



UMEÅ UNIVERSITET

**INTERNET BASED
MINDFULNESS-ACCEPTANCE
-COMMITMENT IN SPORTS:
A RANDOMISED
CONTROLLED TRIAL**

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Abstract

The psychological aspects of sports is crucial for performance and important for sustaining good mental health. Despite this, efforts to improve those aspects are surprisingly rare and partly due to stigmatization of help-seeking together with lack of time and economic resources. However, in recent decades much research on internet-based interventions have been conducted. Also, a growing body of empirical support for the Mindfulness-Acceptance-Commitment approach (MAC) related to enhancement in performance and mental health in sports has emerged. This study was the first to explore the effects of internet-based MAC, which was conducted with the digital self-care programme ACTSPORT with or without feedback. Of 193 participants (aged 18 - 71, from 40 different sports on a variety of levels) who were randomly assigned to feedback, non-feedback and waitlist group, 125 completed the study. The results showed that participants who completed ACTSPORT with feedback experienced significantly enhanced performance, reduced performance anxiety and improved mental health, which included higher quality of life and less symptoms of depression. These improvements were predicted by significant improvements in acceptance and dispositional mindfulness. A larger effect was found for participants with feedback which indicated that some support is preferable. In conclusion, the present study indicate that internet-based interventions in sport may be effective, time-saving, cost-effective, flexible and available means for both enhancement in performance and aspects of mental health.

Keywords: Sport psychology, self-care program, MAC, Acceptance and Commitment Therapy.

Abstrakt

De psykologiska faktorerna inom idrott är avgörande för prestation och viktiga för att upprätthålla god mental hälsa. Trots detta är ansträngningar för att förbättra dessa faktorer förvånansvärt sällsynta. Det beror bland annat på att det råder ett stigma kring att söka hjälp samt brist på tid och ekonomiska resurser. De senaste decennierna har det genomförts en stor mängd forskning på internetbaserade interventioner. Dessutom har Mindfulness-Acceptance-Commitment approach (MAC) fått en ökad mängd empiriskt stöd gällande förbättring i prestation och mental hälsa inom idrott. Föreliggande studie är den första i sitt slag att undersöka effekten av internetbaserad MAC, vilken genomfördes med det digitala självhjälpsprogrammet ACTSPORT med eller utan feedback. Av 193 deltagare (ålder 18 - 71, i 40 olika sporter på alla nivåer) som randomiserades till tre grupper med feedback, utan feedback eller väntelista, fullföljde 125 deltagare studien. Resultaten visade att deltagare som fullföljde ACTSPORT med feedback upplevde signifikant förbättrad prestation, minskad prestationsångest såväl som förbättrad mental hälsa vilket inkluderade högre livskvalité och minskade depressionssymtom. Detta visade sig kunna prediceras av signifikanta förbättringar i acceptans och dispositionell mindfulness. En större effekt sågs för deltagarna i gruppen med feedback vilket indikerade att ett visst stöd är fördelaktigt. Slutsatser från studien är att internetbaserade interventioner inom idrott kan vara effektiva, tidsbesparande, kostnadseffektiva, flexibla och tillgängliga medel för att både öka prestation och aspekter av mental hälsa.

Nyckelord: Idrottspsykologi, självhjälpsprogram, ACTSPORT, MAC, Acceptance and Commitment Therapy.

Internet-based mindfulness-acceptance-commitment in sports: a randomised controlled trial

For optimal performance in sports, skills in technique, strength and conditioning, tactics and psychology are required. Considering the sometimes extremely small margins between success and failure in competitions, all factors are potentially crucial (Birrer & Morgan, 2010).

The sport environment also often leads to psychological distress in several different ways (Rise et al., 2016). The intense physical and psychological demands on athletes is rather unique. Consequences of failures or injuries are not only economic but could also possibly threaten their entire career. Pressure from media, fans and sponsors can be quite demanding, inflated by a lack of social support due to relocation and travelling. Common problems are related to performance anxiety due to the high demands and consequences of failure, stress due to balancing job/school with sports, and loss of life quality as sports takes up a lot of time from other activities (Bengtsson & Fallby, 2011).

In general, the number of people suffering from mental health issues in the western population is very large. Longitudinal studies have shown that the prevalence until adulthood for meeting criterias for at least one diagnosis in the Diagnostic and statistical manual of mental disorders (DSM) is 83% (Copeland, Shanahan, Costello & Angold, 2011; Schaefer et al., 2017). Mental health issues is not only painful but is also strongly associated with deteriorated athletic performance (Raglin, 2001). Several studies have shown that the problem is just as prevalent in sports. For instance, Johansson and Jernstig (2018) showed that about 30% of elite athletes are currently suffering from anxiety and depression, and sadly, other studies indicate that athletes seek help in a lesser degree than the overall population (Watson, 2005). This may partly be explained by societal norms and the common perception of an athlete as not being a person that is “weak” and seeks help for mental health issues, which in turn leads to stigmatization (Gucciardi, Hanton, Fleming, 2017). Moreover, when athletes finally do seek help, the mental health care is seldom adapted to the athletes’ specific needs by the reason of their lifestyle (Bär & Markser, 2013).

Despite of the above mentioned challenges, and despite of decades of research focusing on how to become a successful athlete, psychology has for long been neglected within the sport community in favor of other, more prioritized areas, such as technique, strength and conditioning and tactics (Kellmann, & Beckmann, 2003). This can partly be explained by the fact that the sport community is mainly voluntarily organized, which makes it a question of economy (Breuer, Hoekman, Nagel & van der Werff, 2015). However, on the elite level, the neglect of sport psychology is better explained by the fact that it’s rarely evident for athletes, coaches or others working in sport how sport psychology can contribute to sport performance (Kellmann, & Beckmann, 2003). The uncertainty of its practical relevance leads to psychology not being prioritized in relation to strength and conditioning, tactics and technique, when time is distributed among them (McCalla & Fitzpatrick, 2016).

Still, a majority of athletes consider psychology as an important element of their performance (Ferraro, & Rush, 2000). When taken into consideration the amount of time or resources they are willing to put in to work with sport psychology, a common approach to meet the demand of athletes’ need of consultation and interest is to organize lectures or workshops for larger groups of audiences or teams. However, a meta-analysis by Donker, Griffiths, Cuijpers and Christensen (2009) indicate that the effect of these kinds of interventions are limited, at least in the area of psychology. Another common approach is

individual or small group sessions. This approach has shown to be effective, but is more time demanding both for the athlete and the psychologist (Hedman et al., 2013; Hedman et al., 2011). Furthermore, in sports in general, a lack of evidence-based interventions and inadequate education and/or experience of the practitioner is a common flaw (Lindwall, Johnson & Rylander, 2016).

Internet-based interventions

In recent decades much research has focused on internet based psychological treatments. Carlbring, Andersson, Cuijpers, Riper & Hedman-Lagerlöf (2018) found in a meta-analysis of 20 studies with a total of 1418 participants that internet-based treatments was as effective as traditional treatment for psychiatric disorders. Other studies have found that internet-based treatments are far more cost-effective (Hedman et al., 2011), which is an important factor regarding the availability of sport psychology, since the domain of sport often has limited resources. An internet-based solution is also more flexible since it can be used everywhere, anytime and be more adapted to the user needs (Marks, Shaw & Parkin, 1998). Internet-based solutions also makes it possible for the user to be more anonymous, which may reduce the stigmatization of seeking help. It has also been found to be more appreciated than traditional ways within a group of athletes (Zizzi & Perna, 2002).

Internet-based solutions can be delivered in several ways, as for instance through reading, answering questions, keeping a diary, email conversations, video-calls, forum discussions or chats. A common structure for most internet-based treatments in research has however been that the user gets access to a platform, gets information by means of text or video, worksheets and weekly assignments (Andersson et al., 2008; Andersson, 2009). The worksheets and weekly assignments are reviewed by a therapist who gives feedback and answers questions. Since the user is working independently for the most part, the therapist put in much less time than in a traditional therapy session. However, internet-based treatment models in which the user is working without any support from the therapist have been shown to increase the amount of drop-out and reduce the effect of the treatment (Palmqvist, Carlbring & Andersson, 2007; Andersson & Cuijpers, 2009).

The Mindfulness-Acceptance-commitment approach

Sport psychology is normally centered around performance enhancement but can also be used to prevent or treat mental health issues (Kenttä, Lundqvist & Bjurner, 2015). Partly as an effect of cognitive behavioral theory (CBT) from clinical psychology being implemented in sport, which has proven to enhance performance and reduce symptoms of mental health issues (Gross et al., 2018). However, both research-related- and applied sport psychology have historically mostly been oriented towards psychological skills training (PST) (Williams, 1993). Meta-analyses exploring the effects of PST have shown insufficient study design, quality and varied results in the included studies (Gardner & Moore, 2007). As an alternative, the Mindfulness-Acceptance-commitment approach (MAC), a seven-module protocol, was developed to be more evidence based since that method is drawn from clinical psychology, used in several decades and with more research underpinning its principles. This method is mainly based on reducing the athletes' attempts to reduce or control thoughts or feelings compared to PST which is more based on increasing the control. In MAC, the athlete is instead focusing on the relevant task while accepting thoughts and feelings, and striving towards actions in the valued direction.

The principles of MAC are equal to the principles of Acceptance and commitment theory (ACT) used in clinical settings (Hayes, 2004), but the protocol is adapted for athletes and mindfulness is a larger part of the method. ACT is a development of CBT and is often called the third wave of CBT. In a follow-up study by Thompson, Kaufman, De Petrillo, Glass & Arnkoff (2011) on athletes that had participated in a MAC programme, it was found that the use of mindfulness was reduced after the end of the programme, partly because the athletes didn't see the use of it. For the present study, a new self-help programme (ACTSPORT), with less focus on mindfulness and more behavioral components included, was designed. The ACTSPORT programme was adjusted to be used digitally, and is based on MAC including the seven modules, but in different orders, with less focus on mindfulness and more behavioral components.

Noetel et al., (2017) highlights the need for studying the mediating factors in order to investigate what actually lead to enhanced performance from the use of mindfulness- and acceptance based methods. In their review, Noetel et al. present several studies that have explored and found evidence for some factors, particularly *dispositional mindfulness*, the ability to be present in the here and now, and *acceptance* of thoughts and feelings. A proposed theoretical model for how enhanced dispositional mindfulness from mindfulness practice works in sports were developed by Birrer, Röthlin and Morgan (2012). Here, a number of impact mechanisms from the practice (e.g., attention, flexibility, less rumination etc.) are assumed to promote various psychological skills related to performance (e.g., coping skills, motivational skills, attentional skills etc.) and thus mediates improvements. The opposite of acceptance, *psychological inflexibility* (or experiential avoidance) hinders the actions in the valued direction (Hayes, 2004) and can therefore be detrimental for sport performance. Paradoxically, it also often causes a rebound effect and thus increasing the unwanted states (Marx & Sloan, 2005; Wegner, 1994). Masuda and Tully (2012) also found that both dispositional mindfulness and acceptance are mechanisms that are associated with better mental health. Since these constructs were developed in clinical settings, but were transferred to performance enhancement interventions, improvements in these areas may also have further effects.

Research on mindfulness- and acceptance based methods

As far as we know, no study has examined the effect of a mindfulness- and acceptance based intervention in sports delivered via internet, which makes this study the first of its kind. Three systematic reviews and meta-analyses, exploring the effects of acceptance- and mindfulness based methods for athletes performed in a traditional way (by means of individual- or group sessions) exist to this date. They all showed promising results on a number of variables, even though the results have varied (Bühlmayer, Birrer, Röthlin, Faude, & Donath, 2017; Noetel, Ciarrochi, Van Zanden, & Lonsdale, 2017; Sappington & Longshore, 2015).

In numerous studies, the MAC program has been found to enhance performance. Both in terms of increased self-rated subjective performance and enhanced objective performance (e.g.: John, Verma & Khanna, 2011; Josefsson et al., 2018; Neil, Hanton & Mellalieu, 2013; Ojaghi, Gholizade & Mirheidari, 2013; Wolanin & Schwanhauser, 2010; Zhang et al., 2016). Moreover, MAC has been found to increase task-relevant attention (Bernier, Thienot, Pelosse & Fournier, 2014), as well as to decrease performance anxiety (Scott-Hamilton, Schutte & Brown, 2016), which is known to reduce working memory and lead to task-irrelevant attention (Eysenck & Calvo, 1992). Thus, MAC may help athletes coping with unwanted thoughts or feelings at crucial moments.

What a person consider as the most important aspects of life is also what causes the most discomfort, according to Hayes (2004). The aim of mindfulness- and acceptance based methods in general is not to eliminate our unwanted internal experiences, but rather to help us focus on the actions in the valued direction and quality of life; an effect of MAC that has been extensively reported (Jiménez, 2012). Still, stress and other aspects of mental health issues has been linked to impaired sport performance (Raglin, 2001). A large amount of research has shown that mindfulness- and acceptance based interventions has positive effects on general stress-reduction (Khoury, Sharma, Rush & Fournier, 2015), as well as in sport contexts (Gustafsson, Skoog, Davis, Kenttä & Haberl, 2015; Moen & Wells, 2016). Furthermore, in one study on MAC for athletes exploring the effect on mental health, reduced symptoms of anxiety, depression and eating disorder was shown, as well as enhanced performance (Gross et al., 2018).

Aim

The primary aim of the present study was to explore the effect of the digital self-care programme ACTSPORT with or without feedback, on subjective sport performance, performance anxiety, acceptance, dispositional mindfulness, quality of life, stress, wellbeing, anxiety and depression; and if such possible improvements could be explained by improvements in acceptance and dispositional mindfulness.

Our hypothesis was that ACTSPORT would have a significant positive effect on the nine self-assessed measures and that the feedback group would have a larger effect than the non-feedback group. No effect was expected for the waitlist group. Further, the magnitude of improvement in acceptance and dispositional mindfulness was hypothesized to predict the improvements on the other outcome measures.

Method

Participants

Historically, intervention-based research in sport psychology have been conducted either on novice or elite athletes, and as a consequence generalization to athletes on other levels have been difficult to do (Gardner & Moore, 2006). Furthermore, how the skill-level of athletes have been defined has varied between studies within sport psychology which have made the conclusions even more difficult to do. Therefore, this study recruited participants from a variety of competitive levels, and in line with the definition of elite athletes by Swann, Moran and Piggott (2015) we used the *elite athlete classification point* (EACP). The participants were classified as semi-elite (1-4 points), competitive elite athlete (4-8 points) or successful elite athlete (8-12 points) by having the athletes answering questions about type of sport, level of competition, performances, and for how long they have been competing at that level.

To be included in the study the athletes had to be at least eighteen years old, practice at least four times a week and compete in their sport. They should also be able to put in at least one to two hours a week, for seven to nine weeks working with ACTSPORT. Athletes who have had regular personal contact with a sport psychologist or mental coach for more than three sessions were excluded from participation.

Sport confederations, sport universities and sport high schools in Sweden were contacted to recruit participants. A Facebook page was used to spread information. The participants applied by filling in a form on the website <http://www.actsport.net>. A link to

the research platform was also to be found on the same website. The participants filled in a pre-assessment and were randomly assigned to either one of the two experiment groups, or the waiting list. The allocation were thereby concealed for all participants and the authors. The number of athletes that applied was 314, but after analyzing variables of inclusion and exclusion, 193 participants competing in 40 different sports were included and had access to the programme (Table 1).

Table 1

Demographic description of participants. Frequency, mean and standard deviation (SD).

Variable / Group	Feedback	Non-feedback	Waitlist	Total
Number of participants	39	30	56	125
Sex				
Women	20 (51%)	22 (71%)	29 (42%)	71 (56%)
Men	19 (49%)	9 (29%)	27 (48%)	55 (44%)
Age mean	29.9 (9)	31.3 (9.7)	27.3 (10.4)	29.1 (9.9)
Age min - max	18 - 57	19 - 50	18 - 71	18 - 71
Mean practices per week	6.5 (2.4)	8.1 (2.7) ¹	6.2 (2)	6.7 (2.4)
Successful elite athletes	3	1	1	5
Competitive elite athletes	21	13	20	54
Semi-elite athletes	15	17	35	67

Note. ¹Statistically significant difference at $p < .05$ between the non-feedback group compared to both the feedback group and waitlist group.

Drop-outs and missing data

The groups without feedback (non-feedback group and waitlist group) were from the beginning a bit larger since greater drop-out was expected than the group with feedback, in line with earlier research (Andersson & Cuijpers, 2009). A total of 68 participants didn't complete the study which is presented in table 2. Two participants completed the post-assessment after the calculations were made and one participant only completed the Sport Performance Questionnaire on the post-assessment. The mean age of the drop-outs was 29.07 (Max: 59; min: 18; SD = 10.06) and the mean number of practices were 6.56 (SD = 2.25). There were no statistical differences between the drop-out group and the other study-groups related to relevant background variables (age and number of practices; p 's > .05).

Table 2

Number and percentages of participants who completed each part of the study.

	Feedback	Non-feedback	Waitlist	Total
Pre-assessment	60 (100%)	66 (100%)	67 (100%)	193 (100%)
Module 1	57 (95%)	48 (73%)	-	172 (89%)
Module 2	54 (90%)	43 (65%)	-	164 (85%)
Module 3	49 (82%)	37 (56%)	-	153 (79%)
Module 4	46 (77%)	36 (55%)	-	149 (77%)
Module 5	42 (70%)	33 (50%)	-	142 (74%)
Module 6	40 (67%)	33 (50%)	-	140 (73%)
Module 7	39 (65%)	32 (48%)	-	138 (72%)

Post-assessment	39 (65%)	30 (45%)	56 (84%)	125 (65%)
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Procedure and design

This study was a randomised controlled trial (RCT). The two experiment groups were the self-care programme ACTSPORT with feedback, and the self-care programme ACTSPORT without feedback. The waitlist was given the self-care programme ACTSPORT without feedback after the post-assessment.

All participants completed a pre-assessment two weeks before the programme started. Thereafter, the two experiment groups started the self-care programmes (with or without feedback). The participants had one week to complete each module. On Mondays and at the end of the week, the participant got reminders via text and email from the sport psychologist. When a module was completed the next module was unlocked on the following Monday. The participants had a total of nine weeks to complete the seven modules. Within two weeks from the last day of the programme, the post-assessment was distributed to all participants who had completed the seven modules, as well as to the waitlist participants.

Instruments

Sport Performance Questionnaire (SPQ; Wolanin, 2005). The SPQ measures subjective performance on a 5-point likert scale varying from very bad (1) to very good (5) in ten areas (aggressivity, concentration, strength, endurance, motivation, quickness, agility, fitness, mechanics and team cohesion) and one item for the overall athletic performance. The authors of the study translated the items to Swedish. For this study the total point for all areas were used. No study has to this date investigated its psychometric properties. In the present study the instrument showed an adequate internal consistency with a Cronbach's α coefficient of .76.

The Sport Anxiety Scale-2 (SAS; Smith, Smoll & Schutz, 1990) assesses performance anxiety with 21 items. Somatic anxiety with nine questions (eg. "I feel tense in my stomach"), worry with seven questions (eg. "I have self-doubts") and concentration disruption with five questions (eg. "My mind wanders during sport competition"). For this study the total point for performance anxiety was used. The authors of the study translated the items to Swedish. The questionnaire uses a 4-point likert scale varying from *not at all* (1) to *very much so* (4). Smith et al found an adequate to good internal consistency with a Cronbach's α coefficient that varied from .74 to .88 for the three subareas. In the present study the instrument showed an excellent internal consistency with a Cronbach's α coefficient of .93 for the entire scale.

Acceptance and Action Questionnaire-2 (AAQ-2; Bond et al., 2011). For the present study a Swedish version of the AAQ-2 was used. The questionnaire measures the concept *acceptance* (commonly also labelled *psychological flexibility* or its opposite *experiential avoidance*) and includes ten items (eg. "I'm afraid of my feelings"), where three items are reversed (eg. "I am in control of my life"). The participants respond on a 7-point likert scale ranging from *never true* (1) to *always true* (7). The more points, the lower the level of acceptance. A score higher than 24 suggest probable clinical distress. Bond et al (2011) have reported a Cronbach's α coefficient of .84, which also was the α coefficient in the present study.

Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003). The MAAS measures *dispositional mindfulness*, the ability to be present in the here and now.

The questionnaire consists of fifteen items (eg. “I find myself preoccupied with the future or the past”) on a 6-point likert scale ranging from *almost never* (1) to *almost always* (6). The authors of the study translated the items to Swedish. Higher scores means a greater ability for dispositional mindfulness. The internal consistency for the scale has been reported to be a good with a Cronbach’s α coefficient of .89 (MacKillop and Anderson, 2007). In the present study the instrument showed a Cronbach’s α coefficient of .86.

Brunnsviken Brief Quality of life (BBQ; Lindner et al., 2016). The instrument measures subjective quality of life in six areas: leisure, self-esteem, life, learning, creativity and friendship (eg. “Friends and friendship is important for my quality of life). The questionnaire consists of twelve items that are answered separately, but where every item pair is multiplied with each other. A total score is then calculated. A score below 53 has been suggested a cut-off för clinical sample. The questionnaire uses a 5-point likert scale varying from *not at all* (0) to *fully agree* (4). Frykheden (2014) reported an inadequate internal consistency with a Cronbach’s α coefficient of .68. In the present study the instrument also showed an inadequate internal consistency with a Cronbach’s α coefficient of .67.

Perceived stress scale-10 (PSS-10, Cohen, Kamarck & Mermelstein, 1983). This scale measures perceived stress during the last month. The cut-off score for clinical sample is 20. The Swedish translation (Nordin & Nordin, 2013) consists of ten items (eg. “During the last month, how often have you been upset with something that happened unexpected?) and uses a 5-point likert scale ranging from *never* (1) to *very often* (5). Four items are reversed. More points indicates more stress. The internal consistency was good with a Cronbach’s α coefficient of .84 in a study by Nordin and Nordin (2013), which were the same in the present study.

Clinical Outcomes in Routine Evaluation – Outcome Measure (CORE-OM; Evans et al., 2002). Originally the questionnaire consists of 34 items. For the present study only well-being (eg. “I have felt like crying), anxiety (eg. I have felt tense, anxious or nervous) and depression (eg. “I have felt totally lacking in energy and enthusiasm”) with four items in each area were used. The answers refer to the last seven days, in the range from *never* (0) to *almost always* (4) on a 5-point likert scale. Higher score indicates a greater amount of problems in each specific area. A mean cut-off score over 2.5 for clinical sample for each area has been suggested (Connell et al., 2007). The swedish translation showed an adequate internal consistency with a Cronbach’s α coefficient of .74 for wellbeing and excellent (.90) for anxiety and depression. In the present study the instrument showed an adequate internal consistency for wellbeing and anxiety with a Cronbach’s α coefficient of .74 and good internal consistency for depression ($\alpha = .83$).

Demographic description. Information about age, gender, number of training sessions per week, type of sport, level of competition, years at that level, results/performance at that level and current or earlier contact with sport psychologist or mental coach was gathered. Some of these questions were only utilized for the purpose of inclusion/exclusion (see section Participants).

Intervention

The authors of the present study were in charge of delivering the intervention. The students were in their last semester at the master programme in psychology with sport orientation at Umeå university, and have several years of experience working with athletes, teams, coaches and organizations with mindfulness- and acceptance based

methods concurrently with their education at the university. Prior studies have not found any differences related to participants results, depending on the therapist (Almlöf et al., 2011). In this study the participants were therefore randomly assigned to one of the two sport psychologists.

The content of ACTSPORT was written in Swedish and based on the principles from the MAC protocol (Gardner & Moore, 2007) and ACT (Hayes, 2004). The draft was then reviewed by one elite athlete, one elite coach, one doctoral student in communication and one master of education to ensure applicability, comprehensible language and relevance for athletes. The content was then further revised by the authors and the total amount of text became 58 A4-pages including page brakes, pictures, tables and forms. The content was recorded and compiled with pictures and animations for eight videos. The total time for the videos was 1 hour, 29 minutes and 19 seconds. Three mindfulness exercises was recorded with a total amount of 16 minutes and 43 seconds.

The seven modules consisted of information through video and text, worksheets to be completed during the watch or read and weekly assignments which were evaluated in forms (See Appendix 1 for the full description). Worksheets and assignments included several example responses relevant for athletes. The material was constructed so the athlete could use it both in their sport and/or daily life.

The structure of the feedback from the two sport psychologists was based on telling the participants what they did well, what could be improved and what was missing according to the content of the module and the instructions of the exercises. The feedback contained instructions, suggestions or questions from the sport psychologists. The athlete were also able to ask questions in return to the sport psychologist or commenting on the feedback regarding the content in the module or the instructions of the exercises.

Statistical analyses

SPSS 26 were used for all statistical analyzes of the assessments from the participants who completed the seven modules of ACTSPORT. The sample was checked for sufficient normal distribution, linearity, outliers, homogeneity of variance and covariance.

Mixed between-within subjects analyses of variance (repeated measures ANOVAs) were performed with group as the independent variable, and pre- and post-assessment of the dependent variables (SPQ, SAS-2, AAQ-2 and MAAS) representing the within-subject repeated measures. To control for Type 1 error across multiple tests (ANOVAs) a Bonferroni adjustment of the alpha-level was applied (e.g., $.05/4 = .012$). Wilk's Λ was calculated for most of the analyses. When homogeneity of variance was violated, Pillai's trace was assessed.

A mixed multivariate analysis of variance (repeated measures MANOVA) was performed with group as the independent variable, and pre- and post-assessment of the dependent variables (BBQ, PSS-10 and CORE-OM) representing the omnibus within-subject repeated measure *mental health*. Effect sizes are reported as partial eta squared (partial η^2) with the following interpretation: .01 = small, .06 = medium and .14 = large (Cohen, 1988).

Multiple linear regression analyses were used to test if the magnitude of pre- to post-test difference in the constructs *mindfulness* and *acceptance* significantly predicted the pre- to post-test difference in sport performance (SPQ), performance anxiety (SAS-2), quality of life (BBQ), stress (PSS-10); wellbeing, anxiety and depression (CORE-OM) (see Figure 3). The standardized β coefficient, referring to the standard deviations, was

used since different scales with different units were compared. Effect sizes for the regression analyses are reported as Cohen's f^2 with the following interpretation: .02 = small, .15 = medium and .35 = large (Cohen 1988).

Cronbach's α was calculated for the pre-assessment on all measures and interpreted with the proposed cut-offs by the European Federation of Psychologists' Associations (2013) (adequate $.70 \leq r < .80$, good $.80 \leq r < .90$ and excellent $r \geq .90$).

Ethical considerations

The participants filled in an informed consent in which they approved the ethical considerations, the arrangement of the study, method and purpose. The athletes voluntarily participated in the study and could at any moment terminate their participation without reason or consequences and have their information erased. The participants were informed that no effect from the programme could be guaranteed. The participants declared that they could put at least one to two hours per week during the seven to nine weeks the programme extends. The participants were randomly assigned to each group to ensure scientific quality. The waitlist got access to the programme without feedback after the post-assessment. If information came up that were evaluated as risk for the health of the participant they were referred to professional help. The platform used guaranteed encrypted data storage and safe login. Only the two sport psychologists had access to the answers on the digital assessments, the worksheets and weekly assignments. The participants were informed that the results were only to be analysed on group level and published in scientific journals.

Results

Of the 193 participants completing the pre-assessment, 125 completed the post-assessment. The descriptive data for the assessments is shown in table 3 and Appendix 2. The mean time for the support for the participants in the feedback group (reading answers, giving feedback and answering questions) from the sport psychologists for each module and participant were 6 minutes and 2 seconds.

Table 3

Pre- and post-assessment. Means (M) and standard deviations (SD) of the dependent variables.

	Feed-back (n = 39)		Non-feedback (n = 30)		Wait-list (n = 56)		Total (n = 125)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
SPQ								
Pre	41.36	4.88	40.83	5.07	41.18	5.29	40.79	4.97
Post	43.00	4.36	41.33	5.01	40.89	5.64	41.66	5.17
SAS-2								
Pre	42.85	13.18	42.93	8.42	41.38	12.86	42.21	11.99
Post	35.13	8.93	38.93	11.16	39.95	12.44	38.19	11.26
AAQ-2								
Pre	28.41	8.24	29.53	9.72	30.52	11.20	29.62	9.97
Post	23.51	7.61	27.21	9.67	29.18	11.04	26.94	9.99

MAAS								
Pre	60.46	11.98	57.40	10.50	61.21	11.73	60.06	11.54
Post	64.82	10.73	58.24	11.71	61.46	11.40	61.77	11.44
BBQ								
Pre	62.21	15.03	58.33	15.15	59.88	14.77	60.23	14.89
Post	70.77	11.34	63.03	15.88	61.59	13.44	64.81	13.95
PSS-10								
Pre	14.51	6.18	14.40	5.42	15.34	6.01	14.86	5.90
Post	14.08	5.55	13.97	4.75	15.41	5.96	14.65	5.57
CORE-OM wellbeing								
Pre	1.32	.68	1.20	.57	1.29	.64	1.28	.64
Post	1.14	.59	1.15	.57	1.31	.67	1.22	.63
CORE-OM anxiety								
Pre	1.10	.74	.95	.67	1.17	.80	1.10	.75
Post	.96	.70	.95	.72	1.18	.80	1.06	.75
CORE-OM depression								
Pre	1.27	.77	1.16	.64	1.33	.77	1.27	.74
Post	.93	.61	1.09	.60	1.32	.83	1.15	.73

Note. No difference were found on the pre-assessment for any variable (p 's > .05).

The mixed between-within subjects analyses of variance (ANOVA) revealed a significant group x test interaction for SAS-2 ($F(2, 121) = 7.93, p = .001$, partial $\eta^2 = .12$), for AAQ-2 ($F(2, 121) = 4.56, p = .012$, partial $\eta^2 = .07$), for MAAS ($F(2, 121) = 3.22, p = .044$, partial $\eta^2 = .05$) but not for SPQ ($F(2, 121) = 2.70, p = .071$, partial $\eta^2 = .04$).

Bonferroni corrected follow-up analysis showed a significant pre- to post-test difference for the feedback group on SPQ ($F(1, 122) = 8.04, p = .005$, partial $\eta^2 = .06$), for SAS-2 ($F(1, 121) = 40.44, p < .001$, partial $\eta^2 = .25$), for AAQ-2 ($F(2, 121) = 29.29, p < .001$, partial $\eta^2 = .20$), and MAAS ($F(2, 121) = 11.95, p = .001$, partial $\eta^2 = .09$). For the non-feedback group, a significant pre- to post-test difference were found for SAS-2 ($F(1, 121) = 9.23, p = .003$, partial $\eta^2 = .07$), and AAQ-2 ($F(1, 121) = 6.74, p = .011$, partial $\eta^2 = .05$). No significant pre- to post-test differences were found for the waitlist group on any measure (p 's > .012). Also, a significant difference on the on the post-test between the feedback and the waitlist group on AAQ-2, $p = .019$.

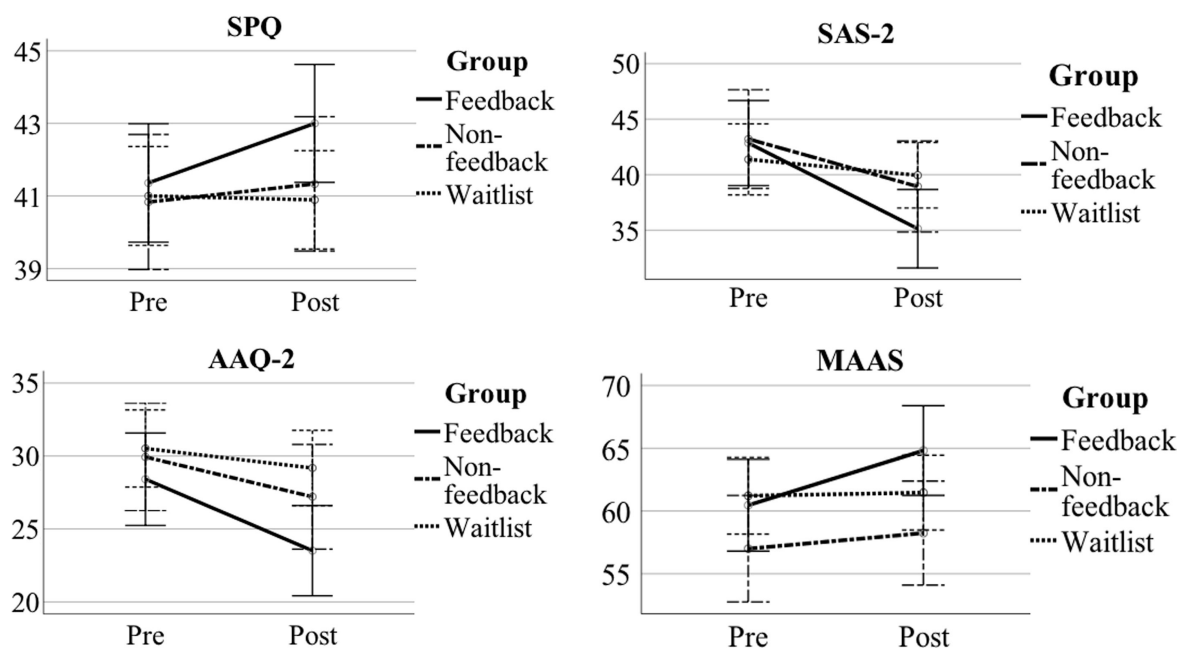


Figure 1: Results for SPQ, SAS-2, AAQ-2 and MAAS as a function of group and test. Error bars: 95% confidence interval.

The mixed multivariate analysis of variance (repeated measures MANOVA) showed no significant group x test interaction for the omnibus concept *mental health* ($F(10, 234) = 2.7, p = .43, \eta^2 = .041$). Univariate results from the included dependent variables (utilizing a Bonferroni adjusted alpha level of .01) confirmed that no group x test interaction was evident for BBQ ($F(2, 121) = 2.87, p = .06, \eta^2 = .045$), PSS-10 ($F(2, 121) = .175, p = .84, \eta^2 = .003$), CORE-OM wellbeing ($F(2, 121) = 1.73, p = .18, \eta^2 = .028$), CORE-OM anxiety ($F(2, 121) = .96, p = .39, \eta^2 = .016$) and CORE-OM depression ($F(2, 121) = 2.79, p = .07, \eta^2 = .044$). However, there was a significant main effect for the feedback group for the omnibus measure mental health $F(5, 117) = 4.12, p = .01, \text{partial } \eta^2 = .15$.

Bonferroni corrected follow-up analysis showed a significant pre- to post-test difference for the feedback group on BBQ, $p < .001$ and CORE-OM depression, $p = .002$. No significant effects were found for the non-feedback nor the waitlist group on any measure (p 's $> .01$). Also, a significant difference on the post-test between the feedback and the waitlist group on BBQ ($p = .004$), and CORE-OM depression ($p = .03$) was found.

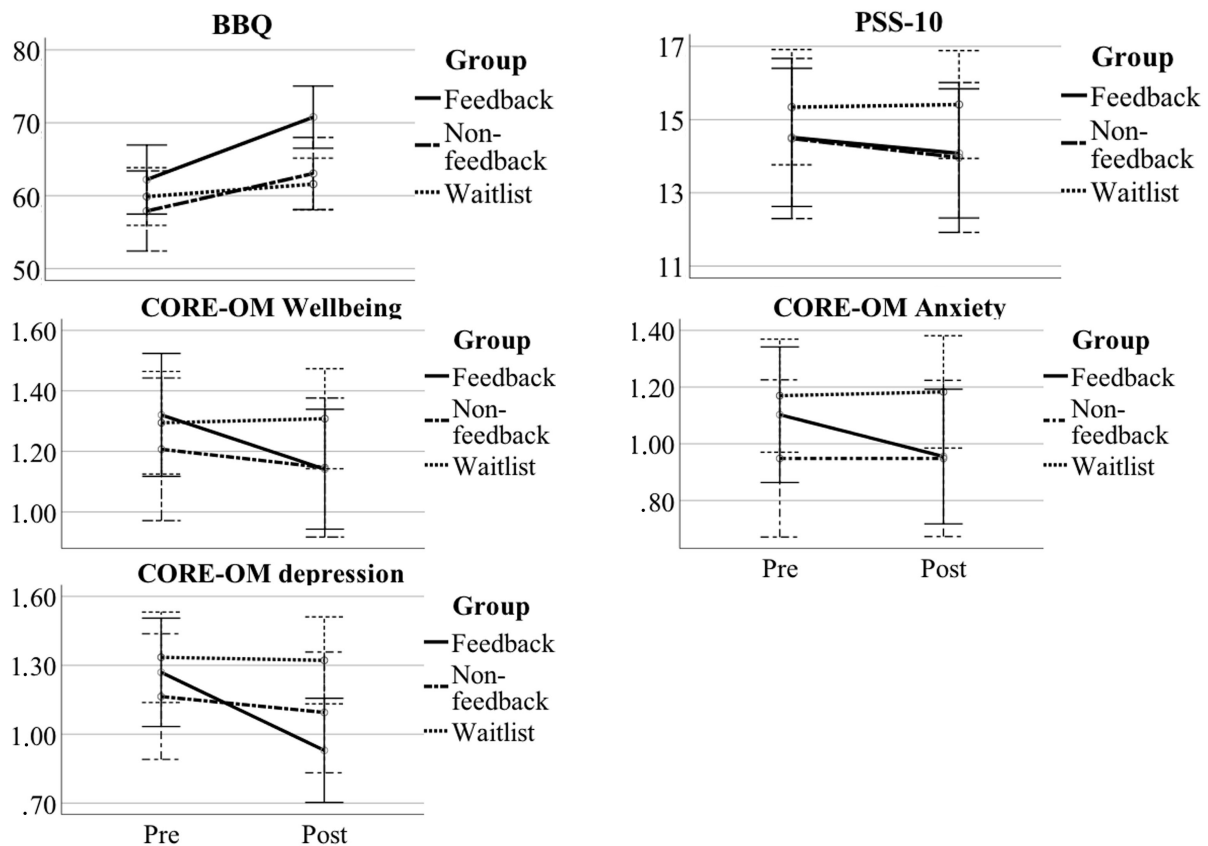


Figure 2: Results for BBQ, PSS-10 and CORE-OM as a function of group and test. Error bars: 95% confidence interval.

The outcome of the regression analyses is presented in Figure 3. Improvements in the two predictors acceptance (AAQ-2) and mindfulness (MAAS) explained 7.5% of the variance in sport performance (SPQ) ($R^2 = .075, F(2, 121) = 4.92, p = .009, \text{cohen's } f^2 =$

.08), 10.2% in performance anxiety (SAS-2) ($R^2 = .102$, $F(2, 121) = 6.90$, $p = .001$, cohen's $f^2 = .11$), 6.3% in quality of life (BBQ) ($R^2 = .063$, $F(2, 121) = 4.04$, $p = .02$, cohen's $f^2 = .07$), 22.1% in perceived stress (PSS-10) ($R^2 = .221$, $F(2, 121) = 17.21$, $p < .001$, cohen's $f^2 = .28$), 12.5% in wellbeing (CORE-OM) ($R^2 = .125$, $F(2, 121) = 8.66$, $p < .001$, cohen's $f^2 = .14$), 9.9% in anxiety (CORE-OM) ($R^2 = .099$, $F(2, 121) = 8.63$, $p = .002$, cohen's $f^2 = .11$), and 16% in depression (CORE-OM) ($R^2 = .160$, $F(2, 121) = 11.54$, $p < .001$, cohen's $f^2 = .19$).

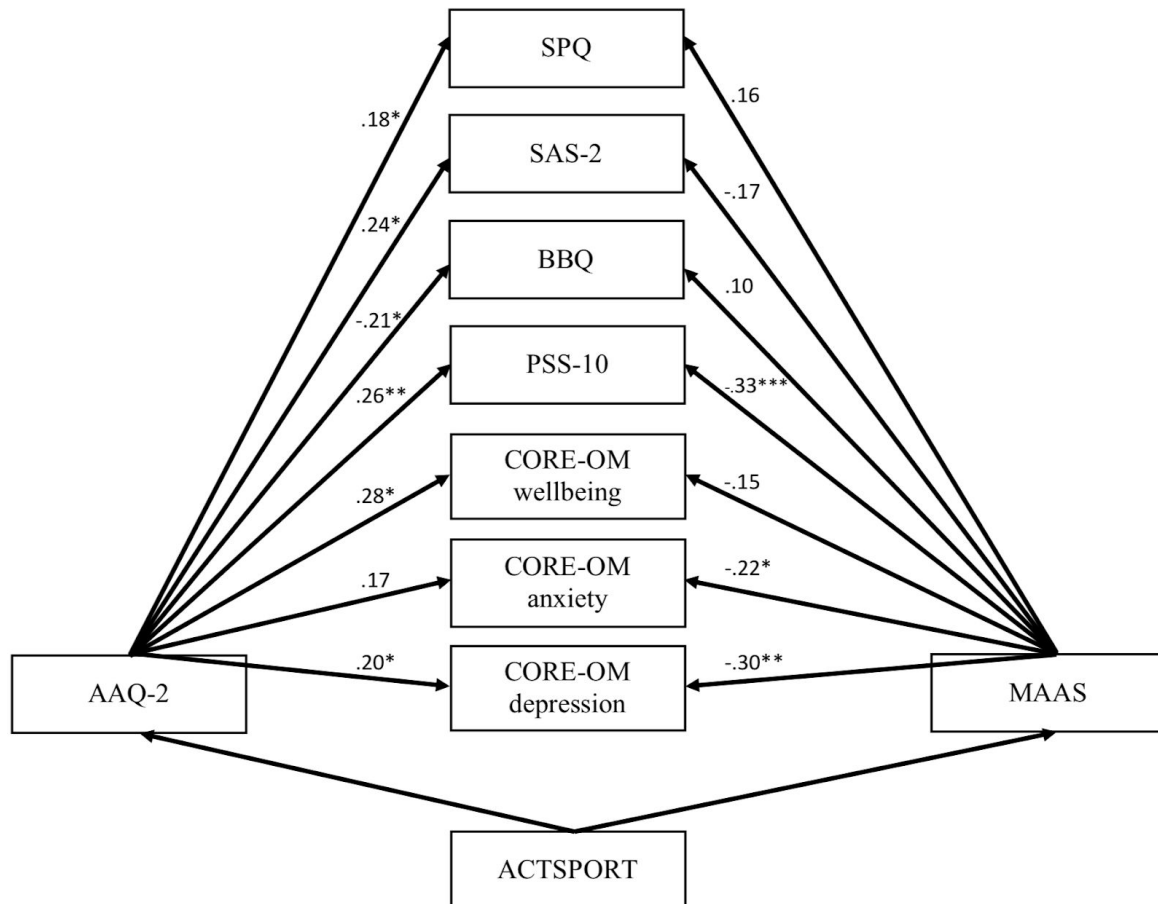


Figure 3: Hypothesized model displaying the standardized β coefficient with AAQ-2 and MAAS as predictors from ACTSPORT to SPQ, SAS-2, BBQ, PSS-10 and CORE-OM.

* $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

The primary aim of the present study was to investigate the effects of internet-based sport psychology with the self-care programme ACTSPORT with or without feedback on performance, performance anxiety, acceptance, mindfulness and aspects of mental health (quality of life, perceived stress, wellbeing, anxiety and depression), compared to a waitlist group. The intervention was based on a modified version of the MAC protocol (Gardner & Moore, 2007) and was the first of its kind to evaluate the protocol delivered via internet. Participants who received ACTSPORT with feedback experienced better performance, less performance anxiety and better mental health (which included higher levels of quality of life and less symptoms of depression). No improvements on stress or anxiety were found. The feedback group also experienced

higher levels of acceptance and dispositional mindfulness, which in turn was found to predict outcomes on the other measures. Therefore, our hypotheses were confirmed on most of the measures for the feedback group. The group without feedback also rated lower levels of performance anxiety and higher levels of acceptance which indicated that ACTSPORT without feedback also can benefit athletes, but perhaps to a lesser degree. As expected, no effect was found for the waitlist group on any measure. The improvements were in line with earlier research with MAC performed in a traditional way (by the means of individual or group sessions) (Bühlmayer, Birrer, Röthlin, Faude, & Donath, 2017; Noetel, Ciarrochi, Van Zanden, & Lonsdale, 2017; Sappington & Longshore, 2015). Despite ACTSPORT using fewer elements of mindfulness than the original MAC protocol (Gardner & Moore, 2007), the participants in the feedback group still experienced positive results on dispositional mindfulness. The results also indicate that ACTSPORT with feedback induce greater improvements compared to the non-feedback intervention or waitlist, at least on performance anxiety, acceptance and dispositional mindfulness. Also a significant difference between the feedback and waitlist group was found for post-test levels of acceptance, quality of life and depression.

Some effect sizes were small in the present study. However, considering that the difference between a gold medal and a fourth place can be as little as milliseconds or millimeters in sports, even small improvements in performance can make a tremendous amount of differences for the athlete. It does not just determine the rate of success, but also price money and sponsorship deals. Since athletes due to stigmatization tend to seek help in a lesser extent than the overall population (Watson, 2005), the improvements on mental health are also promising considering that internet-based interventions are a more anonymous mean (Marks, Shaw & Parkin, 1998; Zizzi & Perna, 2002). Athletes may therefore with internet-based interventions improve aspects of mental health while targeting performance enhancement, which is less stigmatized.

Significant improvements were not evident on all measures, particularly for measures related to mental health, even for the feedback group. For example, no effect was observed on perceived stress, contrary to prior research (Gustafsson, Skoog, Davis, Kenttä & Haberl, 2015; Khoury, Sharma, Rush & Fournier, 2015; Moen & Wells, 2016). Also no effect was shown on wellbeing and anxiety as measured by CORE-OM. The fact that we used a normal population and not a clinical group may have influenced the potential effect of ACTSPORT. El Alaoui et al. (2016) found that better mood rates at the beginning of a study was related to less improvements. By using participants with clinical distress, severe performance issues or intense performance anxiety, larger effects may have been obtained. Furthermore, since the participants completed the pre-assessment during January and February and completed the post-assessment during April, seasonal variations could have influenced the ratings, particularly those relating to mental health. Persson et al. (2010) concluded in their research that this should be accounted for when performing studies over a limited period of time. Persson et al. also found that mood decreased from January to April. Still, participants in the present study showed significant improvements in several areas. Thus, the effects of the present ACTSPORT intervention may have been even larger if conducted during other times of the year.

Compared to traditional way of performing sport psychology, the amount of time the sport psychologist put down was considerably reduced. From 45 - 90 minutes to only about 6 minutes per module. This certainly increases the availability for evidence-based sport psychology. However, the effects of the intervention for the non-feedback group were not as large as for the feedback group, which indicate that some support is needed to gain full benefit from the programme. Internet-based sport psychology is therefore perhaps

a more anonymous, cost-effective, flexible and time-saving way of getting help, both for performance enhancement and for improving mental health, than the traditional way (by the means of individual- and group sessions). Given the fact that the athletes in the present study compete in 35 different sports on a variety of skill- and performance levels, these results may be generalized to a wide range of athletes. However, whether the results are generalizable to athletes below 18 years old and/or practicing less than four times a week can't be determined.

The second aim of this study was to investigate to what extent improvements in acceptance and dispositional mindfulness could predict improvements in performance, performance anxiety and aspects of mental health. The regression analyses indicated that mindfulness and acceptance predicted improvements on all of the seven dependent variables, with small to medium effect sizes. Since ACTSPORT improved both level of experienced dispositional mindfulness and acceptance within the feedback and non-feedback group, it may also explain the improvements on the other dependent variables. This is in line with Gardner and Moore's (2007) theoretical assumptions that dispositional mindfulness and acceptance are mechanisms in the MAC approach that work to produce performance enhancement within sports. Research have also shown an association between mindfulness, acceptance and mental health (Masuda & Tully, 2012), perhaps explaining why ACTSPORT seem to have effect on both performance, performance anxiety and mental health related measures. However, it can't be determined if the relationship was reversed, thus originating from the the athletes' perceived enhancement on the other dependant variables. It may also be the way Raglin (2001) proposed, that better mental health produces enhanced performance.

The participants also completed an evaluation in conjunction with the post-assessment. All participants (100%) experienced that ACTSPORT had helped them, 96% said that they performed better, 94% had improved their mood, 80% gained better physique and 97% would recommend ACTSPORT to a friend. This fact that the participants in general was satisfied indicates that internet-based interventions are appreciated.

Limitations

Several limitations need to be recognized of the present study. First, using waitlist as a control group could make it harder to draw conclusions on the effect of the programme since participants on the waitlist may become more passive (Cunningham, Kypri, & McCambridge, 2013). Also, regardless of method, all interventions carry some placebo-effect. Thus, to what extent ACTSPORT as an intervention contributed to pre- to post-test changes on the different outcome measures is therefore somewhat debatable. Instead, an active control group completing another intervention could have been used, but were unfortunately not possible due to the scope of this study.

Since a large number of measures were used and several analysis were made, the risk for type 1 error was increased. Several measures were taken to adjust for this, including using a Bonferroni adjusted alpha level and setting the *p*-value to a stricter level, which in turn may have increased the risk for a type 2 error.

Related to the validity of the included instruments and outcome measures, this study used self-reported measures which are influenced by common method biases (Podsakoff, MacKenzie & Podsakoff, 2012) and therefore may have influenced the results. The subjective performance (SPQ) measure was used without earlier investigated psychometric properties. However, we found an adequate internal consistency. Anyhow,

this makes the responses highly susceptible to biases and it's hard to draw conclusion if the athletes in the feedback group *actually* performed better. Still, since the participants competed in a variety of sports, and overall objective measures of performance hard to generate, subjective performance estimates was the most applicable.

Related to reliability, the internal consistency of BBQ was inadequate and may therefore have affected the results. The construct quality of life may be too diverse and therefore should be split into different scales to ensure both validity and reliability. Moreover, since we created and utilized a new intervention programme it is difficult to ensure whether other mindfulness- and acceptance based methods delivered via internet will have similar effect. Furthermore, since mindfulness interventions have been suggested to play a key part of the MAC approach (Gardner & Moore, 2007), the fact that we used slightly less elements of mindfulness may have affected the results. Still, as mentioned earlier in the introduction, reducing the amount of mindfulness can help increasing the perception of the programme as more practical relevant.

The drop-out rate was 35%, 55% and 16% for the feedback group, the non-feedback group and the waitlist group respectively, which was expected and in line with earlier research on internet-based interventions (Melville, Casey & Kavanagh, 2010). Participants who dropped-out explained their drop-out in terms of technical issues, information lost in the junk e-mail folder, illness, pregnancy, busy travelling or time constraints. A more user friendly platform and a more flexible length of the programme may have reduced the drop-out. However, as Carlbring, Ekselius and Andersson (2003) has shown, time-limits enhances the effect from internet-based interventions. No notable difference in the demographic information compared to those not dropping out were observed. Further studies investigating how to get those participants to continue is perhaps needed.

Future directions

Since this is the first study evaluating the effects of a mindfulness and acceptance based intervention in sports delivered via internet, a number of questions could and should be further investigated. Perhaps most importantly, comparing internet-based sport psychology with traditional consultation (by the means of individual or group sessions) is needed. Also, investigating the effect of mindfulness and acceptance based interventions delivered via internet on different groups of age, sport, level of competing or clinical groups would be interesting. Furthermore, it would be relevant to further explore and identify the key factors for improvement, to what extent the sport psychologist has to be involved for the intervention to have effect, and whether the sport psychologist can be replaced with a chat-bot and still retain the same results. Future research should also examine whether internet-based interventions also can enhance objective performance measures or increase actual desirable behavior, reduce the amount of injuries or have other physiological benefits. A future study including long term follow-up is also needed to ensure that the improvements are longstanding.

Since there is a large number of different mindfulness- and commitment-based methods, presented under different names, it is hard to compare their effects. Our suggestion is that they all should be seen as ACT methods, or perhaps naming them as acceptance-based behavior therapies (ABBT) as suggested by Roemer and Orsillo (2009).

Conclusions

This study indicate that internet-based sport psychology with ACTSPORT may improve performance, reduce levels of performance anxiety and improve aspects of mental health. It also seems to enhance levels of experienced dispositional mindfulness and acceptance, which in turn predicted the improvements in performance, performance anxiety and aspects of mental health. A larger effect was found for the group of participants who got feedback, which indicate that some support from a sport psychologist is preferable.

References

- Almlöv, J., Carlbring, P., Källqvist, K., Paxling, B., Cuijpers, P., & Andersson, G. (2011). Therapist effects in guided Internet-delivered CBT for anxiety disorders. *Behavioural and Cognitive Psychotherapy*, 39(3), 311-322.
- Andersson, G. (2009). Using the Internet to provide cognitive behaviour therapy. *Behaviour research and therapy*, 47(3), 175-180.
- Andersson, G., Bergström, J., Buhrman, M., Carlbring, P., Holländare, F., Kaldö, V., & Waara, J. (2008). Development of a new approach to guided self-help via the Internet: The Swedish experience. *Journal of Technology in Human Services*, 26(2-4), 161-181.
- Andersson, G., & Cuijpers, P. (2009). Internet-based and other computerized psychological treatments for adult depression: a meta-analysis. *Cognitive behaviour therapy*, 38(4), 196-205.
- Bengtsson, S., & Fallby, J. (2011). *Idrottens karriärövergångar*. SISU idrottsböcker.
- Bernier, M., Thienot, E., Pelosse, E., & Fournier, J. F. (2014). Effects and underlying processes of a mindfulness-based intervention with young elite figure skaters: Two case studies. *The Sport Psychologist*, 28(3), 302-315.
- Birrer, D., & Morgan, G. (2010). Psychological skills training as a way to enhance an athlete's performance in high-intensity sports. *Scandinavian Journal of Medicine & Science in Sports*, 20, 78– 87.
- Birrer, D., Röthlin, P., & Morgan, G. (2012). Mindfulness to enhance athletic performance: Theoretical considerations and possible impact mechanisms. *Mindfulness*, 3(3), 235-246.
- Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., ... & Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior therapy*, 42(4), 676-688.
- Breuer, C., Hoekman, R., Nagel, S., & van der Werff, H. (2015). *Sport clubs in Europe*. New York: Springer.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of personality and social psychology*, 84(4), 822.
- Bühlmayer, L., Birrer, D., Röthlin, P., Faude, O., & Donath, L. (2017). Effects of mindfulness practice on performance-relevant parameters and performance outcomes in sports: A meta-analytical review. *Sports Medicine*, 47(11), 2309-2321.
- Bär, K. J., & Markser, V. Z. (2013). Sport specificity of mental disorders: the issue of sport psychiatry. *European archives of psychiatry and clinical neuroscience*, 263(2), 205-210.
- Carlbring, P., Ekselius, L., & Andersson, G. (2003). Treatment of panic disorder via the Internet: a randomized trial of CBT vs. applied relaxation. *Journal of Behavior Therapy and Experimental Psychiatry*, 34(2), 129-140.
- Carlbring, P., Andersson, G., Cuijpers, P., Riper, H., & Hedman-Lagerlöf, E. (2018). Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: an updated systematic review and meta-analysis. *Cognitive Behaviour Therapy*, 47(1), 1-18.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983) A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 385-396.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral sciences*. New York. Am. Psychol.

- Connell, J., Barkham, M., Stiles, W. B., Twigg, E., Singleton, N., Evans, O., & Miles, J. N. (2007). Distribution of CORE–OM scores in a general population, clinical cut-off points and comparison with the CIS–R. *The British Journal of Psychiatry*, *190*(1), 69-74.
- Copeland, W., Shanahan, L., Costello, E. J., & Angold, A. (2011). Cumulative prevalence of psychiatric disorders by young adulthood: a prospective cohort analysis from the Great Smoky Mountains Study. *Journal of the American Academy of Child & Adolescent Psychiatry*, *50*(3), 252-261.
- Cunningham, J. A., Kypri, K., & McCambridge, J. (2013). Exploratory randomized controlled trial evaluating the impact of a waiting list control design. *BMC medical research methodology*, *13*(1), 150.
- Donker, T., Griffiths, K. M., Cuijpers, P., & Christensen, H. (2009). Psychoeducation for depression, anxiety and psychological distress: a meta-analysis. *BMC medicine*, *7*(1), 79.
- Doran, G. T. (1981). There's a SMART way to write management's goals and objectives. *Management review*, *70*(11), 35-36.
- El Alaoui, S., Ljótsson, B., Hedman, E., Svanborg, C., Kaldo, V., & Lindefors, N. (2016). Predicting outcome in internet-based cognitive behaviour therapy for major depression: a large cohort study of adult patients in routine psychiatric care. *PLoS One*, *11*(9), e0161191.
- Elfström, M. L., Evans, C., Lundgren, J., Johansson, B., Hakeberg, M., & Carlsson, S. G. (2012). Validation of the Swedish version of the Clinical Outcomes in Routine Evaluation Outcome Measure (CORE). *Clinical Psychology and Psychotherapy*.
- Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. *The Cambridge handbook of expertise and expert performance*, *38*, 685-705.
- European Federation of Psychologists' Associations. (2013). *EFPA review model for the description and evaluation of psychological and educational tests. Test review form and notes for reviewers*. Brussels: European Federation of Psychologists' association.
- Evans, C., Connell, J., Barkham, M., Margison, F., McGrath, G., Mellor-Clark, J., & Audin, K. (2002). Towards a standardised brief outcome measure: Psychometric properties and utility of the CORE–OM. *The British Journal of Psychiatry*, *180*(1), 51-60.
- Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition & Emotion*, *6*(6), 409-434.
- Ferraro, T., & Rush, S. (2000). Why athletes resist sport psychology. *Athletic Insight*, *2*(3), 9-14.
- Frykheden, O. (2014). Effektiv mätning av livskvalitet-Brunnsviken Brief Quality of Life Inventory (BBQ): en psykometrisk utvärdering. *Digitala Vetenskapliga Arkivet (DiVA)*.
- Fuller, C. W., Ekstrand, J., Junge, A., Andersen, T. E., Bahr, R., Dvorak, J., & Meeuwisse, W. H. (2006). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *Scandinavian journal of medicine & science in sports*, *16*(2), 83-92
- Gardner, F.L. & Moore, Z.E. (2006). *Clinical Sport Psychology*. Champaign, Illinois: Human Kinetics.
- Gardner, F. L., & Moore, Z. E. (2007). *The psychology of enhancing human performance: The mindfulness-acceptance-commitment (MAC) approach*. Springer Publishing Company.

- Gross, M., Moore, Z. E., Gardner, F. L., Wolanin, A. T., Pess, R., & Marks, D. R. (2018). An empirical examination comparing the mindfulness-acceptance-commitment approach and psychological skills training for the mental health and sport performance of female student athletes. *International Journal of Sport and Exercise Psychology*, 16(4), 431-451.
- Gucciardi, D. F., Hanton, S., & Fleming, S. (2017). Are mental toughness and mental health contradictory concepts in elite sport? A narrative review of theory and evidence. *Journal of Science and Medicine in Sport*, 20(3), 307-311.
- Gustavsson, T., Robinson, P., & Strosahl, K. (2014). *Fokuserad ACT*. Natur & Kultur.
- Gustafsson, H., Skoog, T., Davis, P., Kenttä, G., & Haberl, P. (2015). Mindfulness and its relationship with perceived stress, affect, and burnout in elite junior athletes. *Journal of Clinical Sport Psychology*, 9(3), 263-281.
- Hayes, S. C. (2004). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior therapy*, 35(4), 639-665.
- Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2014). *ACT i teori och tillämpning: vägen till psykologisk flexibilitet*. Natur & Kultur.
- Hedman E, Andersson E, Ljotsson B, Andersson G, Ruck C, & Lindefors N. (2011) Cost-effectiveness of Internet-based cognitive behavior therapy vs. cognitive behavioral group therapy for social anxiety disorder: results from a randomized controlled trial. *Behaviour research and therapy*; 49:729-36.
- Harris, R. (2009). *ACT made simple: An easy-to-read primer on acceptance and commitment therapy*. New Harbinger Publications.
- Johansson, F., & Jernstig, F. (2018). MENTAL HEALTH AND MOTIVATION IN ELITE SPORT. *Digitala Vetenskapliga Arkivet (DiVA)*.
- Josefsson, T., Tornberg, R., Gustafsson, H., & Ivarsson, A. (2019). Practitioners' reflections of working with the Mindfulness-Acceptance-Commitment (MAC) approach in team sport settings. *Journal of Sport Psychology in Action*, 1-11.
- Josefsson, T., Ivarsson, A., Gustafsson, H., Stenling, A., Lindwall, M., Tornberg, R., & Böröy, J. (2018). Effects of mindfulness-acceptance-commitment (MAC) on sport-specific dispositional mindfulness, emotion regulation, and self-rated athletic performance in a multiple-sport population: An RCT study. *Mindfulness*, 1-12.
- John, S., Verma, S. K., & Khanna, G. L. (2011). The effect of mindfulness meditation on HPA-Axis in pre-competition stress in sports performance of elite shooters. *National Journal of Integrated Research in Medicine*, 2(3), 15-21.
- Kellmann, M., & Beckmann, J. (2003). Research and intervention in sport psychology: New perspectives on an inherent conflict. *International Journal of Sport and Exercise Psychology*, 1(1), 13-26.
- Kenttä, G., Lundqvist, C., & Bjurner, P. (2015). *Bättre prestation & hälsa med KBT: fakta, inspiration, fallbeskrivningar*. SISU idrottsböcker.
- Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of psychosomatic research*, 78(6), 519-528.
- Lindner, P., Frykheden, O., Forsström, D., Andersson, E., Ljótsson, B., Hedman, E., Andersson, G., & Carlbring, P. (2016). The Brunnsviken Brief Quality of Life Scale (BBQ): Development and Psychometric Evaluation. *Cognitive Behaviour Therapy*, 45(3), 182-195.
- Lindwall, M., Johnson, U., Rylander, P. (2016). *Gruppdynamik inom idrott: Nycklar till världens bästa lag*. Stockholm: SISU Idrottsböcker.

- MacKillop, J., & Anderson, E. J. (2007). Further psychometric validation of the mindful attention awareness scale (MAAS). *Journal of Psychopathology and Behavioral Assessment*, 29(4), 289-293.
- McCalla, T., & Fitzpatrick, S. (2016). Integrating sport psychology within a high-performance team: Potential stakeholders, micropolitics, and culture. *Journal of Sport Psychology in Action*, 7(1), 33-42.
- Marks, I., Shaw, S., & Parkin, R. (1998). Computer-aided treatments of mental health problems. *Clinical Psychology: Science and Practice*, 5, 151-170.
- Marx, B. P., & Sloan, D. M. (2005). Peritraumatic dissociation and experiential avoidance as predictors of posttraumatic stress symptomatology. *Behaviour research and therapy*, 43(5), 569-583.
- Masuda, A., & Tully, E. C. (2012). The role of mindfulness and psychological flexibility in somatization, depression, anxiety, and general psychological distress in a nonclinical college sample. *Journal of Evidence-Based Complementary & Alternative Medicine*, 17(1), 66-71.
- Melville, K. M., Casey, L. M., & Kavanagh, D. J. (2010). Dropout from Internet-based treatment for psychological disorders. *British Journal of Clinical Psychology*, 49(4), 455-471.
- Neil, R., Hanton, S., & Mellalieu, S. D. (2013). Seeing things in a different light: Assessing the effects of a cognitive-behavioral intervention upon the further appraisals and performance of golfers. *Journal of applied sport psychology*, 25(1), 106-130.
- Noetel, M., Ciarrochi, J., Van Zanden, B., & Lonsdale, C. (2017). Mindfulness and acceptance approaches to sporting performance enhancement: a systematic review. *International Review of Sport and Exercise Psychology*, 1-37.
- Nordin, M., & Nordin, S. (2013). Psychometric evaluation and normative data of the Swedish version of the 10-item perceived stress scale. *Scandinavian journal of psychology*, 54(6), 502-507.
- Ojaghi, A., Gholizade, H., & Mirheidari, L. (2013). The effect of mindfulness techniques training on anxiety and sport performance among table tennis players. *Life Science Journal*, 10, 225-230.
- Palmqvist, B., Carlbring, P., & Andersson, G. (2007). Internet-delivered treatments with or without therapist input: does the therapist factor have implications for efficacy and cost?. *Expert Review of Pharmacoeconomics & Outcomes Research*, 7(3), 291-297.
- Persson, R., Österberg, K., Garde, A. H., Hansen, Å. M., Ørbæk, P., & Karlson, B. (2010). Seasonal variation in self-reported arousal and subjective health complaints. *Psychology, health & medicine*, 15(4), 434-444.
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual review of psychology*, 63, 539-569.
- Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of consulting and clinical psychology*, 51(3), 390.
- Roemer, L., & Orsillo, S.M. (2009). *Mindfulness & acceptance-based behavioral therapies in practice*. New York: Guilford Press.
- Rice, S. M., Purcell, R., De Silva, S., Mawren, D., McGorry, P. D., & Parker, A. G. (2016). The mental health of elite athletes: a narrative systematic review. *Sports medicine*, 46(9), 1333-1353.
- Raglin, J. S. (2001). Psychological factors in sport performance. *Sports Medicine*, 31(12), 875-890.

- Sappington, R., & Longshore, K. (2015). Systematically reviewing the efficacy of mindfulness-based interventions for enhanced athletic performance. *Journal of Clinical Sport Psychology, 9*(3), 232-262.
- Schaefer, J. D., Caspi, A., Belsky, D. W., Harrington, H., Houts, R., Horwood, L. J., & Moffitt, T. E. (2017). Enduring mental health: Prevalence and prediction. *Journal of abnormal psychology, 126*(2), 212.
- Scott-Hamilton, J., Schutte, N. S., & Brown, R. F. (2016). Effects of a mindfulness intervention on sports-anxiety, pessimism, and flow in competitive cyclists. *Applied Psychology: Health and Well-Being, 8*(1), 85-103.
- Smith, R. E., Smoll, F. L., & Schutz, R. W. (1990). Measurement and correlates of sport-specific cognitive and somatic trait anxiety: The Sport Anxiety Scale. *Anxiety research, 2*(4), 263-280.
- Stoddard, J. A., & Afari, N. (2014). *The Big Book of ACT Metaphors: a practitioner's guide to experiential exercises and metaphors in Acceptance and Commitment Therapy*. New Harbinger Publications.
- Swann, C., Moran, A., & Piggott, D. (2015). Defining elite athletes: Issues in the study of expert performance in sport psychology. *Psychology of Sport and Exercise, 16*, 3-14.
- 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*(2), 99-116.
- Wadström, O. (2007). *Sluta älta och grubbla: lättare gjort med KBT*. Linköping: Psykologinsats AB.
- Watson, J. C. (2005). College student-athletes' attitudes toward help-seeking behavior and expectations of counseling services. *Journal of College Student Development, 46*(4), 442-449.
- Wegner, D. M. (1994). Ironic processes of mental control. *Psychological review, 101*(1), 34.
- Williams, J. M. E. (1993). *Applied sport psychology: Personal growth to peak performance*. Mayfield Publishing Co.
- Wolanin, A. T. (2005). *Mindfulness-Acceptance-Commitment (MAC) based performance enhancement for Division I collegiate athletes: A preliminary investigation* (Doctoral dissertation, ProQuest Information & Learning).
- Wolanin, A. T., & Schwanhausser, L. A. (2010). Psychological functioning as a moderator of the MAC approach to performance enhancement. *Journal of Clinical Sport Psychology, 4*(4), 312-322.
- Wulf, G. (2013). Attentional focus and motor learning: a review of 15 years. *International Review of sport and Exercise psychology, 6*(1), 77-104.
- Zhang, C. Q., Si, G., Duan, Y., Lyu, Y., Keatley, D. A., & Chan, D. K. C. (2016). The effects of mindfulness training on beginners' skill acquisition in dart throwing: A randomized controlled trial. *Psychology of Sport and Exercise, 22*, 279-285.
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta psychiatrica scandinavica, 67*(6), 361-370.
- Zizzi, S. J., & Perna, F. M. (2002). Integrating web pages and e-mail into sport psychology consultations. *The Sport Psychologist, 16*(4), 416-431.

Appendix 1: The content of ACTSPORT

Module 1: Introduction, goals and direction

The first module contained an introduction to the programme and description of key principles, mainly focused on highlighting the advantage of altering the behavior rather than focusing on thoughts or feelings. Next, the module described problems with goals and the athlete was asked to reflect on his or hers own goals. The difference between *goals* and *values* was described, including the metaphor “The downhill skier” published in Hayes, Strosahl and Wilson (2014). The use and benefits of defining your *valued direction* was suggested. Lastly, the concept of SMART goals (Doran, 1981) and the differences between three types of goals: *process-*, *performance-* and *outcome goals* (Williams, 1993) was described. Worksheets: Revised version of the *bulls-eye exercise* (published in Hayes, Strosahl & Wilson, 2014) and goal-setting, including the three types of goals. Weekly assignment: Writing down excessive or lack of behavior conflicting with the valued direction of the athlete.

Module 2: Obstacles

This module was mainly based on the concept of *creative hopelessness* (Gardner & Moore, 2007) to enhance motivation for the work in forthcoming modules. Differentiating between two types of obstacles: internal (thoughts, emotions or physiological reactions) and external obstacles (such as age, time, capacity and abilities). Thoughts about past, present or future, myself, others or the world; information about our basic emotions and their functions; physiological reactions such as tiredness or pain was explained. Different solutions to get rid of the obstacles and the short- and long term consequences of that strategy including a revised version of the metaphor “The tiger” described in Stoddard and Afari (2014). Worksheet: Reflecting and writing down your own obstacles based on *clean and dirty pain* (Hayes, 2004). Weekly assignment: Revised version of “Given up for emotions form” described in Gardner and Moore (pp. 115, 2007).

Module 3: Acceptance

Mainly describing the concept of *acceptance* of thoughts and feelings instead of *experiential avoidance*. The more control of feelings or thoughts the worse the performance as the model described by Gustavsson, Robinson and Strosahl (pp. 102, 2014) depicts. The module also included revised version of the metaphor “Tug of war” and the “bus metaphor” altered to a rally car (Hayes, Strosahl & Wilson, 2014). The athletes were further instructed to use the word “and” instead of “but” when facing obstacles throughout the programme. Worksheet: The arrow model (Josefsson, Tornberg, Gustafsson & Ivarsson, 2019). Weekly assignment: Reflecting on the result from the arrow model by answering the questions 1. What actions did you take in valued direction during the week? 2. How well were you able to use acceptance?

Module 4: Present awareness

This module was based on the use of *mindfulness* as a mean to enhance focus, commitment to the valued direction of the athlete and acceptance instead of avoidance. The difference between the world experienced by the senses versus experienced by the

language was described and the metaphor “the cup” (Hayes, Strosahl & Wilson, 2014) was replaced with an object from the athletes sport to further explain this. The risk for using mindfulness as an controlling or avoidant behavior was problematised. Also informing the athletes the risk of “de-automating” knowledge by focusing internally on body parts and instead focus on external cues (Wulf, 2013) to enhance performance. Worksheet: Describing five different mindfulness exercises adapted for athletes to be chosen and used once a day during the week. Weekly assignment: Reflecting on which exercises was used and the outcome of that exercise.

Module 5: Handling thoughts

Based on the concepts *defusion*, seeing a thought as merely a thought and not a truth, and *self-as-context*, getting an observational perspective of ones thoughts (Gardner & Moore, 2007). This perspective was also a mean to enhance commitment to the valued direction and not be as controlled by thoughts, rules, cognitive schemas or norms etc. The athlete encountered several exercises including trying not to think, suppressing one thought and erase a memory. Trying to control ones thought is not only cognitive demanding but also ironically makes the thought more vivid (Wegner, 1994), thus affecting performance and well-being. The parable “tennis-match” (Wadström, 2007) was used to describe common poorly strategies the mind uses. Also using acceptance with thoughts were introduced including doing something while saying the opposite (Stoddard & Afari, 2014). Worksheets: Several defusion and self-as-context techniques both in text and recorded audio. Weekly assignment: Reflecting on using defusion and self-as-context in daily life.

Module 6: Next action

This module integrated the earlier modules into the concept of doing the right next action regardless of mistakes earlier by using acceptance. A metaphor developed by the two authors called the “juggler of thoughts and feelings” was used to describe acceptance after a mistake. By doing the right next action regardless of thoughts and feelings the athlete feels better afterwards, but buy controlling thoughts or feelings by not doing the right next action the athlete feels worse afterwards. This was labelled the confidence spiral. Also the concept of commitment to action was explained. Worksheet: The metaphor “Act in a nutshell” described in Harris (2009). Weekly assignment: Reflecting upon doing the next action in their sport or daily life.

Module 7: Continuing forward

The aim of this module was to foster maintenance of the changes made and improvements from the programme. The path to success and well-being always come with setbacks but being able to learn from them and using strategies for overcoming them is often helpful. The power of habit was used to empowering the athletes into making new ones including explaining the difference between knowledge and understanding. The use of deliberate practice (Ericsson, 2006) was described shortly. The athletes reflected upon the stages of change (Prochaska & Diclemente, 1983) to foster motivation. Worksheets: Plan for maintenance; evaluating the bulls-eye and three types of goals exercises made i module 1. No weekly assignment for this module.

Appendix 2

Table 4

Number and percentages of the 125 participants who completed the post-assessment competing in each sports.

	Feedback	Non-feedback	Waitlist	Total
Number of participants	39	30	56	125
Sports				
Aikido	1 (2%)	0	1 (2%)	2 (2%)
Archery	2 (5%)	2 (6%)	8 (14%)	12 (10%)
Athletics	1 (2%)	0	0	1 (1%)
Arm wrestling	1 (2%)	2 (6%)	0	3 (2%)
Biathlon	1 (2%)	0	1 (2%)	2 (2%)
Bowling	1 (2%)	1 (3%)	1 (2%)	3 (2%)
Canoe	0	0	1 (2%)	1 (1%)
Cross-country skiing	1 (2%)	2 (6%)	0	3 (2%)
Crossfit	2 (5%)	0	0	2 (2%)
Cue sports	1 (2%)	0	0	1 (1%)
Horse riding	1 (2%)	0	0	1 (1%)
Long distance running	0	0	2 (4%)	2 (2%)
Discgolf	0	2 (6%)	2 (4%)	4 (3%)
Fencing	0	0	1 (2%)	1 (1%)
Gymnastics	0	0	1 (2%)	1 (1%)
Martial arts	1 (2%)	0	0	1 (1%)
Miniature golf	1 (2%)	0	0	1 (1%)
Orienteering	4 (10%)	1 (3%)	2 (4%)	7 (6%)
Powerlifting	1 (2%)	0	2 (4%)	3 (2%)
Kickboxing	0	0	1 (2%)	1 (1%)
MMA	0	1 (3%)	0	1 (1%)
Ski-orienteeing	0	0	1 (2%)	1 (1%)
Swimrun	2 (5%)	0	1 (2%)	3 (2%)
Table tennis	1 (2%)	0	0	1 (1%)
Triathlon	4 (10%)	4 (13%)	2 (4%)	10 (8%)
Bandy	0	0	1 (2%)	1 (1%)
Basketball	0	1 (3%)	4 (7%)	5 (4%)
Beachvolleyball	6 (15%)	9 (30%)	10 (18%)	25 (20%)
Curling	0	1 (3%)	0	1 (1%)
Floorball	1 (2%)	0	0	1 (1%)
Handball	2 (5%)	0	1 (2%)	3 (2%)
Ice-hockey	1 (2%)	0	2 (4%)	3 (2%)
Lacrosse	0	2 (6%)	0	2 (2%)
Roller derby	2 (5%)	2 (6%)	3 (5%)	7 (6%)
Soccer	1 (2%)	0	8 (14%)	9 (7%)