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Mindfulness training in performance enhancement and burnout prevention in junior elite athletes

An exploration of the influence of mindfulness training on stress, school and sports performance, and athlete burnout among Norwegian Junior Elite Athletes

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En undersøkelse av innflytelsen av mindfulness trening på stress, skole- og idrettsprestasjon, og utbrenthet blant junior elite idrettsutøvere

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En undersøkelse av innflytelsen av mindfulness trening på stress, skole- og idrettsprestasjon og utbrenthet blant junior elite idrettsutøvere

Sammendrag

Hensikten med denne studien har vært å undersøke påvirkningen mindfulness trening har på stress, oppfattet skole- og idrettsprestasjon, og utbrenthet (athlete burnout) blant junior elite idrettsutøvere.

Interaksjonen mellom variablene; *grad av mindfulness*, *oppfattet stress*, *oppfattet skole- og idrettsprestasjon,* og *grad av burnout* ble undersøkt ved en kvantitativ spørreundersøkelse, blant 382 junior elite idrettsutøvere ved syv ulike videregående skoler i Midt-Norge, der samtlige utøvere var tilknyttet satsningen *spisset toppidrett*.

I det formål å kunne belyse anvendbarhet av mindfulness trening i forebygging av utbrenthet og for prestasjonsutvikling blant junior elite idrettsutøvere, ble i tillegg en 12-ukers mindfulness treningsintervensjon med 29 junior elite utøvere gjennomført og analysert kvalitativt.

Resultater av de kvantitative analysene om interaksjonen mellom de nevnte variablene, viser at høyere grad av mindfulness er assosiert med lavere nivåer av stress, høyere oppfattet skole- og idrettsprestasjoner, og lavere grad av utbrenthet.

Mindfulness intervensjonen viste til å ha en positiv innvirkning på utøvernes oppfattet tankestress, resulterende i bedre søvn og derav forbedret restitusjon. I tillegg viste intervensjonen til å ha en betydelig innvirkning på juniorutøvernes oppmerksomhet

Reduksjon i tankestress, forbedret søvn, og derav forbedret restitusjon tyder på at mindfulness trening er hensiktsmessig i forebygging av utbrenthet blant junior elite utøvere. Forbedret oppmerksomhet og de resulterende fordelene ved dette kan tyde på at mindfulness trening også kan ha en positiv innvirkning på prestasjonsutvikling innen skole og idrett.

Nøkkelord: Mindfulness-meditasjon, athlete burnout, burnout, stress reduksjon, junior utøvere, junior idrett, oppmerksomhet.

An exploration of the influence of mindfulness training on stress, school and sports performance, and athlete burnout among Norwegian Junior Elite Athletes

Abstract

Aim of this thesis is to explore the influence of mindfulness training on stress, perceived performance in school and sports as well as athlete burnout in junior elite athletes.

The interaction between the variables, degree of mindfulness, perceived stress, perceived performance in school and sports, and degree of burnout was investigated through a survey examination in 382 junior elite athletes. These junior athletes attended 7 different high schools offering elite sports programs in Mid-Norway. Additionally, a 12-week mindfulness-training program on 29 junior elite athletes was performed and analyzed qualitatively in order to determine the usefulness of mindfulness training in burnout prevention and performance enhancement in junior elite sports.

The results of the quantitative analysis of the interaction of the variables mindfulness, stress, school and sports performance and athletes burnout showed that higher levels of mindfulness are associated with lower levels of stress, higher levels of perceived school- and sports performance, and lower levels of athlete burnout. The mindfulness intervention was shown to have a positive impact on athletes perceived mind stress, resulting in better sleep and feelings of improved recovery. Besides the influence on mind stress and recovery, changes in *awareness* seem to be the most obvious outcome of the mindfulness intervention. All athletes mentioned they had improved their awareness. Improvements in attention awareness, focus awareness, awareness of inner experiences and awareness of beneficial and nonbeneficial personal choices were mentioned by all athletes.

The reduction of perceived mind stress and the improved recovery through better sleep indicates the usefulness of mindfulness training in athlete burnout prevention.

The improved awareness might result in better attention abilities that could be important in performance enhancement in both, school and sports.

Keywords: Mindfulness-meditation, burnout, stress reduction, awareness, sleep, performance enhancement, junior athletes, junior sports.

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1. Introduction

Junior elite athletes often dream about a bright future in their sport. But on their long path towards future glory they can and will meet a wide range of challenges, which can contribute to performance impairment, negative overload and eventually burnout. Pressure to perform highly in both sports and school (Moen, 2013) and a wide range of age-related problems are only some of the challenges junior elite athletes have to face and cope with. High degrees of stress have an impact on an athlete's ability for training adaption and performance (Goodger, Gorely, Lavalle & Hardwood, 2007). This in turn decreases their ability to reach their own goals. Possibly unfulfilled expectations within sports or school may also lead to higher levels of stress and thereby contribute to burnout (Gustafsson, Kenttä, Hassmén & Lundqvist, 2007; Goodger et al., 2007; Gould & Dieffenbach, 2002; Moen, 2013).

While adult elite athletes are frequently part of a professional team with professional coaches, physiologists, sports psychologists and medical stuff, who help athletes to cope with a wide range of situations, junior athletes often do not have access to the same kind of expertise. Junior elite athletes are in a sensitive age for their athletic development. At this age they often have to and want to succeed in multiple disciplines (school/sports), while they sometimes meet an even higher range of challenges and external expectations compared to adult elite athletes (Moen, 2013). Athlete burnout is, therefore, especially problematic in junior sports and can be seen as a possible antecedent for early drop out from sports (Moen, 2013). Research, to help prevent junior athletes from getting burned out, is therefore of high importance.

Due to the multidimensional nature of athlete burnouts and because of the contributing influence of stress on burnout syndromes (Black & Smith, 2007; Gustafsson & Skoog, 2012; Raedeke & Smith, 2001; 2004), stress management and stress reducing training could be an interesting part of burnout prevention. One widely used intervention method in stress reduction is mindfulness training, which was shown to alleviate a variety of mental health problems and improve psychological functioning (Baer, 2003). In addition to the stress reducing effect of mindfulness training (Baer, 2003; Grossman, Niemann, Schmidt & Wallach, 2004), mindfulness is also negatively associated to burnout (Mc Cracken & Yang, 2008).

Research on neural correlates of mindfulness and clinical sports psychology has further shown that mindfulness can be useful in a wide range of performance enhancement cases, like performance development, performance dysfunction, performance impairment, and performance termination (Marks, 2008).

Because athlete burnout is a chronic state, difficult to handle and which can have a big impact on athletes daily life, this thesis seeks to explore if mindfulness training can be useful in stress reduction, performance enhancement and burnout prevention in junior elite athletes. This study first investigates possible interactions between the mentioned variables, which are possible antecedents to athlete burnout. This study further aims to explore possible influences of mindfulness training on mindfulness, stress, perceived performance in school and sports and athlete burnout in junior elite athletes.

2. Theoretical background

Excellence in performance and in life begins with a vision of where you want to go and commitment to do what it takes to get there (Orlick, 2000). In elite sports, high levels of performance are the result of many years of well planned, systematical, highly demanding training - both physically and mentally (Bompa, 1999). Reaching an international level in elite sports requires training spans of 10 years or more with high training volumes (Smith, 2003; Viru &Viru, 2001). The main purpose in all these years of elite training is to enhance performance level by adapting physiology and mind to the specific requirements of the sport and by using an optimal training load (O`Toole, 1998). The higher the degree of adaptation to the training process, the greater the potential for high levels of performance will be (Bompa &Haff, 2009). However, adaptation to training depends on the relationship between stress (physiological, psychological and social stress) and adequate regeneration.

An accumulation of sometimes small, but daily problems, such as school or work stress, dysfunctional relationships, social conflicts, financial problems, illnesses or death of close related persons, can affect an athlete's training tolerance (Miller, Vaughn, & Miller, 1990). Over time this accumulated stress can become chronic (McEwen, 1998; Semmer, McGrath, & Beehr, 2005). Chronic stress and maladaptation to stress over time can lead towards the mentioned impairment of training adaptation, the risk of underperformance, the development of overtraining syndrome, and ultimately athlete burnout (Cresswell,

2009; Gustafsson, Hassmén, Kenttä & Lundqvist, 2008; Rowbottom, 2000). Therefore, it is of high importance that athletes and coaches consider these non-training stressors in combination with the training load (Gustafsson, Kenttä & Hassmén, 2011).

Athlete burnout is a difficult and chronic state, from which it often takes a long time to recover (Shirom, 2005). Although the occurrence of athlete burnout still is not fully understood (Judge, Bell, Theodore, Simon & Bellar, 2012), it is suggested that the number of athletes, who are suffering from burnout, seems to be rising (Gould & Dieffenbach, 2002). The already mentioned chronic stress from various sources seems to be the most important antecedent (Raedeke & Smith, 2001; Schaufeli & Buunk, 2003). Psychosocial factors (Cresswell & Eklund, 2006), excessive training stress and lack of recovery (Gould, Tuffey, Udry & Loehr, 1997; Gustafsson et al., 2008; Lemyre, Treasure & Roberts, 2006), sport hassles (Cresswell, 2009), or perceived performance pressure from coaches (Price & Weiss, 2000) are only some of a wide range of stressors, which can contribute to the development of athlete burnout.

Athlete burnout is considered to be a multidimensional syndrome or construct (Raedeke &Smith, 2009; Coakley, 2009; Gustafsson et al., 2011), which consists of three central dimensions: 1) *emotional and physical exhaustion*, 2) *reduced sense of accomplishment*, and 3) *sport devaluation* (Raedeke, 1997). According to Raedeke & Smith (2009) *emotional and physical exhaustion* seems to be the most obvious manifestation of burnout and is characterized by feelings of emotional and physical fatigue associated with training and competing. They hypothesize that *a reduced sense of accomplishment* is explained by perceived inefficacy and a tendency to negative evaluations of oneself, in terms of sports performance and own accomplishments. Athletes, who experience this phenomenon, perform below expectations and are unable to achieve personal goals (Raedeke & Smith, 2009). *Sport devaluation* is defined as a detached attitude towards the sport, reflected by negativity and a lack of concern regarding the sport itself and the performance quality (Raedeke & Smith, 2009). The most common consequence of high levels of burnout is lack of motivation (Goodger et al., 2007), which may lead to the unwanted outcome of dropout from sports (Moen, 2013).

Because of the strong research support on the influence of stress on burnout syndromes (Black & Smith, 2007; Gustafsson & Skoog, 2012; Raedeke & Smith, 2001; 2004), stress management should be seen as an important part of recovery and behavior changing processes (Nigg, Borelli, Maddock, & Dishman, 2008). One widely used intervention method in stress reduction is mindfulness training, which may help reduce a

variety of mental health problems and improve psychological functioning (Baer, 2003). Mindfulness has been described as paying attention on purpose, in the present moment, and without judgment (Kabat-Zinn, 1994). It is also described as a non-evaluative, receptive moment-to-moment attention or awareness with three principal components - non-evaluation (non-judgment), open receptivity and present-centeredness (Brown & Ryan, 2003). According to Weinstein and Ryan (2011) these three components together characterize the mindful-awareness state and are believed to work together in producing beneficial outcomes. A tendency towards open-mindedness and curious introspection has also been shown to be integral in this beneficial process (Martin, 1997; Teasdale, Segal, Williams, & Mark, 1995).

Several mindfulness programs as for example Kabat-Zinn's (1982, 1990) Mindfulness-based Stress Reduction (*MBSR*) or Segal, Williams, and Teasdale's (2002) Mindfulness-Based Cognitive Therapy (*MBCT*) have been developed. The first one (MBSR by Kabat-Zinn, 1982; 1990) is probably the most well known of numerous mindfulness based interventions (Thompson, Kaufman, De Petrillo, Glass & Arnkoff, 2011). This program is a group-based mindfulness intervention originally designed as an adjunct treatment for patients with chronic pain (Keng, Smoski & Robins, 2011). The program consists of an eight-to-ten weeks course, in which groups of up to thirty participants meet twice a week for two and a half hours for mindfulness meditation training and instruction (Kabat-Zinn, 1990). In addition to mindfulness exercises in class, participants are asked to engage in home mindfulness practices and attend an all-day intensive mindfulness meditation retreat. The assumption of MBSR is that individuals learn to be less reactive and judgmental toward their experiences, and more able to recognize and break free from habitual and maladaptive patterns of thinking and behavior (Keng et al., 2011).

Mindfulness-based interventions have been shown to reduce stress symptoms (Baer, 2003; Grossman et al., 2004) and it has been shown that mindfulness is negatively associated with burnout (Mc Cracken & Yang, 2008). It has also been found that the practice of mindfulness can help improve wellbeing (Brown& Ryan, 2003; Carlsson& Brown, 2005), physical health (Grossman et al., 2004), as well as to reduce pain, anxiety, and depression (Kabat-Zinn, Massion, Kristeller, Peterson, Fletcher, Pbert, Lenderking & Santorelli, 1992; Teasdale, Moore, Hayhurst, Pope, Williams & Segal, 2002). The negative association between mindfulness and burnout was also confirmed by a study conducted by Jouper and Gustafsson (2013), which showed that mindfulness practice can help sufferers

from athletes burnout to recover from exhaustion, fatigue and frequent fever reactions and can help to improve psychological feelings of energy and primordial force as well as sports functioning.

Marks (2008) suggested mindfulness practice to be relevant for athletes in cases of performance development, performance dysfunction, performance impairment, and performance termination. The suggestion that mindfulness may improve athletic performance is supported by the theoretical overlap between mindfulness and „flow“ (Thompson et al., 2011; Gardner& Moore, 2004b; Kaufman, Glass & Arnkoff, 2009; Kee & Wang, 2008). “Flow” is described as a state of mind or consciousness, in which a person is completely absorbed in his or her actions and experiences a unity of body and mind (Csikszentmihalyi, 1990) that facilitates peak performance (Jackson & Csikszentmihalyi, 1999; Jackson & Eklund, 2002).

For use as a mindfulness-intervention in sports, Kaufman et al. (2009) developed and evaluated a 4-week mindfulness program for athletes integrating elements of both *MBSR* (Kabat-Zinn, 1990) and *MBCT* (Segal et al., 2002). This so-called mindful- sport-performance-enhancement-program (MSPE) teaches and trains athletes how to apply mindfulness skills to sport. This is done through repeated practice and discussion of mindfulness exercises, including a walking meditation adapted to the participant`s individual sport (Thompson et al., 2011). MSPE was originally developed for archers and golfers (Kaufman et al., 2009), but has also been adapted to other sports. MSPE was shown to increase overall trait mindfulness and dispositional optimism (a component of sport confidence) in archers, and to increase golfers´ ability to describe observed phenomena (Kauman et al., 2009). Over 75% of the athletes, who participated in the study by Kaufman et al. (2009) felt increases in their perceived performance and/or enjoyment of their respective sports. Furthermore, significant increases in awareness and significant decreases in sport-related worries were found in long distance runners taking part of an MSPE intervention program (De Petrillo, Kaufman, Glass & Arnkoff2009).

According to Marks (2008) an explanation for all presented positive effects of the mindfulness programs could be that mindfulness practice provides an opportunity to enhance concentration and non-reactivity. The emotional experience of stressful events is not denied during the practice, but acknowledged and accepted, while maintaining task-focus. Enhancement of continues attention reduces rumination and facilitates shift of attention focus to desired targets and impede thereby elaboration of unpleasant thoughts and feelings (Marks, 2008). This explanation fits well with the

suggestions of Weinstein, Brown & Ryan (2009) about two primary ways through which mindfulness training may produce beneficial effects. Firstly, mindfulness practice may promote a less defensive, more willing exposure to challenging and threatening events and experiences. This may reduce negative cognitive appraisals of those situations, thus leading to lower levels of perceived stress. Secondly, mindfulness training may foster an enhanced capacity to cope adaptively with situations, which are perceived as challenging, threatening, or harmful (Weinstein et al., 2009). They hypothesized that higher levels of mindfulness would be related to both, a lower tendency to appraise or interpret events as stressful and to more adaptive coping in stressful situations (Weinstein et al., 2009).

Based on the presented theoretical background this study aims to investigate the relationships between mindfulness, perceived stress, perceived performance in school and sports and athlete burnout in junior elite athletes. It is hypothesized that higher levels of mindfulness are associated with lower levels of stress. This could lead to higher levels of perceived school- and sports performance, and thereby to lower levels of athlete burnout (Figure 1).

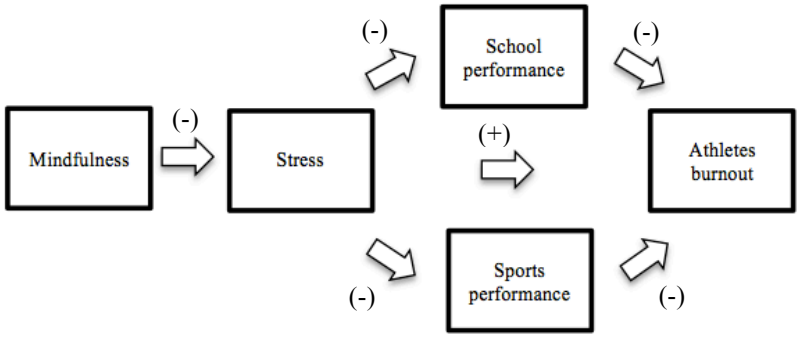

Figure 1: *Model of hypothesized interactions between the explored variables.*

Furthermore, this study aims to explore the influence of a mindfulness training intervention on the variables presented in Figure 1. Possible findings may help to determine whether mindfulness is an important variable in performance enhancement in junior sports and in preventing junior athletes from chronic stress and athlete burnout.

3. Method

3.1 Overall method

The research in this study is conducted through a dual method design. First, data were collected quantitatively. Thereafter, a 12-week mindfulness training intervention was analyzed qualitatively.

A survey analysis explored the interactions between the variables mindfulness, perceived stress, perceived performance in school and sports, as well as athlete burnout in 382 junior elite athletes attending 7 high schools for elite sports. After the first survey, 29 athletes attending the same school were offered to take part in a mindfulness intervention lasting 12 weeks. This 12-week mindfulness intervention was conducted and then analyzed qualitatively to explore possible influences of a mindfulness intervention on mindfulness, perceived stress, school and sports performance, and athlete burnout.

3.2 Method of the survey examination

The survey was performed to identify possible interactions between mindfulness, perceived stress, perceived performance in school and sports and athletes burnout.

3.2.1 Participants

483 junior athletes from 7 different Norwegian high schools for elite sports were invited to voluntarily participate in an online questionnaire measuring degree of mindfulness, level of perceived stress, perceived performance in sports and school, and degree of athletes burnout. The athletes were participants in different sports such as cross country skiing, biathlon, nordic combined, shooting, ice-hockey, ski jumping, alpine skiing, cycling, track and field, football, orienteering, handball and volleyball. From these, 382 participants (216 males and 166 females) completed the data collection, leading to a response rate of 79%. The participants had a mean age of 18.5 years, ranging from 17 to 20 years. The instruments in the present study were either initially developed in Norwegian, or translated to Norwegian from English by two independent bilingual researchers.

3.2.2 Questionnaires and measurements

The variables examined here include items and inventories such as age, gender, type of sport, type of school, degree of mindfulness, perceived stress, perceived performance in school and sports, and degree of athletes burnout. All scales and measurements used in this part of the study were based on previously developed measurements proven to hold both satisfactory reliability and validity. The measurements were originally in English. The scales were translated to Norwegian by the author using a Translation-Back-Translation technique and slightly adjusted for the purpose of this study.

- The Mindful Attention Awareness Scale (MAAS)

To measure the degree of mindfulness the validated Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) was used. By use of a double Translation-Back-Translation technique this version was translated from English to Norwegian by the author. Participants reported how often they believed they currently had experiences referenced by each of the 15 items (e.g. ‘‘I do jobs or tasks automatically without being aware of what I am doing” or ‘‘I find myself preoccupied with the future or the past”) on a 6-point Likert scale ranging from “almost always” (1) to “almost never” (6). Higher scores indicated higher degrees of dispositional mindfulness. The reliability of the 15-item scale in the present study was high (α = 0.92).

- The Perceived Stress Scale (PSS-14)

To measure participants’ self-appraised stress, the Perceived Stress Scale-14 (PSS-14; Cohen, Kamarck, & Mermelstein, 1983) was used. By use of a double Translation-Back-Translation technique, this version was translated from English to Norwegian by the author. The scale assesses the perception of stressful experiences by asking the respondents to rate the frequency of their feelings and thoughts related to events and situations that occurred over the previous month (Andreou, Evangelos, Lionis, Varvogli, Gnardellis, Chrousos & Darviri, 2011). The questions are general in nature and measure the degree to which the participants find their lives unpredictable, uncontrollable, and overloading; all of which are central to the stress experience (Cohen et al., 1983).

The PSS-14 consists of 14 items (e.g., ‘‘During the past month, how often have you felt that you were unable to control the important things in your life?’’) rated on a 5-point Likert scale ranging from 0‘‘never’’ to 4 ‘very often’’. The questionnaire`s construct validity has been reported to be good (Cohen et al., 1983; Cohen & Williamson, 1988) and

its test-retest reliability is reported to be adequate for short periods of time (2 days, r = 0.85) (Cohen et al., 1983). The reliability of this scale in the present study is high (α = 0.78).

- The Athlete Satisfaction Questionnaire (ASQ).

Measurements of individual performance in sports as e.g. results in different competitions can be influenced by different variables such as random chance or opponents' outstanding performance (Courneya & Chelladurai, 1991). Therefore athletes' satisfaction with their own performance can be a more useful measure of perceived performance (Chelladurai & Riemer, 1998). To measure participants' perceived satisfaction with their own performance and progress in sports, in this study the Athlete Satisfaction Questionnaire (ASQ; Riemer & Toon, 2001) was used. The ASQ seeks to measure participants perceived satisfaction with their own task performance, including a perception of absolute performance, improvements in performance and goal achievement. To avoid short-term affective reactions regarding results in competitions and to include experienced progress during daily training, in this study athletes' satisfaction with their own progress in sport during the ongoing- or last finished season was used as an outcome variable.

To measure perceived sports performance respondents were asked to consider 4 items (e.g. *"I am satisfied with the degree to which I have reached my athletic performance goals during the season"*) on a 7-point Likert scale ranging from "not at all satisfied" (1) to "extremely satisfied" (7). All items sought to enlighten how satisfied respondents were with their own progress in sports during the ongoing or previously finished season. Reliability for this measure in the present study was high (α = 0.94).

To measure perceived performance and progress in school, a slightly adjusted version of the ASQ was used. In the same way as shown above, respondents were asked to consider 4 items (e.g. *" I am satisfied with the degree to which I have reached my goals in the school subjects during this ongoing school year"*) on a 7-point Likert scale ranging from "not at all satisfied" (1) to "extremely satisfied" (7). All items sought to explore how satisfied the respondents were with their own progress in school during the ongoing school year. Reliability for this measure was high in the present study (α = 0.96).

- The Athlete Burnout Questionnaire (ABQ).

A Norwegian version (Moen, 2013) of the Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2009) was employed to assess participants' burnout level. The core for

each of the 15 items was; *''How often do you feel this way?''* The respondents were requested to rate the extent to which the items address their participation motives on a five-point Likert scale anchored by "Almost Never" (1) to "Almost Always" (5). The ABQ has three five-item subscales assessing the three key dimensions of burnout: (1) a reduced sense of accomplishment, (2) emotional and physical exhaustion, and (3) devaluation of sports participation (Raedeke & Smith, 2009). The burnout-level is calculated by averaging all three sub-scale scores. In this study the reliability for this scale was $\alpha = 0.81$, $\alpha = 0.85$ and $\alpha = 0.79$, respectively.

3.2.3 Data Analysis

For analyzing the data of this part of the study quantitatively the SPSS 20 software (SPSS Inc., Chicago, IL, USA) was used. The observed variables in the theoretical model proposed in this study were: mindfulness, perceived stress, perceived school- and sports performance, and athlete burnout. SPSS was used to analyze the means, standard deviation and Cronbach's Alphas of the studied variables.

The observed variables were then analyzed by stepwise multiple regression analysis using the regression coefficient β, where athlete burnout was the dependent variable and mindfulness, perceived stress, perceived performance in school and sports were the predictor variables.

3.3 Method of the qualitative analysis of a 12-week mindfulness based intervention

As part two of this study a 12-week mindfulness training intervention was performed and analyzed qualitatively; this to explore possible influences of mindfulness on the variables mentioned above and especially on athletes burnout. In order to reach a deeper understanding of the influence and the mechanisms of mindfulness training in junior elite sports, the mindfulness training intervention was investigated qualitatively by semi-structured interviews.

3.3.1 Participants

The participants in this second part of the study were 29 junior elite athletes, all attending the same Norwegian high school for elite sports in Mid-Norway. All athletes also were also part of the previous survey discussed above. These 29 athletes (14 females/ 15

males) performed three different sports (biathlon, cross-country skiing, and shooting). Their age ranged from 18 to 20, with a mean age of 18.5 years. Out of these 29 participants, 6 athletes were selected semi-randomly (2 - one male, one female - athletes out of every sport) to take part in qualitative semi-structured interviews. The sample consisted of 3 female and 3 male athletes, who ranged in age from 18 to 20 years (2 biathletes, 2 cross-country skiers, 2 shooters).

3.3.2 Mindfulness program

The mindfulness intervention lasted 12 weeks in total, divided into 4 continuous periods of three weeks. After each of these periods athletes, who agreed to take part in this intervention, were invited to a 2-hour mindfulness-class conducted by an experienced mindfulness coach. There, the training was discussed, the planning for the next period was made and mindfulness was trained. The mindfulness-intervention program consisted mainly of 2 different types of mindfulness training: a) sitting meditation with focus on breathing and b) body scanning (laying and standing) with help of sound files in different length varying from 10-30 minutes. All participants received the audio files used in this intervention before the start of the first period. The mindfulness training-periods differed in content, volume and intensity (Table 1).

Throughout the whole intervention, participants were asked to write a personal mindfulness training-diary, including type of training, training-volume, and personal thoughts and findings linked to the program to assure the program followed up as good as possible. These diaries were used to improve the follow-up of the athletes during the program. Additionally, the mindfulness classes every 3th week were observed by the author to secure the program-content and to gain deeper understanding of the influence of the intervention throughout the program. These observations helped also to gain wider understanding of athletes' thoughts about the program and their follow up during the periods.

After finishing the last period, 6 participants were randomly picked and asked to participate in qualitative semi-structured interviews in order to analyze the mindfulness-intervention. Before the interviews were conducted, the researcher emphasized that all information would be kept confidential and no participants would be mentioned by name. The interviewed athletes were furthermore informed about their rights and signed an informed consent to be part of the study.

The author who conducted the interviews was trained in qualitative research methodology and in qualitative interviewing techniques. The interview-guide was extensively discussed with the supervisor before conducting the interviews. As mentioned, a semi-structured format was chosen for the interviews. This ensured that all the important topics were explored, while flexibility in individual responses was still allowed. All interviews were conducted at the same day at the participants' school and lasted from 35 to 60 minutes. They were audio-recorded and later transcribed verbatim.

Table 1: *Overview of the 12-week mindfulness-intervention divided into 4 periods of 3 weeks.*

Period	***Training plan***	***Goal***
1	**Minimum 5 times weekly;** **Mornings:** Body-scanning (13 minute audio-file). **Evenings:** Meditation in sitting position with focus on breathing (10 minute sound file).	To train on keeping concentration and focus over longer periods of time in a relaxed way.
2	**Minimum 3 times weekly;** **Mornings:** 3-5 minute mix of meditation-body-scanning with focus on whole body in sitting or laying-position (without use of audio-file). **Evenings:** Body-scanning (30 min audio-file)	To get used to meditate individually without use of guiding or audio-files. To train the change of direction and intensity of focus.
3	**Monday:** Body-scanning in laying position (30 min audio-file) **Tuesday:** meditation in sitting position with focus on breathing (6 min) **Wednesday**: body scanning, (13 min audio-file) **Thursday:** meditation in sitting position with focus on breathing (6 min) **Friday:** Body-scanning in laying position (30 min audio-file) **Saturday:** no mindfulness training **Sunday:** no mindfulness Training	To train the different mindfulness skills.
4	Athletes were guided to make individual mindfulness training plans. The minimum weekly training volume was 90 minutes of self-chosen meditations. In combination with this period's training plan on formal meditation the athletes were asked to train non-formal meditation.	To maintain reached level of mindfulness and to learn participants to plan and train mindfulness individually

3.3.4 Interview guide

Based on theoretical knowledge on mindfulness, stress, performance and athlete burnout an interview-guide was developed. The different sections of the semi-structured interview included questions related to: a) recovery, b) sleep, c) stress, d) fatigue, e) school- and sports performance, f) motivation, g) focus, h) awareness, i) general thoughts about the program. This interview guide was discussed and evaluated with the supervisor before the interviews were conducted.

3.3.5 Data analysis procedures

In this part of the study a content analysis in 5 steps was used to analyze the data.

1. All 6 audio-recorded interviews were transcribed verbatim, resulting in 88 pages of 1.5-spaced text.

2. The investigator listened first to the recorded interviews several times while he read and reread the 6 interviews to quality control the transcriptions and to become as familiar as possible with all of the participants. All respondents received copies of their individual interview transcripts, and were asked to respond on their accuracy before analyses were conducted.

3. The interviews were first analyzed to identify raw-data themes characterizing each participant's responses within every part of the interview. These raw-data were described as preliminary themes, quotes or paraphrased quotes and could show an apparent idea of the athlete´s experiences with the mindfulness intervention. Raw-data themes were discussed with the supervisor (an experienced sports psychologist) and analyzed inductively until a consensus was reached and data categories were identified. These labeled data categories were: stress, sleep, recovery, mood, focus, school motivation, sports motivation, school performance, sports performance and metacognition.

4. Independent summaries of all participants' interviews were conducted as idiographic profiles by the author by categorizing quotes of all interviews one by one to the labeled categories. The investigator extensively analyzed all theses summaries, until consent about every idiographic profile was found. These

idiographic athlete profiles and their first interpretations were sent to each of the athletes to clarify and assure that the assumptions made by the researcher were as right as possible.

5. To be able to make suggestions about the influence of the 12-week intervention the labeled categories and all athletes' profiles were analyzed further to find common patterns. Finally, suggestions about findings were made and discussed between the researcher and his supervisor.

3.3.5 Trustworthiness

Trust with the participants was built up by the researcher being present at all the mindfulness training classes. Thereby, the trustworthiness in accordance to the criteria by Lincoln and Guba (1985) was strengthened. All respondents received copies of their individual interview transcripts, and were asked to respond on their accuracy before further analyses were conducted. After analyzing the interviews, all athletes also received their personal athlete profile with the interpretations made by the researcher. The athletes were asked to comment on how far the profiles and interpretations corresponded with their own interpretations. After this review- and clarification-process by the athletes, the researcher made small adjustments in some of the profiles and interpretations.

4. Results

4.1 Results of the survey examination on mindfulness, stress, perceived school and sports performance, and athlete burnout

Stepwise multiple regression analysis employing *athlete burnout* as the dependent variable revealed *that* mindfulness predicted *stress* ($\beta = -.189$, $P < 0.001$) negatively, while stress again predicted *school performance* ($\beta = -.140$, $P < 0.001$) and *sports performance* ($\beta=-.228$, $P < 0.001$) negatively. Both *school performance* ($\beta = -.003$, $P < 0.001$) and *sports performance* ($\beta = -.659$, $P < 0.001$) predicted athlete burnout negatively, but the negative prediction of *sports performance* on *athlete burnout* was stronger. *Stress* was here shown to be a strong predictor for *athlete burnout* ($\beta = .506$, $P < 0.001$).

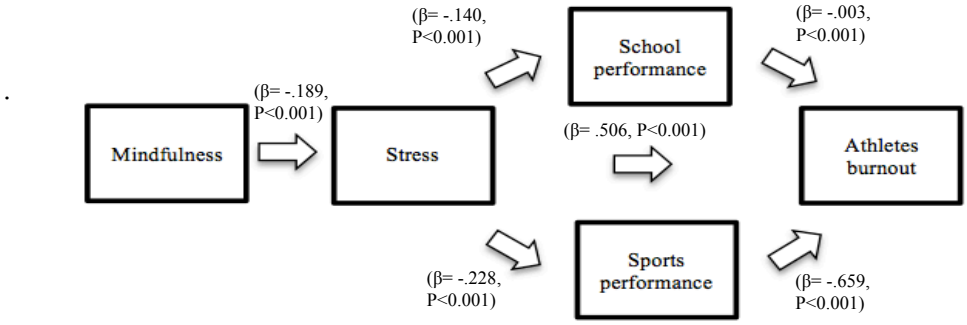

Figure 2: *Regression model of the interaction of the studied variables.*

The reliability values (presented as Cronbach´s Alphas) of the different questionnaires have already been described in the methods and are summarized in Table 2.

Table 2: *Outcomes of the different questionnaires, presented as means, standard deviations (SD) and the reliability of the test using Cronbach`s Alpha, N=382.*

Measurement	**Mean**	**SD**	**Cronbach´s Alpha**
Mindful Attention Awareness Scale (MAAS)	64.26	13.50	0.92
Perceived Stress Scale (PSS-14)	37.61	6.45	0.78
Athlete Satisfaction Questionnaires (ASQ)			
1) Sports Satisfaction Questionnaire	19.16	4.94	0.94
2) School Satisfaction Questionnaire	18.29	4.22	0.96
Athlete Burnout Questionnaire (ABQ)	34.48	10.40	0.84
1) Reduced sense of accomplishment	12.68	4.17	0.81
2) Emotional and physical exhaustion	11.39	4.27	0.85
3) Devaluation of sports participation	10.41	4.12	0.79

4.2 Results of the qualitative analysis of the 12-week mindfulness based intervention.

Based on the analyses of the interviews four main outcome categories were constructed: *A: Recovery*, *B: Awareness, C: Focus* and *D: Performance.* For all four categories, subcategories as shown below were created. The interviews were extensively analyzed and findings categorized in to the categories and subcategories.

Table 3 A, B, C, D: *Findings of the qualitative analysis allocated into categories and their subcategories: A: Recovery, B: Awareness, C: Focus and D: Performance. X=effect mentioned, X/- = effect only mentioned for some situations, - = not mentioned.*

Category A: Recovery

Athlete	1	2	3	4	5	6
Improved recovery	X	X	X	X	X	X
Less mind stress	X	X	X	X	X	X
Less rumination	X	X	-	X	X	X
More mind stress	-	-	X/-	-	-	-
More rumination	-	-	X/-	-	-	-
Improved sleep	X	X	X	X	X	-
Faster falling a sleep	X	X	-	X	X	-
Feelings of high total load, exhaustion	-	-	-	-	X	X
Accept, less reactivity to stressful experiences	X	X	X/-	X	X	X

Category B: Awareness

Athlete	1	2	3	4	5	6
Improved attention awareness	X	X	X	X	X	X
Improved focus awareness	X	X	X	X	X	X
Improved awareness of what is beneficial /nonbeneficial	X	X	X	X	X	X
More present oriented awareness	X	X	X	X	X	X

Category C: Focus

Athlete	1	2	3	4	5	6
Improved focus duration	X	X	X	X	X	X
Improved clarity of focus tasks	X	X	-	X	X	X
To little clarity of focus tasks	-	-	X	-	-	-

Category D: Performance

Athlete	1	2	3	4	5	6
Improved school performance	X	X	X	X	-	-
Improved sports performance	X	X	-	X	X	X
Improved school motivation	X	X	X	X	-	-
Improved sports motivation	X	X	-	X	-	-
Less performance anxiety in sports	X	X	X	X	X	-

- Category A: Recovery

Investigating the effects of the mindfulness training intervention qualitatively, the influence on recovery is prominent. The main effect on recovery seems to be rooted in lower mind stress and less rumination leading to improved sleep and relaxation. Five out of six athletes mentioned improved sleep quality, while the sixth participant already slept well before the intervention.

> Athlete-3: *"I slept better… and feel I wake up more recovered… maybe that´s because I don't think so much anymore when I go to bed…"*
>
> Athlete-5: *"I want to continue with this training because I became calmer by doing it and I react different on stressful experiences. I have improved my ability to relax and I sleep better… so I feel it has helped me…"*

All interviewed athletes mentioned they had improved their recovery. All athletes also mentioned less perceived mind stress. Five out of six athletes mentioned that less perceived mind stress led to lower rumination. Decreased perceived mind stress and lower rumination seems to be an important antecedent for athletes falling asleep easier and for improved perceived sleeping quality. Four out of the six athletes mentioned to fall asleep faster, while five athletes mentioned they slept deeper and better.

> Athlete-1: *"I feel a big difference in sleep. I fall asleep much easier. Earlier I struggled with falling asleep and I lay awake for a long time, ruminating about a lot of things… Now I don`t ruminate that much anymore, so it takes like 5 minutes and then I fall asleep… that`s strange… but feels very good…"*
>
> Athlete-1: *"I feel I sleep better, deeper and more calm… My sleeping quality has improved a lot…"*

All athletes also mentioned experiences of being more recovered, possibly due to their improved sleep.

> Athlete-4: *"…I feel this program improved my sleeping quality… this improvement I realized quite early in this program… I slept much deeper and dreamed less… I also woke up much more recovered and relaxed now than I did before…"*
>
> Athlete-2: *"I felt the improved sleeping quality had an effect on how recovered I felt in the mornings… I could get up earlier and I was less tired…That´s really good…"*

Athlete-1: *"When I wake up I feel more relaxed and recovered and I feel that helps me getting more out of the following day… I feel a big improvement in sleep-quality…"*

All athletes mentioned that they react less to stressful experiences.

Athlete-4: *"I´m just much more calm now…It´s very unusual that I get stressed now… If I´m for example in a situation in which I only have little time, I´m better at making a plan and decide what is important to focus on and what not…"*

Athlete-2: *"I`ve become calmer, less stressed, after I started this program, if I for example have an exam that I haven`t prepared for that well, it doesn`t stress me that much anymore… I just take it easier and just focus on what matters…Situations doesn`t stress me that much anymore…so that's great…"*

Athlete-4: *"It feels like my focus is changed… it´s much easier to have solutions ready when unexpected things happen in trainings and competitions… also it´s easier to follow a plan and focus on my predefined work tasks"*

Although all athletes expressed improved recovery, some of the athletes still experienced stress due to the combination of school, sports and eventually also the mindfulness training program. Two of the athletes expressed that they experienced a high amount of exhaustion due to this combination. Still, both of them mentioned that they believed the mindfulness training had helped them to prevent even higher degrees of exhaustion.

Athlete-5: *"I felt I was very lo in energy levels true big parts of the season… Because I succeeded well in sports, I had very high expectations to my self in, both, sports and school; also I felt high expectations by other people… During this period we travelled a lot to races and had a lot to do at school… I didn´t have time to any other activities than sports and school… so, it was quite tiring and tuff… but, also if the mindfulness program was intensive, I felt I had more energy thanks to the mindfulness training… because I improved my sleep, felt asleep earlier and got more out of a night of sleep..."*

Athlete-6: *" Combining school and sports is very stressful for me… it can create a lot of rumination about all the things I should get done… that can make me feel anxious and stressed… In these situations I feel mindfulness training can help me to alleviate these thoughts…"*

Three of the six athletes mentioned they had experienced that the program was quite extensive, resulting in a period with decreased motivation and follow-up in around the

middle of the intervention period. All athletes who had experienced a period of decreased follow up of the program expressed that they started to follow the program again because they felt the positive effects of the training decreased after a while without training.

> Athlete-2: *"Sleeping quality has generally improved, but maybe the effect was reduced in the period when I didn`t train mindfulness as much… especially in the periods when I trained mindfulness a lot I felt it was fantastic… I slept very well! "*

> Athlete-5: *"In one period I felt I didn´t have time to follow the program as I was very tired because we had a lot going on in school and in sports… I stopped to train mindfulness, but then I felt I got more stressed again… I just got this inner calmness and was much more present within myself while I trained mindfulness regularly… I feel it somehow influenced my whole life and I also performed better..."*

- Category B: Awareness

Besides the positive influence of mindfulness training on changes in mind stress and recovery, change in *awareness* (as mentioned by all athletes) seems to be the most obvious outcome of this training intervention. Although also changes in the specific goal directed awareness in school and sports were mentioned, the most obvious changes in awareness seem to be changes in general awareness.

> Athlete-3: *"I feel I have a much higher awareness now… I discover more… I discover easier when my focus drifts away and than I m able to refocus on what matters in the present moment… I m more aware of my own thoughts and focus…That´s maybe the biggest change through this program…"*

It seems as this wide awareness was influenced in a higher degree than the narrow and more specific awareness. Improvements in attention awareness, focus awareness, and awareness of beneficial and nonbeneficial personal choices were mentioned by all the athletes.

> Athlete-4: *" I feel I have a bigger awareness for inner experiences and things going on… I don´t feel that creates any stress, in opposite I feel have become calmer because of that… I realize easier what is important and what is not…"*

> Athlete-1: *"I am more aware of small things than before… and my evaluations have become more complete…"*

> Athlete-5: *"I am more aware of my technique in skiing and on my feelings when I try different technical solutions…."*

All athletes also reported to be more present oriented and more aware of what is going on in the actual moment.

> Athlete-1: *„ I suddenly started to be able to be more focused on the one thing which I am doing at this one particular moment...“*
>
> Athlete-5: *“It was easier to differentiate what is important and what is not… and to just focus on what matters in the moment…”*

Although improvements in awareness generally were mentioned as something positive (N=5), higher awareness was shown to have the potential of causing higher rumination. One out of the six athletes mentioned that the improved awareness of unbeneficial feelings could cause higher rumination in some situations when he/she didn´t know how to handle these feelings.

> Athlete-3: *“ I somehow feel like being more aware of my inner experiences… In the mornings I can for example make a body scanning and feel immediately what state the body is in… if I feel my body is very tired, that can stress me a little bit… It somehow lies there all the time and I ruminate about it… ”*

- Category C: Focus

All athletes mentioned changes in focus abilities, but it seems that these changes were more on awareness of their focus, than on their actual and precise focus. When e.g. asking the athletes, if they could describe their focus while performing at their best in their sports, only two out of six could be really precise in their description of their focus; both were shooters.

> Athlete-2: *“Earlier my focus easily drifted away, now it´s much easier to just keep the focus on the things that matters, as e.g. in shooting... If I`ve e.g. plan to focus on the way I pull the trigger, the focus on this task is much clearer and stronger…”*

Still, five out of six athletes mentioned they would have an improved clarity in focus tasks. In overall five out of six athletes mentioned changes of focus abilities in their sports.

> Athlete-4: *“ I am much more focused and it s not often that my task focus disappears while skiing… My awareness and focus in skiing is very good, and also quite good at school… much better than before…”*

Athlete-5: *"Earlier I could have thoughts about giving up in races… those thoughts I don't have anymore… Now I am just focused on my tasks and on skiing well during the whole race…."*

Athlete-6: *"I now had some races where my shooting was crazy … I was 100% focused on my self and every single shot… I was only present in this one moment without thinking on possible outcomes… I was extremely determined and had a big self confidence… I have never been like this before…"*

All the athletes mentioned changes in focus abilities at school.

Athlete-4: *"I am just much more focused… for example if I am reading school things I am much more focused on what I am actually reading… it´s easier to remember things I read and I get things done in shorter time… It´s easier to follow and listening to the teacher, and when I am working in class I don´t get as easily distracted by others…"*

Athlete-2*: "In school it has become easier to follow and understand what the teacher says since I have a higher awareness now and I also am more focused… I feel I remember more after class than I did before this program…"*

One athlete expressed that higher awareness in combination with a too poorly defined focus task in a performance situation in his/her sport, could cause insecurity, stress and rumination. Especially this could be a problem in competition situations. He struggled with insecurity about what to focus on to perform well. This athlete was the same one who also mentioned that improved awareness of nonbeneficial feelings or experiences eventually could cause more rumination, if he did not know how to handle the situation or experience.

Athlete-3: *"I got more aware of things now, but in shooting it feels like I haven´t found the key yet… and when I e.g. shoot badly I suddenly can loose my self confidence in shooting… So in shooting I still struggle to accept an refocus… but it has maybe changed a little bit recently … I stay more positive and get less stressed"*

Athlete-3: *"I have struggled to be as focused in competitions as I am in trainings, especially in shooting I am more insecure… it works better in skiing… "*

Although it is not clear whether the athletes actually had improved their focus abilities or more there awareness of own focus and attention, all six athletes mentioned they felt improvement in duration of time they could keep a high focus.

Athlete-1: *"I`m able to keep concentration on more shots for example…"*

- Category D: Performance

The last category presents the findings according to the athletes perceived performances in both, school and sports. Influences on performance have already been touched in the previous categories, but are presented more specific in this category. Four out of the six athletes responded that they felt the intervention had helped them to improve school performance and also school motivation.

> Athlete-4: *"I feel I´m now able to sit much longer periods of time and read school things, without getting bored and unfocused… earlier I got bored after like 30minutes, now I can sit like for over an hour, easily… That made working much more interesting and therefore I also got more motivated…"*
>
> Athlete-4: *"I feel being part off this program also paid off in school performance… If you work more focused, off course, it helps… I think I am better at school now than I was before… We didn´t so many exams in this period, but I feel that all exams that we did have went pretty well…"*
>
> Athlete-2: *"The improved ability of focusing has generally had a very positive effect on my school performance… Since I my awareness in school is higher and since it s easier to focus and work well, my grades have improved… It´s also easier to get interested and stay interested on what s going on at school…"*

Five out of six athletes also expressed that they felt the program had helped them to perform better in their sport.

> Athlete-1: *"I feel this program has helped me to perform better in shooting, the results are better now. I think that`s because of the improved quality of the training sessions, in combination with my improved skills of being focused on just the one thing that matters at a particular moment…"*
>
> Athlete-6: *"I´m more present in training and competing… there is somehow more flow in it, I´m more focused on my self and my tasks than on the others…Also earlier I have been like in my own "bubble" while shooting for example, but never as extreme as now…"*

Three out of the six athletes mentioned that they had improved their sports motivation, while no changes were expressed in the other three athletes. The perceived positive changes in both, school and sports performances seem to be mostly because of the improved attention awareness and because of more energy due to improved sleep and

recovery skills. Nearly all athletes (five out of six) expressed they felt they would experience less performance anxiety.

> Athlete-4: *"I now feel less anxious of competing than before… earlier I ruminated a long time before an important race… now I use less energy on being nervous about things like that… Now these thoughts can pop up when I´m meditating, but then I can already process those thoughts there… I just feel less nervous… Before the start of a race I feel calmer, much clearer on my focus and tasks, and just a lot less stressed… also ski testing before the race became much more relaxing now…"*

> Athlete-5: *"I feel that I relate a little different to my expectations now than I did before… I don't put that much pressure on my self as before… I focus more on my self than on my opponents and therefore I feel less stressed… somehow I have become calmer and less anxious in according to my sports performance…"*

5. Discussion

The main purpose of this study was to explore whether mindfulness training is useful in burnout prevention and performance enhancement in junior elite athletes. This study first quantitatively investigated the interaction of the variables mindfulness, stress, perceived performance in school and sports, and athlete burnout in junior elite athletes. Then this study qualitatively investigated the influence of a mindfulness training intervention on the variables with the main goal of determining its usefulness in burnout prevention and performance enhancement in junior elite athletes.

The findings of the quantitative exploration of the interaction of mindfulness, perceived stress, school- and sports performance, and athlete burnout revealed that mindfulness predicted stress negatively, while stress again predicted school performance and sports performance negatively. As shown in previous studies (Black & Smith, 2007; Gustafsson & Skoog, 2012; Raedeke & Smith, 2001; 2004) stress here was also shown to be a strong predictor for athlete burnout. The negative association of mindfulness and athlete burnout found in the present study corresponds with the previous findings by McCracken & Yang (2008). The findings of this negative association may support the possible usefulness of stress management interventions like for example mindfulness training in burnout prevention. Because of the strong direct relation of stress and athlete burnout and the weaker direct influence of mindfulness on athlete burnout, it seems that

the effects of mindfulness on athlete burnout are indirect; and thus seem to be due the positive influence mindfulness has on stress.

Sports performance was shown to predict athlete burnout negatively, while the influence of degrees of perceived school performance on athlete burnout was not shown to be strong. Possible reasons for the stronger relationship of sports performance - rather than school performance - to athlete burnout may be because the concept of athlete burnout is defined for sports rather than school performance. This can also be seen in the way Raedeke (1997) describes athlete burnout, characterized by *emotional and physical exhaustion*, *reduced sense of accomplishment*, and *sport devaluation*. Another reason could be found in the high importance junior elite athletes attending specialized sports schools often address to their own personal sports performance, in comparison to the importance they address to their school performance. This means that poor athletic performance and results might lead to higher rumination and mind stress.

Based on the qualitative interviews the main influences of a mindfulness training intervention in junior elite athletes seem to be on their recovery and attention awareness. Mindfulness training seems to have a positive influence on athletes perceived mind stress, leading to lower rumination. These findings correspond highly with previous theory and own findings from the quantitative exploration on the interaction between the studied variables. Lower mind stress and a decrease in rumination seem to help athletes fall asleep faster and to improve their sleeping quality. Improved sleep seems to cause better recovery and feelings of higher energy. These findings of improved sleep and improved recovery are interesting, since they can have an impact on the athletes' daily life. In order to prevent junior athletes from burnout, the explored improvements in stress management abilities, improved sleep and improved recovery are interesting. This is due to chronic stress being one of the main antecedents for athletes burnout (Black & Smith, 2007; Gustafsson & Skoog, 2012; Raedeke & Smith, 2001; 2004). The possible positive influence of mindfulness on stress and recovery matches the findings by Jouper & Gustafsson (2013), which described that mindfulness helps sufferers of athlete burnout to recover from exhaustion, fatigue and frequent fever reactions and helps to improve psychological feelings of energy and primordial force as well as sports functioning. Improved psychological feelings of energy were also clearly mentioned in the interviews in this study. It is suggested that this finding may be related to athletes improved recovery through better sleep and their lowered reactivity to stress. Lower reactivity to stress is also suggested by Marks (2008) to be one possible explanation for the positive and beneficial

effects of mindfulness training. Improved awareness as described by all interviewed athletes and higher awareness of what is beneficial and nonbeneficial could lead to better stress management. This higher awareness could thereby lead to less perceived stress, less rumination and improvements in the ability to relaxing.

Although the athletes mentioned positive influences of mindfulness training on recovery, several of these athletes reported experiences of high total loads due to the combination of school and sports. In two out of six athletes, this high perceived total load resulted in high levels of perceived exhaustion. Several of the athletes also reported they had a period were they struggled with the motivation to train mindfulness, because they felt the program was too extensive, which could have lead to even higher levels of exhaustion. Still the athletes, who mentioned these kinds of struggles with motivation during the program, reported they restarted with the mindfulness training after a shorter break. This was because they felt things had worked better in periods where they trained mindfulness. This may indicate that mental training methods, as mindfulness training, have to be maintained. Otherwise the positive effects could decrease. The mentioned periods with lack of motivation could also indicate that it is important that a mindfulness intervention is not too extensive. Junior elite athletes, who attend high schools, already have fully filled day programs. If a mental training intervention takes too much space, it could cause more stress and the beneficial effects could thereby be weakened or entirely lost. Although periods of reduced mindfulness training motivation were mentioned, all athletes were positive about the benefits of mindfulness training to improve their recovery from the experienced high total loads.

Another highly important and often perceived outcome of the conducted mindfulness intervention seems to be the effect of athletes' improved awareness. This corresponds very well with the findings by De Petrillo et al. (2009), who showed significant increases in the awareness in runners taking part in a mindful sports performance enhancement intervention (MSPE). Degree of attention awareness seems to affect different parts of the athletes' daily life. Improved awareness of beneficial and nonbeneficial experiences can, as discussed earlier lead to more beneficial personal choices in different life situations, such as in school, sports or in their every day life.

Improved attention- or focus-awareness seems to be beneficial for both, school and sports performance, allowing athletes to pay more attention to drifting of their attention or focus at e.g. school, in training or competitions. Paying attention to "mind wandering" could be beneficial for both, personal performance and wellbeing. This positive effect of

becoming more aware of own "mind wandering" is strengthened by the findings of Killingworth & Gilbert (2010), who indicated that rumination and "mind wandering" can lead to higher perceived unhappiness. Higher attention awareness, as found in this study, might lead to further improve in training quality and thereby enhance sports performance and motivation. Improved attention awareness could also be one possible reason for why athletes are mentioning improved school performance and improved focus abilities as an outcome of the intervention. By improving their attention, it seems as if the interviewed junior elite athletes improved their way of working at school by being more aware of their own attention and focus. Also, it seems that athletes are more aware of what is going on in the present moment. In school situations this might lead to an improved learning.Changes in focus were often mentioned in the conducted interviews. Especially improved focus abilities in school and schoolwork were mentioned. This could also be related to higher task awareness.

Improved task awareness in school could lead to higher motivation because of increased understanding of own responsibility for school results and the importance of good work over time. In sports, improved task awareness might lead to higher quality in training and competing. It might influence the degree of pre-competition arousal and anxiety due to higher task orientation. It seems that improved awareness could also lead to a more present-oriented state of mind and thereby minimize mind-stress and anxiety.

Although it seems that improved awareness offers several beneficial outcomes, it may also lead to more rumination, insecurity and mind stress. This is especially the case if athletes become aware of nonbeneficial feelings, which they do not know how to handle or if work- or focus-tasks are not defined clear enough. Improved acceptance of the stressful experiences or nonbeneficial feelings was also mentioned by Kabat-Zinn et al. (1992) and, therefore, seems to be important.

Five out of six athletes mentioned that they had improved their focus abilities and all explained that they had improved the duration of time they could keep a strong focus. It therefore seems that the meditation training improves athletes' endurance in keeping high attention and focus on specific tasks. Although athletes mentioned they are better at focusing there seem to be differences in how clearly they could e.g. explain how their focus was when performing at their best. Therefore it is hypothesized that it is rather the change in awareness of own experiences than the focus abilities, which have changed. It has to be considered that barely defined focus tasks in combination with higher awareness of own internal experiences, could lead to higher insecurity; thereby creating more stress

and rumination. Also, if the internal focus abilities are trained extensively through mindfulness meditation, there could be a lack of external focusing skills resulting in little clarity of own focus tasks. For improving both, internal and external focus, it could be useful to combine mental training methods such as mindfulness training (internal focus), with training methods focusing on improvement of external focus, such as attention training technique (ATT; Wells, 2000; 2005).

Also, athletes expressed a big variation of different kinds of positive changes such as e.g. improvements in performance due to the mindfulness intervention. It is important to keep in mind that the athletes have been followed up during 12 weeks though. This by itself could have caused feelings of positive changes. Nevertheless, clear findings from this 12-week mindfulness training intervention seem to be a reduction of mind stress, impairment in rumination, better sleep and enhanced recovery. Another improvement seems to be on attention awareness leading to several of the mentioned beneficial outcomes.

Evaluating the conducted intervention program, it was found that close follow up of mental-training interventions by a coach seems to be important. This is due to positive influences on motivation and a more beneficial adaption of experiences. The analysis of this 12-week intervention further shows that it is highly important that a possible mental training intervention, like this mindfulness program, in junior elite athletes should not be too extensive because of their already very filled days. Too extensive programs could become a possible antecedent of even higher perceived stress levels, which in turn could affect athletes negatively.

6. Conclusion

Based on this study it can be concluded that mindfulness training is an interesting mental training method, which can possibly be used in performance enhancement and burnout prevention in junior elite athletes; the latter is due to increased stress reduction and recovery. Mindfulness seems to have a positive, but mostly indirect influence on levels of athlete burnout in junior elite athletes through the link of impaired perceived stress. Reductions in athletes´ perceived mind stress seem to lead to lower perceived stress levels, less rumination, better sleep and improved recovery.

Positive effects of mindfulness training were found in athletes' awareness abilities (attention awareness, focus awareness, awareness on what is beneficial and nonbeneficial, present-oriented awareness). It seems that improved awareness is beneficial for enhanced recovery, school and sports performance.

Higher perceived performance led to higher satisfaction and improved motivation, which also had a positive influence on burnout prevention. Mindfulness was not directly related to school and sports performance. This does not mean that mindfulness does not have any influence on school and sports performance. The possible positive effects are just more indirect as for e.g. true improved recovery or improved task awareness.

Higher awareness in combination with an insufficiently defined focus task can cause insecurity, higher mind stress and rumination in performance situations/tasks. For future use of mindfulness training in performance enhancement, it is, therefore, important that focus tasks are defined as clearly as possible. A close cooperation with the sports specific coach could therefore be highly interesting in future mindfulness training interventions in sports. For clarifying focus tasks and thereby minimizing the risk that improved awareness can lead to insecurity in performance situations, it could further be interesting to combine mindfulness training with other mental training programs, which focus more on external focus abilities.

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References

Andreou, E., Evangelos, C. A., Lionis, C., Varvogli, L., Gnardellis, C., Chrousos, G. P & Darviri, C. (2011). Perceived Stress Scale: Reliability and Validity Study in Greece. *International Journal of Environmental Research and Public Health*, 8, 3287-3298.

Baer, R.A. (2003). Mindfulness training as a clinical intervention: A conceptual and empiri- cal review. *Clinical Psychology: Science and Practice, 10,* 125-143.

Black, J.M., & Smith, A.L. (2007). An examination of Coakley's perspective of identity, control and burnout among adolescent athletes. International Journal of Sport Psychology, 38, 417-436.

Bompa, T.O. (1999). *Theory and methodology of training. 4th ed.* Champaign, IL: Human Kinetics.

Bompa, T.O., Gregory Haff, G. (2009). *Periodization: theory and methodology of training. 5th ed.* Champaign, IL: Human Kinetics.

Brown, K.W., & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological wellbeing. *Journal of Personality and Social Psychology, 84*, 822-848.

Carlsson, L.E., & Brown, K.W. (2005). Validation of the mindful attention awareness scale in a cancer population. *Journal of Psychosomatic Research, 58,* 29-33.

Chelladurai, P., & Riemer, H. A. (1998). Measurement of leadership in sport. In J. L. Duda (Ed.), *Advances in sport and exercise psychology*, 227-253. Morgantown, WV: Fitness Information Technology.

Coakley, J. (2009). From the Outside in: Burnout as an Organizational Issue. *Journal of Intercollegiate Sport*, Vol. 2 Issue 1, p.35.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385-396.

Cohen, S., & Williamson, G.M. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health*, 31-67. Newbury Park, CA: Sage.

Courneya, K. S., & Chelladurai, P. (1991). A model of performance measures in baseball. *Journal of Sport and Exercise Psychology, 13*, 16-25.

Cresswell, S.L. (2009). Possible early signs of burnout: A prospective study. *Journal of Science and Medicine in Sports, 12*, 393-398.

Cresswell, S.L., & Eklund, R.C. (2006). Athlete burnout: Conceptual confusion, current research, and future directions. In S. Hanton & S. S, Mellaleu (eds.), *Literature reviews in sport psychology,* 91-129. New York: Nova Science.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper and Row.

De Petrillo, L.A, Kaufman, K.A., Glass, C.R., & Arnkoff, D.B. (2009). Mindfulness for long-distance runners: An open trial using Mindful Sport Performance Enhancement (MSPE). *Journal of Clinical Sport Psychology, 4*, 357-376.

Gardner, F.L., & Moore, Z.E. (2004b). The multi-level classification system for sport psychology (MCS-SP). *The Sport Psychologist, 18*, 89-109.

Goodger, K., Gorely, T., Lavallee, D., & Harwood, C. (2007). Burnout in sport: A systematic review. *The Sport Psychologist, 21,* 127-151.

Gould, D., & Dieffenbach, K. (2002). Overtraining, underrecovery, and burnout in sport. In M. Kellman (Ed.), Enhancing recovery: Preventing underperformance in athletes. Champaign, IL: Human Kinetics.

Gould, D., Tuffey, S., Udry, E. and Loehr, J. (1997). Burnout in Competitive Junior Tennis Players: III. Individual Differences in the Burnout Experience, *The Sport Psychologist*, 1997, 11.

Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57,* 35-43.

Gustafsson, H., Hassmén, P., Kenttä, G., & Johansson, M. (2008). A qualitative analysis of burnout in elite Swedish athletes. *Psychology of Sport and Exercise, 9,* 800-816.

Gustafsson, H., Kenttä, G., Hassmén, P., & Lundqvist, C. (2007). Prevalence of burnout in competitive adolescent athletes. *The Sport Psychologist, 21*, 21-37.

Gustafsson, H., Kenttä, G., & Hassmén, P. (2011). Athlete burnout: An integrated model and future research directions. *International Review of Sport and Exercise Psychology, 4,* 3-24.

Gustafsson, H., & Skoog, T. (2012). The mediational role of perceived stress in the relation between optimism and burnout in competitive athletes. *Anxiety, Stress, and Coping, 25,* 183-199.

Jackson, S.A., & Csikszentmihalyi, M. (1999). *Flow in sports: The keys to optimal experiences and performances*. Champaign, IL: Human Kinetics.

Jackson, S.A., & Eklund, R.C. (2002). Assessing flow in physical activity: The Flow State Scale-2 and Dispositional Flow Scale-2. *Journal of Sport & Exercise Psychology, 24*,133-150.

Jouper, J. & Gustafsson, H. (2013). Mindful Recovery: A Case Study of a Burned-Out Elite Shooter. *The Sport Psychologist*, 27, 92-102.

Judge, L.W., Bell, R.J., Theodore, R., Simon, L. & Bellar, D. (2012). An Exploratory Examination of Burnout in NCAA Division II Athletes. *Journal of Intercollegiate Sport*, Vol. 5, Issue 2, p230.

Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4,* 33-47.

Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Random House.

Kabat-Zinn, J., Massion, A.O., Kristeller, J., Peterson, L.G., Fletcher, K.E., Pbert, L., Lenderking, W.L., Santorelli, S.F. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *The American Journal of Psychiatry, 149,* 936-943.

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York: Hyperion.

Kaufman, K.A., Glass, C.R. & Arnkoff, D. B. (2009). Evaluation of Mindful Sport Performance Enhancement (MSPE): A New Approach to Promote Flow in Athletes. *Journal of Clinical Sports Psychology,* 2009, 4, 334-356

Kee, Y.H., & Wang, C.K.J. (2008). Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psychology of Sport and Exercise, 9,* 393-411.

Keng, S. L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: a review of empirical studies. *Clinical Psychology Review, 31*, 1041-1056.

Killingsworth, M.A., & Gilbert D.T. (2010). A Wandering Mind Is an Unhappy Mind. *Science, 330. www.sciencemag.org.*

Lemyre, P.-N., Treasure, D.C., & Roberts, G.C. (2006). Influence of variability in motivation and affect on elite athlete burnout susceptibility. *Journal of Sport and Exercise Psychology, 28,* 32-48.

Lincoln, Y.S., & Guba, E.G. (1985). Naturalistic Inquiry. Newbury Park, CA: Sage Publications.

Marks, D.R. (2008). The Buddha's Extra Scoop: Neural Correlates of Mindfulness and Clinical Sport Psychology. *Journal of Clinical Sport Psychology,* 2, 216-241.

Martin, J. R. (1997). Mindfulness: A proposed common factor. *Journal of Psychotherapy Integration, 7*(4), 291-312.

McCracken, L.M., & Yang, S-Y. (2008). A contextual cognitive- behavioral analysis of rehabilitation workers' health and wellbeing: Influences of acceptance, mindfulness, and values-based action. *Rehabilitation Psychology, 53,* 479-485.

McEwen, B.S. (1998). Protective and damaging effects of stress mediators. New England *Journal of Medicine, 338*, 171-179.

Miller, T.W., Vaughn, M.P., & Miller, J.M. (1990). Clinical issues and treatment strategies in stress orientated athletes. Sports Medicine, 9, 370-379.

Moen, F. (2013). Burnout among Junior Athletes in relation to their Perceived Progress Academically in School and in Sport. *International Journal of Sciences, Vol.2* (ISSN 2305-3925).

Nigg, C.R., Borelli, B., Maddock, J., & Dishman, R.K. (2008). A theory of physical activity maintenance. *Applied Psychology: An International Review, 57,* 544-560.

Orlick, T. (2000). *In Pursuit of Excellence: How to Win in Sport and Life Through Mental Training. 3rd ed.* Champaign: Human Kinetics

O'Toole, M.L. (1998). Overreaching and overtraining in endurance athletes. In R.B. Kreider, A.C. Fry, & M.L. O'Toole (Eds.), *Overtraining in sport*, 3-17. Champaign, IL: Human Kinetics.

Price, M.S., & Weiss, M.R. (2000). Relationships among coach burnout, coach behaviors, and athletes' psychological responses. *The Sport Psychologist, 14,* 391-409.

Raedeke, T. D. (1997). Is athlete burnout more than stress? A commitment perspective. Journal of Sport & Exercise Psychology, 19, 396-417.

Raedeke, T.D., & Smith, A.L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport & Exercise Psychology, 23,* 281-306.

Raedeke, T.D., & Smith, A.L. (2004). Coping resources and athlete burnout: An examination of stress mediated and moderation hypothesis. *Journal of Sport & Exercise Psychology, 26,* 525-541.

Raedeke, T.D., & Smith, A.L. (2009). The Athlete burnout questionnaire manual. Morgantown, WV: Fitness Information Technology.

Riemer, H. A., & Toon, K. (2001). Leadership and satisfaction in tennis: Examination of congruence, gender and ability. *Research Quarterly for Exercise and Sport, 72*, 243-256.

Rowbottom, D.G. (2000). Periodization of training. In W.E. Garret & D.T. Kirkendall (Eds.), Exercise and sport science, 499-512. Philadelphia, PA: Lippincott Williams & Wilkins.

Schaufeli, W.B., & Buunk, B.P. (2003). Burnout: An overview of 25 years of research and theorizing. In M.J. Schabracq, J.A.M. Winnubst, & C.L. Cooper (Eds.), *The handbook of Work and Health Psychology, 2,* 383-425. Chichester: Wiley & Sons.

Segal, Z.V., Williams, J.M., & Teasdale, J.D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse.* New York: Guilford.

Semmer, N.K., McGrath, J.E., & Beehr, T.A. (2005). Conceptual issues in research on stress and health. In C.L. Cooper (Ed.), *Handbook of stress medicine and health, 2,* 1-44. Boca Raton: CRC Press.

Shirom, A. (2005). Reflections on the study of burnout. *Work and Stress, 19,* 263-270.

Smith, D.J. (2003). A framework for understanding the training process leading to elite performance. *Sports Medicine, 33,* 1103-1126.

Teasdale, J.D., Segal, Z.V., & Williams, J.M. G., & Mark, G. (1995). How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness training) help? An information processing analysis. *Behavior, Research, & Therapy*, *33*, 25-39.

Teasdale, J.D., Moore, R.G., Hayhurst, H., Pope, M., Williams, S., & Segal, Z.V. (2002). Metacognitive awareness and prevention of relapse in depression: Empirical evidence. *Journal of Consulting and Clinical Psychology, 70*, 275-287.

Thompson, R. W. Kaufman, K. A. De Petrillo, L. A. Glass, C. R. Arnkoff , D. B. (2011). One year follow-up of mindful sport performance enhancement (MSPE) with archers, golfers, and runners. *Journal of Clinical Sport Psychology*, 5, 99-116.

Viru, A., & Viru, M. (2001). *Biochemical monitoring of sport training.* Champaign, IL: Human Kinetics.

Weinstein, N., Brown, K.W., & Ryan, R.M. (2009). A multi-method examination of the effects of mindfulness on stress attribution, coping, and emotional wellbeing. *Journal of Research in Personality*, *43*, 374-385.

Weinstein, N., & Ryan R.M. (2011). A Self-determination theory approach to understanding stress incursion and responses. *Stress and Health 27(1)*, 4-17.

Wells, A. (2000). *Emotional disorders and metacognition: Innovative cognitive therapy*. Chichester, UK: Wiley.

Wells, A. (2005). Detached mindfulness in cognitive therapy: A metacognitive analysis and ten techniques. *Journal of Rational-Emotive Cognitive-Behavior Therapy, 23*, 337-355.

Appendix:

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