg fra prosjektet uten å oppgi grunn, og dine data vil bli slettet. Alle data behandles med konfidensialitet, din deltakelse vil være anonym, og du vil anonymiseres ved hjelp av et referansenummer. Oversikt over referansenummer knyttet til ditt navn vil oppbevares på et låst kontor, og vil makuleres ved prosjektets slutt i desember 2013. Kun undertegnede har tilgang til data, og forsker er underlagt taushetsplikt. Foresatte/verge for utøvere under 18 år har rett til å se spørreskjemaer på forhånd dersom det er ønskelig.

Prosjektet er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S, og finansieres av Seksjon for coaching og psykologi ved Norges Idrettshøgskole (NIH). Resultatene vil være tilgjengelig for alle deltakere ved å kontakte undertegnede etter forventet levert avhandling våren 2017. Som stipendiat ved NIH 2013-2017, skal forskningsprosjektet være grunnlaget for min doktorgrad, under veiledning av førsteamanuensis Pierre-Nicolas Lemyre ved NIH.

Dersom du ønsker å delta i prosjektet, returner spørreskjema og samtykkeerklæring. Ved spørsmål, kontakt gjerne undertegnede.

Med vennlig hilsen

Gro Jordalen  
Stipendiat, Seksjon for coaching og psykologi, Norges idrettshøgskole  
E-post: [gro.jordalen@nih.no](mailto:gro.jordalen@nih.no)  
Tlf: 23 26 23 51 / 99 77 89 65

Pierre-Nicolas Lemyre  
Førsteamanuensis og leder, Seksjon for coaching og psykologi  
Leder Forskningscenter for trening og prestasjon  
Norges idrettshøgskole  
E-post: [nicolas.lemyre@nih.no](mailto:nicolas.lemyre@nih.no)  
Tlf: 23 26 24 22

Samtykkeerklæring for deltakelse i forskningsprosjektet

*«Avgjørende faktorer for utvikling av toppidrettsutøvere i Norge»*

Jeg har mottatt og lest informasjonen om forskningsprosjektet.

Jeg ønsker å delta:

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Sted

---

Dato

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Underskrift utøver

## **Appendix IV**

Study II and III

Demographics

The Sport Motivation Scale II

The Brief Self-Control Scale

The Athlete Burnout Questionnaire (Study II)

The Athlete Burnout Questionnaire, Emotional and Physical Exhaustion (Study III)



## Demographics

Fyll ut skjemaet ved å sette kryss ved det som passer for deg.

Kjønn: Kvinne: ...  
Mann: ...

Fødselsår: .....

Antall år 1: ... 2: ... 3: ... 4: ... >4: ...  
vgs.:

Hovedidrett: Langrenn: ... Skiskyting: ... Hopp: ... Alpint: ...  
Andre idretter: .....

Antall år idrettssatsing: 1-3: ... 4-6: ... 7-9: ... 10-12: ... 13-15: ... >15: ...

Gjennomsnitt timer trening/uke: 1-5: ... 6-10: ... 11-15: ... >15: ...

Høyeste foreløpige prestasjonsnivå: VM/Ungdoms-OL: ... Internasjonalt renn: ...  
NM: ... Norgescup: ...  
Regionalt renn: ...

Mål for sesongen – deltakelse i: VM/Ungdoms-OL: ... Internasjonalt renn: ...  
NM: ... Norgescup: ...  
Regionalt renn: ...

## **Sport Motivation Scale-II**

(SMS-II; Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013)

Rapporter i hvilken grad argumentene under samsvarer med dine personlige grunner/din motivasjon for å være aktiv idrettsutøver.

Marker på en skala fra 1 til 7, der 1 = samsvarer absolutt ikke, 7 = samsvarer perfekt.

1. Fordi det gir meg glede å lære mer om idretten min.
2. Fordi å bedrive idrett gjenspeiler essensen av hvem jeg er.
3. Fordi det er en av de beste måtene jeg har valgt for å utvikle andre sider ved meg selv.
4. Fordi det er veldig interessant å lære hvordan jeg kan forbedre meg.
5. Det er ikke klart for lenger; jeg tror egentlig ikke min plass er i idretten.
6. Fordi jeg har valgt denne idretten som en måte å utvikle meg selv.
7. Fordi mennesker rundt meg belønner meg når jeg gjør dette.
8. Fordi jeg synes det er en god måte å utvikle sider ved meg selv som jeg verdsetter.
9. Fordi jeg ikke ville føle meg verdt noe om jeg ikke gjorde dette.
10. Fordi mennesker jeg bryr meg om ville blitt opprørt om jeg ikke gjorde dette.
11. Fordi gjennom idrett lever jeg i tråd med mine dypeste prinsipper.
12. Fordi det er gøy å oppdage nye strategier for å prestere.
13. Fordi jeg tror andre ville mislike meg hvis jeg ikke gjorde dette.
14. Fordi jeg føler meg bedre når jeg gjør dette.
15. Jeg har hatt gode grunner for å være aktiv utøver, men nå spør jeg meg selv om jeg skal fortsette.
16. Fordi jeg ville føle meg dårlig om jeg ikke tok meg tid til å gjøre dette.
17. Jeg vet ikke lenger; jeg har inntrykk av at jeg ikke er i stand til å lykkes i denne idretten.
18. Fordi deltakelse i idrett er en vesentlig del av livet mitt.

### The Brief Self-Control Scale

(Tangney, Baumeister, & Boone, 2004)

Ved hjelp av skalaen, vennligst oppgi hvor mye hver av de følgende påstandene passer for hvordan du vanligvis er. Sett kryss i ett det svaralternativ ved å bruke skalaen under.

Ikke i det hele tatt					Veldig mye
1	2	3	4	5	

1. Jeg er god til å motstå fristelse.
2. Jeg har vanskelig for å endre dårlige vaner.
3. Jeg er lat.
4. Jeg sier uanstendige ting.
5. Jeg gjør visse ting som ikke er bra for meg, hvis de er morsomme.
6. Jeg nekter å gjøre ting som er dårlige for meg.
7. Jeg ønsker jeg hadde mer selvdisciplin.
8. Andre ville si jeg har jerndisciplin.
9. Det å ha det gøy og moro hindrer meg ofte i å få jobben gjort.
10. Jeg har problemer med å konsentrere meg.
11. Jeg klarer å jobbe effektivt mot langsiktige mål.
12. Noen ganger klarer jeg ikke å unngå å gjøre noe, selv om jeg vet det er galt.
13. Jeg gjør ofte ting uten å tenke gjennom konsekvensene.

### Athlete Burnout Questionnaire

(Raedeke & Smith, 2001)

Besvar følgende påstander i forhold til hvordan du føler angående idretten din på nåværende tidspunkt. Det gjør du ved å sette kryss i en av boksene med numrene fra 1 til 5, hvor

- 1 betyr: "Jeg har det nesten aldri sånn",
- 2 betyr: "Jeg har det sjelden sånn",
- 3 betyr: "Jeg har det av og til sånn",
- 4 betyr: "Jeg har det ofte sånn",
- 5 betyr: "Jeg har det nesten alltid sånn".

	1	2	3	4	5
Jeg utretter mange verdifulle ting i idrett.....					
Jeg føler meg så sliten på grunn av treningen min, at jeg har problemer med å finne energien til å gjøre andre ting.....					
Den innsatsen jeg legger i idrett kunne vært brukt bedre på andre ting.....					
Jeg føler meg altfor sliten av å delta i idrett.....					
Jeg oppnår ikke mye i idrett.....					
Jeg bryr meg ikke så mye om mine idrettsprestasjoner, som jeg gjorde tidligere.....					
Jeg lever ikke opp til mine egne forventninger i idrett.....					
Jeg føler meg utslitt av idrett.....					
Jeg er ikke så engasjert i idrett som jeg har vært tidligere.....					
Jeg føler meg fysisk utslitt av idrett.....					
Jeg føler meg mindre bekymret om det å være suksessfull i idrett enn det jeg har vært tidligere.....					
Jeg blir både mentalt og fysisk utmattet av kravene i idrett.....					
Det virker som om, uansett hva jeg gjør, så er ikke prestasjonene mine så gode som de burde være.....					
Jeg føler, at jeg har suksess i idrett.....					
Jeg har negative følelser overfor idrett.....					

**Athlete Burnout Questionnaire, Emotional and Physical Exhaustion**  
(Raedeke & Smith, 2001)

Besvar følgende påstander i forhold til hvordan du føler angående idretten din på nåværende tidspunkt. Det gjør du ved å sette kryss i en av boksene med numrene fra 1 til 5, hvor

- 1 betyr: "Jeg har det nesten aldri sånn",
- 2 betyr: "Jeg har det sjelden sånn",
- 3 betyr: "Jeg har det av og til sånn",
- 4 betyr: "Jeg har det ofte sånn",
- 5 betyr: "Jeg har det nesten alltid sånn".

1. Jeg føler meg så sliten på grunn av treningen min, at jeg har problemer med å finne energien til å gjøre andre ting.
2. Jeg føler meg altfor sliten av å delta i idrett.
3. Jeg føler meg utslitt av idrett.
4. Jeg føler meg fysisk utslitt av idrett
5. Jeg blir både mentalt og fysisk utmattet av kravene i idrett



## **Appendix V**

### Study III

Application to the Norwegian Centre for Research Data

Approval by the Norwegian Centre for Research Data

Information letter and declaration of consent participants, information letter institution

## MELDESKJEMA

Meldeskjema (versjon 1.4) for forsknings- og studentprosjekt som medfører meldeplikt eller konsesjonsplikt (jf. personopplysningsloven og helseregisterloven med forskrifter).

1. Intro		
Samles det inn direkte personidentifiserende opplysninger?	Ja • Nei ○	En person vil være direkte identifiserbar via navn, personnummer, eller andre personentydige kjennetegn.
Hvis ja, hvilke?	<input checked="" type="checkbox"/> Navn <input type="checkbox"/> 11-sifret fødselsnummer <input type="checkbox"/> Adresse <input checked="" type="checkbox"/> E-post <input type="checkbox"/> Telefonnummer <input checked="" type="checkbox"/> Annet	Les mer om hva personopplysninger.  NB! Selv om opplysningene skal anonymiseres i oppgave/rapport, må det krysses av dersom det skal innhentes/registreres personidentifiserende opplysninger i forbindelse med prosjektet.
Annet, spesifiser hvilke	Navn blir innhentet da deltakere skriver under på samtykkeerklæring.	
Skal direkte personidentifiserende opplysninger kobles til datamaterialet (koblingsnøkkel)?	Ja ○ Nei •	Merk at meldeplikten utløses selv om du ikke får tilgang til koblingsnøkkel, slik fremgangsmåten ofte er når man benytter en databehandler
Samles det inn bakgrunnsopplysninger som kan identifisere enkeltpersoner (indirekte personidentifiserende opplysninger)?	Ja • Nei ○	En person vil være indirekte identifiserbar dersom det er mulig å identifisere vedkommende gjennom bakgrunnsopplysninger som for eksempel bostedskommune eller arbeidsplass/skole kombinert med opplysninger som alder, kjønn, yrke, diagnose, etc.
Hvis ja, hvilke	Alder, kjønn, idrett (det vil imidlertid være flere deltakere med akkurat de samme opplysningene for disse variablene)	NB! For at stemme skal regnes som personidentifiserende, må denne bli registrert i kombinasjon med andre opplysninger, slik at personer kan gjenkjennes.
Skal det registreres personopplysninger (direkte/indirekte/via IP-/epost adresse, etc) ved hjelp av nettbaserte spørreskjema?	Ja • Nei ○	Les mer om nettbaserte spørreskjema.
Blir det registrert personopplysninger på digitale bilde- eller videoopptak?	Ja ○ Nei •	Bilde/videoopptak av ansikter vil regnes som personidentifiserende.
Søkes det vurdering fra REK om hvorvidt prosjektet er omfattet av helseforskningsloven?	Ja ○ Nei •	NB! Dersom REK (Regional Komité for medisinsk og helsefaglig forskningsetikk) har vurdert prosjektet som helseforskning, er det ikke nødvendig å sende inn meldeskjema til personvernombudet (NB! Gjelder ikke prosjekter som skal benytte data fra pseudonyme helseregistre).  Dersom tilbakemelding fra REK ikke foreligger, anbefaler vi at du avventer videre utfylling til svar fra REK foreligger.
2. Prosjektittel		
Prosjektittel	A longitudinal study assessing the effects of motivation, self-regulatory competencies, and training load on the performance of young athletes over the course of a competitive season	Oppgi prosjektets tittel. NB! Dette kan ikke være «Masteroppgave» eller liknende, navnet må beskrive prosjektets innhold.
3. Behandlingsansvarlig institusjon		
Institusjon	Norges idrettshøgskole	Velg den institusjonen du er tilknyttet. Alle nivå må oppgis. Ved studentprosjekt er det studentens tilknytning som er avgjørende. Dersom institusjonen ikke finnes på listen, har den ikke avtale med NSD som personvernombud. Vennligst ta kontakt med institusjonen.
Avdeling/Fakultet	Seksjon for coaching og psykologi	
Institutt		
4. Daglig ansvarlig (forsker, veileder, stipendiat)		



Fornavn	Gro	<p>Før opp navnet på den som har det daglige ansvaret for prosjektet. Veileder er vanligvis daglig ansvarlig ved studentprosjekt.</p> <p>Daglig ansvarlig og student må i utgangspunktet være tilknyttet samme institusjon. Dersom studenten har ekstern veileder, kanbiveileder eller fagansvarlig ved studiestedet stå som daglig ansvarlig.</p> <p>Arbeidssted må være tilknyttet behandlingsansvarlig institusjon, f.eks. underavdeling, institutt etc.</p> <p>NB! Det er viktig at du oppgir en e-postadresse som brukes aktivt. Vennligst gi oss beskjed dersom den endres.</p>
Etternavn	Jordalen	
Stilling	Stipendiat	
Telefon	23262351	
Mobil	99778965	
E-post	gro.jordalen@nih.no	
Alternativ e-post	grojor85@gmail.com	
Arbeidssted	Norges Idrettshøgskole	
Adresse (arb.)	PB 4014 Ullevål Stadion, Sognsv. 220	
Postnr./sted (arb.sted)	0806 Oslo	
<b>5. Student (master, bachelor)</b>		
Studentprosjekt	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Dersom det er flere studenter som samarbeider om et prosjekt, skal det velges en kontaktperson som føres opp her. Øvrige studenter kan føres opp under pkt 10.
<b>6. Formålet med prosjektet</b>		
Formål	Denne studien vil undersøke hvordan unge vintersport utøveres motivasjon, evne for selv-regulering, velvære, utmattelse, antall år med erfaring innen idrett, treningsbelastning og prestasjonsnivå er assosiert over vintersesongen 2015/16. Analysene inkluderer utøvere på ulike prestasjonsnivå, med ulikt antall år idrettserfaring, samt ulik treningsbelastning, og har som formål å undersøke forskjeller i disse variablene i forhold til de idrettspsykologiske faktorene, samt hvorvidt utøverne bruker disse psykologiske faktorene i trening og prestasjon. Det antas at assosiasjoner mellom selv-bestemt motivasjon, evne for selv-regulering, og grad av velvære/utmattelse vil påvirkes av prestasjonsnivå, år idrettserfaring, og treningsbelastning.	Redegjør kort for prosjektets formål, problemstilling, forskningsspørsmål e.l.
<b>7. Hvilke personer skal det innhentes personopplysninger om (utvalg)?</b>		
Kryss av for utvalg	<input type="checkbox"/> Barnehagebarn <input checked="" type="checkbox"/> Skoleelever <input type="checkbox"/> Pasienter <input type="checkbox"/> Brukere/klienter/kunder <input type="checkbox"/> Ansatte <input type="checkbox"/> Barnevernsbarn <input type="checkbox"/> Lærere <input type="checkbox"/> Helsepersonell <input type="checkbox"/> Asylsøkere <input checked="" type="checkbox"/> Andre	
Beskriv utvalg/deltakere	Vintersport-utøvere i alderen 16-20 år.	Med utvalg menes dem som deltar i undersøkelsen eller dem det innhentes opplysninger om.
Rekruttering/trekking	Rekruttering fra skoler (f.eks NTG) og idrettsklubber.	Beskriv hvordan utvalget trekkes eller rekrutteres og oppgi hvem som foretar den. Et utvalg kan trekkes fra registre som f.eks. Folkeregisteret, SSB-registre, pasientregistre, eller det kan rekrutteres gjennom f.eks. en bedrift, skole, idrettsmiljø eller eget nettverk.
Førstegangskontakt	Ansvarlig for prosjektet (stipendiat) vil sende informasjon om prosjektet til aktuelle sportssjefer, trenere og lærere på e-post, og senere kontakte disse per telefon for å undersøke interesse for at deres gruppe utøvere deltar.	Beskriv hvordan kontakt med utvalget blir opprettet og av hvem. Les mer om dette på temasidene.
Alder på utvalget	<input type="checkbox"/> Barn (0-15 år) <input checked="" type="checkbox"/> Ungdom (16-17 år) <input checked="" type="checkbox"/> Voksne (over 18 år)	Les om forskning som involverer barn på våre nettsider.
Omtrentlig antall personer som inngår i utvalget	200	
Samles det inn sensitive personopplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Les mer om sensitive opplysninger.

Hvis ja, hvilke?	<input type="checkbox"/> Rasemessig eller etnisk bakgrunn, eller politisk, filosofisk eller religiøs oppfatning <input type="checkbox"/> At en person har vært mistenkt, siktet, tiltalt eller dømt for en straffbar handling <input type="checkbox"/> Helseforhold <input type="checkbox"/> Seksuelle forhold <input type="checkbox"/> Medlemskap i fagforeninger	
Inkluderes det myndige personer med redusert eller manglende samtykkekompetanse?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Les mer om pasienter, brukere og personer med redusert eller manglende samtykkekompetanse.
Samles det inn personopplysninger om personer som selv ikke deltar (tredjepersoner)?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Med opplysninger om tredjeperson menes opplysninger som kan spores tilbake til personer som ikke inngår i utvalget. Eksempler på tredjeperson er kollega, elev, klient, familiemedlem.
<b>8. Metode for innsamling av personopplysninger</b>		
Kryss av for hvilke datainnsamlingsmetoder og datakilder som vil benyttes	<input type="checkbox"/> Papirbasert spørreskjema <input checked="" type="checkbox"/> Elektronisk spørreskjema <input type="checkbox"/> Personlig intervju <input type="checkbox"/> Gruppeintervju <input type="checkbox"/> Observasjon <input type="checkbox"/> Deltakende observasjon <input type="checkbox"/> Blogg/sosiale medier/internett <input type="checkbox"/> Psykologiske/pedagogiske tester <input type="checkbox"/> Medisinske undersøkelser/tester <input type="checkbox"/> Journaldata (medisinske journaler)	<p>Personopplysninger kan innhentes direkte fra den registrerte f.eks. gjennom spørreskjema, intervju, tester, og/eller ulike journaler (f.eks. elevmapper, NAV, PPT, sykehus) og/eller registre (f.eks. Statistisk sentralbyrå, sentrale helseregistre).</p> <p>NB! Dersom personopplysninger innhentes fra forskjellige personer (utvalg) og med forskjellige metoder, må dette spesifiseres i kommentar-boksen. Husk også å legge ved relevante vedlegg til alle utvalgs-gruppene og metodene som skal benyttes.</p> <p>Les mer om registerstudier her.</p> <p>Dersom du skal anvende registerdata, må variabelistene lastes opp under pkt. 15</p>
	<input type="checkbox"/> Registerdata	
	<input type="checkbox"/> Annen innsamlingsmetode	
Tilleggsopplysninger		
<b>9. Informasjon og samtykke</b>		
Oppgi hvordan utvalget/deltakerne informeres	<input checked="" type="checkbox"/> Skriftlig <input checked="" type="checkbox"/> Muntlig <input type="checkbox"/> Informeres ikke	<p>Dersom utvalget ikke skal informeres om behandlingen av personopplysninger må det begrunnes.</p> <p>Les mer her.</p> <p>Vennligst send inn mal for skriftlig eller muntlig informasjon til deltakerne sammen med meldeskjema.</p> <p>Last ned en veiledende mal her.</p> <p>NB! Vedlegg lastes opp til sist i meldeskjemaet, se punkt 15 Vedlegg.</p>
Samtykker utvalget til deltakelse?	<input checked="" type="radio"/> Ja <input type="radio"/> Nei <input type="radio"/> Flere utvalg, ikke samtykke fra alle	<p>For at et samtykke til deltakelse i forskning skal være gyldig, må det være frivillig, uttrykkelig og informert.</p> <p>Samtykke kan gis skriftlig, muntlig eller gjennom en aktiv handling. For eksempel vil et besvart spørreskjema være å regne som et aktivt samtykke.</p> <p>Dersom det ikke skal innhentes samtykke, må det begrunnes.</p>
Innhentes det samtykke fra foreldre for ungdom mellom 16 og 17 år?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Les mer om forskning som involverer barn og samtykke fra unge.
Hvis nei, begrunn		
<b>10. Informasjonssikkerhet</b>		
Spesifiser	Personidentifiserende opplysninger blir innhentet ved hjelp av SurveyXact, og data blir oppbevart på PC på låst kontor når forsker ikke er tilstede. Direkte personidentifiserende opplysninger (deltakers navn i samtykkeerklæring) blir oppbevart låst på veileders kontor).	NB! Som hovedregel bør ikke direkte personidentifiserende opplysninger registreres sammen med det øvrige datamaterialet.

Hvordan registreres og oppbevares personopplysningene?	<input type="checkbox"/> På server i virksomhetens nettverk <input type="checkbox"/> Fysisk isolert PC tilhørende virksomheten (dvs. ingen tilknytning til andre datamaskiner eller nettverk, interne eller eksterne) <input checked="" type="checkbox"/> Datamaskin i nettverkssystem tilknyttet Internett tilhørende virksomheten <input type="checkbox"/> Privat datamaskin <input type="checkbox"/> Videopptak/fotografi <input type="checkbox"/> Lydopptak <input type="checkbox"/> Notater/papir <input checked="" type="checkbox"/> Mobile lagringsenheter (bærbar datamaskin, minnepenn, minnekort, cd, ekstern harddisk, mobiltelefon) <input type="checkbox"/> Annen registreringsmetode	<p>Merk av for hvilke hjelpemidler som benyttes for registrering og analyse av opplysninger.</p> <p>Sett flere kryss dersom opplysningene registreres på flere måter.</p> <p>Med «virksomhet» menes her behandlingsansvarlig institusjon.</p> <p>NB! Som hovedregel bør data som inneholder personopplysninger lagres på behandlingsansvarlig sin forskningsserver.</p> <p>Lagring på andre medier - som privat pc, mobiltelefon, minnepenne, server på annet arbeidssted - er mindre sikkert, og må derfor begrunnes. Slik lagring må avklares med behandlingsansvarlig institusjon, og personopplysningene bør krypteres.</p>
Annen registreringsmetode beskriv		
Hvordan er datamaterialet beskyttet mot at uvedkommende får innsyn?	PC er beskyttet med brukernavn og passord, og den blir oppbevart på låst kontor når forsker ikke er tilstede.	Er f.eks. datamaskintilgangen beskyttet med brukernavn og passord, står datamaskinen i et låsbart rom, og hvordan sikres bærbare enheter, utskrift og opptak?
Samles opplysningene inn/behandles av en databehandler (ekstern aktør)?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	Dersom det benyttes eksterne til helt eller delvis å behandle personopplysninger, f.eks. Questback, transkriberingsassistent eller tolk, er dette å betrakte som en databehandler. Slike oppdrag må kontraksreguleres.
Hvis ja, hvilken		
Overføres personopplysninger ved hjelp av e-post/Internett?	Ja <input checked="" type="radio"/> Nei <input type="radio"/>	F.eks. ved overføring av data til samarbeidspartner, databehandler mm.
Hvis ja, beskriv?	Personopplysninger (alder, kjønn) samles inn ved hjelp av SurveyXact	Dersom personopplysninger skal sendes via internett, bør de krypteres tilstrekkelig. Vi anbefaler for ikke lagring av personopplysninger på nettskytjenester. Dersom nettskytjeneste benyttes, skal det inngås skriftlig databehandleravtale med leverandøren av tjenesten.
Skal andre personer enn daglig ansvarlig/student ha tilgang til datamaterialet med personopplysninger?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	
Hvis ja, hvem (oppgi navn og arbeidssted)?		
Utleveres/deles personopplysninger med andre institusjoner eller land?	<input checked="" type="radio"/> Nei <input type="radio"/> Andre institusjoner <input type="radio"/> Institusjoner i andre land	F.eks. ved nasjonale samarbeidsprosjekter der personopplysninger utveksles eller ved internasjonale samarbeidsprosjekter der personopplysninger utveksles.
<b>11. Vurdering/godkjenning fra andre instanser</b>		
Søkes det om dispensasjon fra taushetsplikten for å få tilgang til data?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	For å få tilgang til taushetsbelagte opplysninger fra f.eks. NAV, PPT, sykehus, må det søkes om dispensasjon fra taushetsplikten. Dispensasjon søkes vanligvis fra aktuelt departement.
Hvis ja, hvilke		
Søkes det godkjenning fra andre instanser?	Ja <input type="radio"/> Nei <input checked="" type="radio"/>	F.eks. søke registreier om tilgang til data, en ledelse om tilgang til forskning i virksomhet, skole.
Hvis ja, hvilken		
<b>12. Periode for behandling av personopplysninger</b>		
Prosjektstart	01.12.2015	Prosjektstart Vennligst oppgi tidspunktet for når kontakt med utvalget skal gjøres/datainnsamlingen starter.
Planlagt dato for prosjektslutt	15.04.2016	Prosjektslutt: Vennligst oppgi tidspunktet for når datamaterialet enten skal anonymiseres/slettes, eller arkiveres i påvente av oppfølgingsstudier eller annet.
Skal personopplysninger publiseres (direkte eller indirekte)?	<input type="checkbox"/> Ja, direkte (navn e.l.) <input checked="" type="checkbox"/> Ja, indirekte (bakgrunnsopplysninger) <input type="checkbox"/> Nei, publiseres anonymt	NB! Dersom personopplysninger skal publiseres, må det vanligvis innhentes eksplisitt samtykke til dette fra den enkelte, og deltakere bør gis anledning til å lese gjennom og godkjenne sitater.
Hva skal skje med datamaterialet ved prosjektslutt?	<input checked="" type="checkbox"/> Datamaterialet anonymiseres <input type="checkbox"/> Datamaterialet oppbevares med personidentifikasjon	NB! Her menes datamaterialet, ikke publikasjon. Selv om data publiseres med personidentifikasjon skal som regel øvrig data anonymiseres. Med anonymisering menes at datamaterialet bearbejdes slik at det ikke lenger er mulig å føre opplysningene tilbake til enkeltpersoner. Les mer om anonymisering.
<b>13. Finansiering</b>		

Hvordan finansieres prosjektet?	Prosjektet finansieres av Norges Idrettshøgskole, Seksjon for Coaching og Psykologi	
<b>14. Tilleggsopplysninger</b>		
Tilleggsopplysninger		



Gro Jordalen  
Seksjon for coaching og psykologi Norges idrettshøgskole  
Postboks 4014 Ullevål stadion  
0806 OSLO

Vår dato: 12.11.2015

Vår ref: 45268 / 3 / MHM

Deres dato:

Deres ref:

## TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 20.10.2015. All nødvendig informasjon om prosjektet forelå i sin helhet 12.11.2015. Meldingen gjelder prosjektet:

45268                      *A longitudinal study assessing the effects of motivation, self-regulatory competencies, and training load on the performance of young athletes over the course of a competitive season*  
*Behandlingsansvarlig*    *Norges idrettshøgskole, ved institusjonens øverste leder*  
*Daglig ansvarlig*        *Gro Jordalen*

Personvernombudet har vurdert prosjektet og finner at behandlingen av personopplysninger er meldepliktig i henhold til personopplysningsloven § 31. Behandlingen tilfredsstillende kravene i personopplysningsloven.

Personvernombudets vurdering 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, 15.04.2016, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Marianne Høgetveit Myhren

Kontaktperson: Marianne Høgetveit Myhren tlf: 55 58 25 29

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

*Avdelingskontorer / District Offices*

*OSLO:* NSD, Universitetet i Oslo, Postboks 1055 Blindern, 0316 Oslo. Tel: +47-22 85 52 11. [nsd@uio.no](mailto:nsd@uio.no)

*TRONDHEIM:* NSD, Norges teknisk-naturvitenskapelige universitet, 7491 Trondheim. Tel: +47-73 59 19 07. [kyrre.svarva@svt.ntnu.no](mailto:kyrre.svarva@svt.ntnu.no)

*TROMSØ:* NSD, SVF, Universitetet i Tromsø, 9037 Tromsø. Tel: +47-77 64 43 36. [nsdmaa@sv.uit.no](mailto:nsdmaa@sv.uit.no)



Vedlegg: Prosjektvurdering



Utvalget informeres skriftlig og muntlig om prosjektet og samtykker til deltakelse. Informasjonsskrivet er godt utformet forutsatt at "anonymiseres" fjernes fra setningen "Alle data behandles med konfidensialitet, og deltakere vil anonymiseres ved hjelp av et referanse-nummer" i informasjonsskrivene til deltakerne/institusjoner. Du kan f.eks. heller skrive at deltakerne vil få utdelt et referansenummer som de skal oppgi i spørreundersøkelsen, og evt. at de ikke vil bli bedt om å oppgi navn jf. telefonsamtale 12.11.2015. Det må også inkluderes at data anonymiseres ved prosjektslutt 15.04.2016.

Personvernombudet legger til grunn at forsker etterfølger Norges idrettshøgskole sine interne rutiner for datasikkerhet. Dersom personopplysninger skal sendes elektronisk eller lagres på pc/mobile enheter, bør opplysningene krypteres tilstrekkelig.

SurveyXact er databehandler for prosjektet. Norges idrettshøgskole skal inngå skriftlig avtale med SurveyXact om hvordan personopplysninger skal behandles, jf. personopplysningsloven § 15. For råd om hva databehandleravtalen bør inneholde, se Datatilsynets veileder: <http://www.datatilsynet.no/Sikkerhet-internkontroll/Databehandleravtale/>.

Forventet prosjektslutt er 15.04.2016. Ifølge prosjektmeldingen skal innsamlede opplysninger da anonymiseres. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved å:

- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. bosted/arbeidssted, alder og kjønn)

Vi gjør oppmerksom på at også databehandler (SurveyXact) må slette personopplysninger tilknyttet prosjektet i sine systemer. Dette inkluderer eventuelle logger og koblinger mellom IP-/epostadresser og besvarelser.



Forespørsel om å delta i forskningsprosjektet

*«Avgjørende faktorer for utvikling av toppidrettsutøvere i Norge –  
Variasjoner gjennom en konkurransesesong»*

Vi ønsker å invitere deg til deltakelse i et spennende forskningsprosjekt. Prosjektet vil se på motivasjon blant unge utøvere i konkurransesesong, og formålet er å studere utvikling på veien mot elite prestasjoner og en toppidrettskarriere. Prosjektet gjennomføres vinter-sesongen 2015-2016, og vil være en longitudinell undersøkelse som inneholder et demografisk spørreskjema samt flere standardiserte internasjonale spørreskjemaer oversatt til norsk. Antatt varighet for besvarelse er ca. 10 minutter. Besvarelse skjer 6 ganger gjennom sesongen (en gang hver måned).

Det er frivillig å delta i prosjektet, deltakere kan når som helst trekke seg fra prosjektet uten å oppgi grunn, og data vil bli slettet. Alle data behandles med konfidensialitet, og deltakere vil anonymiseres ved hjelp av et referansenummer. Kun undertegnede har tilgang til data, og forsker er underlagt taushetsplikt. Foresatte/verge for utøvere under 18 år har rett til å se spørreskjemaer på forhånd dersom det er ønskelig.

Prosjektet er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S, og finansieres av Seksjon for coaching og psykologi ved Norges Idrettshøgskole (NIH). Resultatene vil være tilgjengelig for alle deltakere ved å kontakte undertegnede etter forventet levert avhandling våren 2017. Som stipendiat ved NIH 2013-2017, skal forskningsprosjektet være grunnlaget for min doktorgrad, under veiledning av førsteamanuensis Pierre-Nicolas Lemyre ved NIH.

Dersom du ønsker å delta i prosjektet, returner samtykkeerklæring og besvar spørreskjema i SurveyXact (internettbasert spørreskjema system). Ved spørsmål, ta gjerne kontakt gjerne undertegnede.

Med vennlig hilsen

Gro Jordalen  
Stipendiat, Seksjon for coaching og  
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E-post: [gro.jordalen@nih.no](mailto:gro.jordalen@nih.no)  
Tlf: 23 26 23 51 / 99 77 89 65

Pierre-Nicolas Lemyre  
Førsteamanuensis og leder, Seksjon for  
coaching og psykologi  
Leder Forskningscenter for trening og  
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Norges idrettshøgskole  
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Samtykkeerklæring for deltakelse i forskningsprosjektet

*«Avgjørende faktorer for utvikling av toppidrettsutøvere i Norge –  
Variasjoner gjennom en konkurransesong»*

Jeg har mottatt og lest informasjonen om forskningsprosjektet.

Jeg ønsker å delta:

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Sted

---

Dato

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Underskrift utøver

Til *navn institusjon*

*v/leder*

*adresse*

Oslo, 18.10.2013

Anmodning om å få gjennomføre en undersøkelse ved *eksempel navn institusjon*

Vi ønsker å invitere utøvere ved *navn institusjon* til deltakelse i forskningsprosjektet «*Avgjørende faktorer for utvikling av toppidrettsutøvere i Norge – Variasjoner gjennom en konkurransesesong*». Prosjektet vil se på motivasjon blant unge utøvere i konkurransesesong, med formål om å studere utviklingen på veien mot elite prestasjoner og en toppidrettskarriere. Prosjektet skal gjennomføres vintersesongen 2015-2016, og vil bestå av en longitudinell undersøkelse som inneholder et demografisk spørreskjema samt flere standardiserte internasjonale spørreskjemaer oversatt til norsk. Antatt varighet for besvarelse er ca. 10 minutter.

Det er frivillig å delta i prosjektet, og deltakere kan når som helst trekke seg fra prosjektet uten å oppgi grunn. Data for deltakere som velger å trekke seg, vil bli anonymisert og slettet. Alle data behandles med konfidensialitet, og deltakere vil anonymiseres ved hjelp av et referansenummer. Kun undertegnede har tilgang til data, og forsker er underlagt taushetsplikt. Foresatte/verge for utøvere under 18 år har rett til å se spørreskjemaer på forhånd dersom det er ønskelig.

Prosjektet er meldt til Personvernombudet for forskning, Norsk samfunnsvitenskapelig datatjeneste A/S, og finansieres av Seksjon for coaching og psykologi ved Norges Idrettshøgskole (NIH). Resultatene vil være tilgjengelig for alle deltakere ved å kontakte undertegnede etter forventet levert avhandling våren 2017. Som stipendiat ved NIH 2013-2017, skal forskningsprosjektet være grunnlaget for min doktorgrad, under veiledning av førsteamanuensis Pierre-Nicolas Lemyre ved NIH.

Siden *navn institusjon* ved *leder* er ansvarlig for trening og oppfølging av utøvere, rettes denne anmodningen til dere/hit. På forhånd har jeg tatt kontakt med *navn kontaktperson* ved *navn institusjon*, som har uttrykt velvilje for prosjektet. Det vil bli gitt utfyllende informasjon om prosjektet og dets resultat til ansatte, utøvere og foreldre når disse er klare (dersom dette er ønskelig). Jeg håper at *navn institusjon* stiller seg positive til deltakelse i undersøkelsen.

Ved spørsmål, kontakt gjerne undertegnede.

Med vennlig hilsen,

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