EFFECTS OF AN INTERNET-BASED CBT PROGRAMME ON COACTIVE ELITE ATHLETES PSYCHOLOGICAL SKILLS

- A randomized controlled study

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The importance of psychological skills for athletes’ performance has been a major focus in the field of sport psychology the last decades. This study has aimed to investigate the effects of an internet-based psychological skills programme on coactive elite athletes. The programme, PEAK, was based on CBT techniques with six different modules including thoughts, mindfulness and goal-setting. 70 athletes were randomized into two groups, PEAK (n=35) and waitlist (n=35). No significant results were found on the outcome variables ASCI-28, OMSAT-3, mCSAI-2(conf), PSQ and MAAS. However, a trend was found on the subscales mCSAI-2(cog) and mCSAI-2(som). The qualitative data showed positive attitudes towards the programme. One conclusion of the study is that more tailored internet-based psychological skills programmes must be developed and tested.

The fact that optimal performance in sport is dependent on the athlete’s physical as well as psychological abilities is widely recognized. However, at elite level physical differences between athletes tend to get smaller. Modern techniques, high-class equipment and scientific studies are all a natural part of today’s physical training for top level athletes. Instead psychological skills can be the crucial factor that determines whether someone ends up winning or losing (Birrer & Morgan, 2010). In the same way the athletes optimize their external physical condition researchers suggest they need to train and optimize their internal psychological core to enhance peak performance. In other words, to become a world champion in the future might require training both the inside (mind) and outside (body). Psychological skills training programmes is one way to enhance athletes’ knowledge and skills in the area and the benefits of this has been widely reported. Empirical evidence shows that psychological skills are crucial to high level performance not only in sport setting but also in many other areas, such as military participations and to be successful at work (Birrer & Morgan, 2010; Hammermeister et al., 2010). Research in the sports field considers psychological skills training programmes to be suitable for different types of sport. Nevertheless, programmes should be evaluated and include skills training necessary and suitable for the particular sport (Birrer & Morgan, 2010).

Which psychological skills that are important for enhancing performance is under great debate and further research in this area and in the area concerning the role of different skills in different sports is needed (Birrer & Morgan, 2010). However, most mental training programmes used for enhancing sport performance today stress the development and use of psychological techniques such as anxiety management, goal-setting, concentration, imagery, coping with stress, and different ways to build confidence (Weinberg & Williams, 2006). Athletes should possess not only one specific psychological skill, but a set of psychological skills
that are often associated with optimal performance to be able to reach the top level in their sport (Hammermeister et al., 2010).

The lengths of the skills training programmes vary throughout different studies, most programmes had a duration of three to six months. Positive effects have also been found in programmes that have been executed during a shorter time span than three months (Weinberg & Williams, 2006). Weinberg & Gould (2007) suggest that “Psychological skills training (PST) refers to the systematic and consistent practice of mental or psychological skills for the purpose of enhancing performance, increasing enjoyment, or achieving greater sport and physical activity self-satisfaction” (p. 250). To achieve this psychological skills training should be systematic, planned, goal-oriented, controlled and evaluated (Birrer & Morgan, 2010).

Psychological skills training have been criticized for the fact that most studies investigating the efficacy of it do not meet the criteria for evidence-based empirical support (Gardner & Moore, 2006). Many studies conceded not to use adequate design and methodology, and hardly any studies used a control group. Another problem in this area is that many studies of psychological skills training have used non-competitive athletes and have therefore been unable to generalize the results to elite athletes (Gardner & Moore, 2006). Despite all the knowledge of psychological factors and psychological skills as characteristic of top level athletes, still far from every athlete is involved in psychological skills training in order to reach the top level (MacNamara, Button & Collins, 2010). To overbuild the problems with evidence-based empirical support, psychological skills training interventions for athletes possibly could be more influenced by the evidence-based interventions used in other traditional psychological areas.

Cognitive Behavioral Therapy (CBT)
Common to cognitive and behavioral theories is the assumption that psychological problems are found and maintained by cognitive processes and by the individual’s way to manage and respond to their environment (Ledley, Marx & Heimberg, 2006). A CBT-based approach contains a clear agenda and a clear focus to work with. It also includes psychosocial and educational aspects in which the client may learn more about different theories and the rationale behind the methods. The client is always involved in the process and is well informed and understands the purpose of different interventions used. Typical interventions can be cognitive restructuring, behavioral experiments, mindfulness, coping with emotions and negative thoughts (Kåver, 2006). Home assignment is an important tool to activate and motivate the client to try new (internal and external) behaviors and gain new experiences (Kåver, 2006). CBT-based methods have proved effective in a variety of areas. In a review of Butler et al. (2006) empirical evidence shows large effect sizes of CBT in a range of areas such as treatment of anxiety, depression, social phobia and panic disorders. Also non clinical groups like tinnitus patients have shown a great success using CBT (Andersson et al, 2002).
Cognitive behavioral interventions for athletes have been examined in earlier studies. In a review by Humara (1999) different treatments have been used with a variety of athletes with results demonstrating the effectiveness using CBT-interventions for improving athlete performance. In a review by Birrer and Morgan (2010) examples of studies on mindfulness interventions and sport is presented. These studies show promising results. The review also illustrates the usefulness of CBT based strategies in pain management and recovery.

An approach that emphasizes the importance of structure, based on high activity by the client, and also includes learning elements should be well suited as a starting point for psychological skills training interventions for elite athletes. To suit the athletes strict schedule (e.g. training, travels etc.) as a suggestion a combination of CBT with a more accessible tool, like the internet, should be useful.

Internet – delivered CBT
A new area that has recently been gaining ground is the use of internet-based cognitive behavior therapy. This development of CBT has received great empirical support (Andersson, 2009; Carlbring et al. 2006). Large effects have been demonstrated in the majority of internet-based studies, such as in the treatment of social phobia (Carlbring et al., 2006), but also in non-clinical conditions, such as help to cope with stress and anxiety for individuals with tinnitus (Andersson et al, 2002). Further research has shown that the importance of support from a contact person should not be neglected. There is a significant correlation between the amount of support given and outcomes (Palmqvist, Carlbring & Andersson 2007; Spek et al., 2007).

Although sport and internet should be a good combination, there is a lack of research in this particular area. Yet some studies exist and they show encouraging results. In a study by Zizzi and Perna (2002) the effects of two different approaches of sport psychology methods with athletes were examined. 163 athletes were randomized into one of two groups in which one were contacted by a sport psychology consultant and the other group with electronic methods. The results showed that the athletes preferred internet-based methods such as e-mail and webpage when working with sport psychologist (Zizzi & Perna 2002). According to Zizzi and Perna (2002) the greatest barrier for the athletes to use internet programmes was lack of time. Another important aspect to take into consideration is the athlete’s motivation and receptiveness to the benefits of psychological skills. However, the sum of the different studies on combining internet based-methods and sport psychology interventions shows several benefits (Marks, Shaw, & Parkin, 1998).

Advantages of using the internet for psychological intervention have been brought to attention (Marks et al., 1998). One benefit is simply accessibility; accessibility to the system. The fact that the internet is accessible at any time and from a variety of locations is a huge advantage. This enables clients to work with the material when it best suits them and from wherever they wish (Marks et al., 1998). The flexibility that the internet offers should suit elite athletes very well because of their busy schedule and it also allows them to work with the material in their own pace and
at their own convenience. Other benefits of using the internet is that it can be used to overcome distance and it makes it possible for different professions to meet without psychical presence required (Andersson, 2010). Many athletes may travel a lot with limited time to schedule face-to-face appointments with sport psychologists. To be able to use the internet for these meetings should facilitate the work with psychological skills.

The PEAK project
The aim of the PEAK project was to develop an internet-based psychological skills training programme, for elite athletes, based on cognitive and behavioral theories. Considering this population it was essential to deviate from a clinical perspective and instead focus on a salutogenic perspective, inspired from the new research field of positive psychology and mindfulness. The main reason for developing a programme for this particular target group is the psychological demands that elite athletes face when trying to reach optimal performances. The programme is an attempt to combine the use of the internet with evidence-based cognitive behavioral methods and psychological skills training for athletes.

An internet based approach was chosen to suit the demands of the group. An internet-based exercise programme should lend itself particularly well to this target group where no physical presence is required. This should suit elite athletes who travel frequently, both in training and competition purposes well. Within the frame of this project, two target groups of elite athletes have been included: interactive sports and coactive sport. In this study, the aim was to investigate whether the PEAK programme might help coactive elite athletes to improve their psychological skills during a specific time period.

Coactive sports
Coactive sports are defined as sports that involve minimal interaction between team members or between competitors (Cox, 1994). Athletes in coactive sports compete at the same time as others but no interaction occurs. Long-distance running, skiing, golf and swimming are some examples of coactive sports. Sports were no interaction at all exists are called isolated sports. In these sports athletes compete alone and in isolation and their results are not affected by other athletes’ performances. Examples of isolated sports are figure skating, wushu and high-jump. Because of the many similarities between these two groups of athletes, they were in this study merged into one group, coactive athletes. Sports with more interactions are called interactive sports (e.g. soccer, basketball, and boxing). This categorization between coactive and interactive sports is relatively common in the sports science field (Carron et al., 2002; Munroe et al., 1999).

Due to the conditions in coactive sports athletes have to rely on themselves for motivation and performance. Although they may be part of a team, athletes do not receive physical help from teammates during the competition (Schilling & Hayashi, 2001). Considerable evidence shows that successful elite athletes own a set of psychological skills that distinguish them from less successful athletes. This set is suggested to include greater self-confidence, less anxiety and a greater trust in their ability to handle unexpected events (Hammermeister et al., 2010). For
coactive elite athletes this might be particularly true and of great importance as one can imagine that they face more complex psychological demands when competing on their own, without the physical and psychological support of others. Given this, one can assume the group to be high-functional but to also have a good platform for further improvement of the psychological skills needed in their sports. Therefore, psychological skills training that focus on the individuals’ own thoughts, emotions and coping strategies should gain and be suitable for this group of athletes.

This study has aimed to investigate the effects of an internet-based psychological skills programme on coactive elite athletes.

Method

Participants
Research participants to the PEAK programme were recruited through Umeå Centre for Sports Sciences, National Sports federation of Sweden, Swedish Olympic Committee and other relevant specialist associations within the sports community, and through advertisements in different types of social media such as Facebook.

Participants were able to apply to take part in the study by filling in various forms on the website www.peakprojektet.nu. More information about the project was also available on the website. In the next step of the recruitment process, all individuals who had announced an interest in participating in the PEAK programme received an email concerning whether or not they were admitted to the study. The ones who matched the inclusion criteria were subsequently randomly divided into two groups; one PEAK group and one group that constituted of a waitlist. The training group initiated the internet based programme PEAK during February 2011 and the waitlist initiated the same programme in April 2011. This study is based on the training group that received access to the PEAK programme in February and the group that was on the waitlist at the same time. Participants were males and females practicing sport at an elite level including both individual athletes as well as team athletes; see Table 1 for further demographic descriptions. To be included in the study the participants had to achieve the following criteria;

1. Be at the minimum age of 18 years old.
2. Be an active athlete that practices sport at a top level defined as: “Individual athletes who compete at least at national championship level or team athletes who play at least in one of the top two national leagues in Sweden”.
3. Practice a coactive sport.
4. Practice a sport affiliated to the National sport federation of Sweden.
5. Have access to a computer with internet access.
A total of 73 participants completed the forms during the first data collection. As the flow chart shows in Figure 1, three subjects were excluded due to not fulfilling the age criteria or elite athlete criteria. The individuals that were excluded were informed by e-mail. The total number of participants remaining after the exclusion was 70. The subjects were then randomized into two groups which resulted in 35 participants in PEAK programme and 35 subjects in the wait list group. The PEAK programme group was once more randomized to three different contact persons. Altogether, 56 subjects filled in the forms during the post test.
**Design and procedure**

An experimental design with two groups was used for this study. One group was assigned to the internet-based PEAK programme and the other group received no intervention. Independent within-group variables had two levels: pretest and posttest on the outcome variables shown below. Pretest was administrated online for both PEAK group and waitlist group during the two weeks prior to the PEAK programme was initiated. Posttest was administrated online during the two weeks after the PEAK programme last week. The athletes completed five self-report questionnaires and a few demographic questions online to determine their perceived psychological skills level at the moment. Administration of self-reports online has proven to give equal results as administering self-reports with paper and pen (Carlbring et al., 2005). The time to complete the pre- and posttest was estimated to approximately 45 minutes each. The self-reports were administered in the following order: Demographic questions, Athletic Coping Skills Inventory-28 (ACSI-28), Perceived Stress Questionnaire (PSQ), Ottawa Mental Skills Assessment.
Tool-3 (OMSAT-3), Modified Competitive State Anxiety Inventory-2 (mCSAI-2), and finally Mindful Attention Awareness Scale (MAAS).

The whole PEAK programme was internet-based and the athletes contacted their contact person, turned in home assignments and received feedback on their home assignments through a special secure programme (KHS). The PEAK group got access to a new PEAK module every Monday during the six week programme, given that they had completed the previous week's home assignment. After completed home assignment each participant received feedback from their contact person. Each contact person spent 15 minutes a week to produce feedback to each participant. This amount of time has been used as praxis in several previous studies (Andersson et al., 2008). To learn more about the PEAK programme, see heading below.

**Instruments**

**Athletic Coping Skills Inventory-28 (ACSI-28)**

The ACSI-28 (Smith et al, 1995) contains seven sport-specific subscales: Coping with Adversity; Coachability; Concentration; Confidence and Achievement Motivation; Goal Setting/Mental Preparation; Peaking under Pressure, and Freedom from Worry. A total score of the inventory can be summed from adding the different subscales to yield a Personal Coping Resources score. The Personal Coping Resources score is assumed to reflect a versatile psychological skill construct. Each subscale consists of four items and the total number of items for the inventory is 28. There are four different alternatives to each item ranging from “Almost never” to “Almost always”. Scores on Personal Coping Resources range from 0 to 84. A higher score indicates greater psychological skills. The validity for each subscale is higher than the validity for the Personal Coping Resources score ($\alpha=0.84$) but this total score is still useful in order to distinguish a multifaceted aspect of the athletes’ psychological skills (Smith et al, 1995). In this study only the total score for ACSI-28 has been used due to the study’s aim to investigate a wide range of psychological skills.

**Mindful Attention Awareness Scale (MAAS)**

MAAS by Brown and Ryan (2003) measures the ability to focus on and be aware of what happens in the present. The scale consists of 15 items with six different alternatives ranging from “Almost always” to “Almost never”. The total scores range from 15 to 90. The higher the score on MAAS, the greater is the individuals’ awareness of the present and his or her surroundings. A high score also indicates a greater ability to focus on and be attentive to one’s own inner sensations. MacKillop and Anderson (2007) reported the internal reliability for MAAS to be $\alpha=0.89$.

**Modified Competitive State Anxiety Inventory-2 (mCSAI-2)**

The mCSAI-2 (Jones & Swain, 1992) measures the intensity and directionality of anxiety interpretation, which includes subcomponents of cognitive anxiety, somatic anxiety, and self-confidence. The intensity scales consists of 27 items (nine in each subscale). The intensity scale is rated on a four-point scale ranging from 1
“Not at all” to 4 “Very much so”. Scores on the intensity scale range from 9 to 36. A higher score on the cognitive and somatic subscales indicates greater cognitive or somatic anxiety. A higher score on the self-confidence scale indicates greater state self-confidence. No total score is given for the inventory. In the directional scale the subjects rate how they perceive the intensity of their cognitive and somatic anxiety symptoms and self-confidence. The alternatives range from -3 “Very debilitating towards performance” to +3 “Very facilitating to performance”. According to Jones and Swain (1992) the modified CSAI-2 has shown strong internal consistency, with reliability coefficients of 0.80 and 0.90 for each subscale. The modified CSAI-2 is a measure of state anxiety, but several researchers (Jones & Swain, 1995; Perry & Williams, 1998) have changed the instructions so athletes answer the items based on how they usually feel during competitions, which measures trait anxiety, rather than their feelings at a specific competition, which measures state anxiety. The participants of the present study practice different sports and some were not in their competitive season during the study and therefore the researchers decided to use the scale as a measurement of trait anxiety. The researchers used a Swedish translation of the modified instructions to base the subjects’ answers on their usual pre-competition disposition during their last competitive season.

**Ottawa Mental Skills Assessment Tool-3 (OMSAT-3)**

The third version of the OMSAT by Durand-Bush and colleagues (2001) measures a broad range of mental skills. OMSAT-3 consists of 48 items divided into 12 mental skill groups (four items per group). The 12 mental skill groups are: Goals, Confidence, Commitment, Stress, Fear, Relaxation, Activation, Focus, Refocus, Imagery, Mental Practice and Competition Plans. A 7-point scale with alternatives ranging from “Strongly agree” to “Strongly disagree” with a neutral choice available is used. Scores in each subscale range from 4 to 28. A total score for all subscales has been used in this study. Earlier research has displayed internal consistency scores ranged from 0.68 to 0.88, indicating strong reliability (Durand-Bush et al., 2001).

**Perceived Stress Questionnaire (PSQ)**

The PSQ (Levenstein et al., 1993) consists of 30 items with the seven subscales harassment, overload, irritability, lack of joy, fatigue, worries, tension. Respondents rate how often an item has applied to them during the last week on a 4-point scale ranging from 1 “Almost never” to 4 “Almost always”. A higher score indicates a higher amount of perceived stress. The total score for PSQ has been used in this study. Strong reliability has been shown for the PSQ with internal consistency scores of 0.90 (Levenstein et al., 1993).

**Demographic questions**

At pre- and posttest the participants also answered a set of demographic questions, which included age, sex, competitive level, sport, earlier experiences from psychological skills training or mental skills training. The athletes were also asked to indicate how important they rate psychological skills for their own sport performance and how much time they spent practicing psychological skills at the
time. The answers to the questions about age and competitive level were used to include or exclude athletes from the study. The other answers were primary used to serve as variables when summarizing and discussing the outcomes of the study in this paper.

**PEAK programme**
The psychological skills training programme, PEAK that was used in the study was a six week long internet based programme. PEAK was created by students of psychology Helfrich, Lindwall and Moharer and is based on CBT theories but with an athletic integration. The programme consisted of various modules that were accessible through internet during the training period progress. Each module handled diverse skills that were thought to increase performance for athletes. Each area was addressed through both theoretical and practical elements, where participants first learned more about the topic and then carried out various tasks related to that topic. Cognitive, emotional and physiological components were addressed in the programme. All modules also included a home assignment that was handed in to each participants contact person every week. All exercises were read and feedback was provided by the contact person. The programme was mostly operated by the participants themselves but they had the opportunity to continually have their questions answered via encrypted e-mail. The modules included in the programme were;

*Goal and goal setting*
The first module started with an introduction to the programme and the logic of it. Principles on how to set a goal was described together with exercises. The material also included the importance of goal setting and its function for athletes. In the end of the module the participants formulated their own goals.

*Identifying and dealing with thoughts*
Module number two covered the area of thoughts. Theoretical aspects of thoughts were explained including automatic thoughts, positive and negative thoughts and patterns of thinking. The participant’s task in this module was among other things, to identify their own thoughts in training/competitive situations and also think of strategies to handle them.

*The ability to handle emotions*
In the third week of the programme feelings was the main topic. Facts about feelings, complex feelings and their functions were described in this module. Through different exercises participants actively became aware of their feelings in different situations and practiced to not immediately react to these.

*The meaning of behavior*
After thoughts and feelings had been introduced the last part of the cognitive-behavior chain was presented: Behaviors and their connection to thoughts and feelings. Athletes had a chance to try new and different behaviors to gain new experiences.
Concentration and attention /Mindfulness

The second last module dealt with concentration and attention with mindfulness as a tool. After theories of concentration for athletes were presented the participants were able to practice to stay focused through a variety of mindfulness exercises.

Maintaining psychological skills

The last module started with a summary of the previous five modules. The module ends with the participants writing a plan on how they will maintain and keep working with their new abilities.

Ethical considerations

Athletes participated voluntarily in the study. The participants in the project were well aware of the fact that active engagement in the internet-based training programme was indeed needed for an enhanced sporting performance to be achieved. Participants were randomly divided in to one of the two groups; PEAK programme or waitlist. The waitlist group got access to the PEAK programme after their time on waitlist. To assure most valid scientific evidence, participants were not allowed to select group. Individuals who did not agree to this were consequently excluded from the project. Athletes were informed at the start that participation was voluntary and that they could, at any time, drop out of the study without any consequences. Participants were informed that this was a research project with no guarantee of increased psychological skills or performance. Participants were offered to continuously have their questions answered via encrypted e-mails – this was offered throughout the course of the project. The KHS programme guarantees the secrecy needed for handling the participants’ information and ensures that only authorized personnel can access the information. KHS uses encrypted email and participant codes. All the participants filled out informed consents. The study was approved by “Vetting the ethics of research involving humans”.

Statistical analyzes

In this study a mixed effect model were used. This model includes all participants that signed up for the study and just not the ones completing the whole intervention, which enables a statistical analyze that is more representative for the whole group (Gueorguieva & Krystal, 2004). The mixed effect model report standard error (SE) and not standard deviation (SD). To receive standard deviation the formula \( SD = SE \times \sqrt{n} \) was used. Effect sizes (Cohens d) was calculated with the formula \( \text{Cohens } d = (M_1 - M_2)/(SD_1 - SD_2)/2 \).

Results

Results on the changes of the outcome measures ACSI-28, OMSAT-3, subscales of mCSAI-2, PSQ and MAAS is presented for the two groups with estimated means, standard deviations and values concerning time, group and interaction. Effect sizes were also calculated with Cohen’s d. According to Cohen (1988) an effect size of 0.2
and above should be interpreted as small, an effect size of 0.5 and above as moderate and an effect size of 0.8 or more should be understood as large.

Outcome measures

No significant difference at pretest was found between the two groups when using pairwise comparisons with independent t-test. Analyses at posttest with mixed effect model showed a trend on the subscales mCSAI-2(cog) and mCSAI-2(som). However, no significant differences were found on any test (see Table 2).

Table 2 - Estimated mean values (M) and standard deviation (SD) for both groups on all outcome measures and measurement occasions. The table also illustrates the main effects and interaction effects from mixed effects model, where T = time effect, G = effect of group and I = interaction effect.

<table>
<thead>
<tr>
<th>Measures</th>
<th>PEAK (n =35)</th>
<th>Waitlist (n =35)</th>
<th>Mixed effect model (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td><strong>ACSI-28</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>47.37</td>
<td>11.73</td>
<td>48.80</td>
</tr>
<tr>
<td>Post</td>
<td>49.61</td>
<td>12.90</td>
<td>48.53</td>
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<td></td>
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<tr>
<td><strong>OMSAT-3</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>224.60</td>
<td>33.43</td>
<td>225.17</td>
</tr>
<tr>
<td>Post</td>
<td>232.03</td>
<td>41.27</td>
<td>221.83</td>
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<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>mCSAI-2(cog)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>19.54</td>
<td>6.53</td>
<td>20.17</td>
</tr>
<tr>
<td>Post</td>
<td>18.64</td>
<td>7.18</td>
<td>20.96</td>
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<td></td>
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<td></td>
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<tr>
<td><strong>mCSAI-2(som)</strong></td>
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<td></td>
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<tr>
<td>Pre</td>
<td>19.27</td>
<td>3.63</td>
<td>19.35</td>
</tr>
<tr>
<td>Post</td>
<td>18.96</td>
<td>3.70</td>
<td>20.49</td>
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<td></td>
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<tr>
<td><strong>mCSAI-2(conf)</strong></td>
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<td></td>
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<tr>
<td>Pre</td>
<td>24.66</td>
<td>5.81</td>
<td>23.53</td>
</tr>
<tr>
<td>Post</td>
<td>25.64</td>
<td>6.26</td>
<td>24.40</td>
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<td></td>
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<td></td>
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<tr>
<td><strong>MAAS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>55.26</td>
<td>10.40</td>
<td>55.06</td>
</tr>
<tr>
<td>Post</td>
<td>54.95</td>
<td>9.38</td>
<td>54.98</td>
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<tr>
<td></td>
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<td></td>
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<tr>
<td><strong>PSQ</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre</td>
<td>62.00</td>
<td>17.10</td>
<td>61.47</td>
</tr>
<tr>
<td>Post</td>
<td>59.26</td>
<td>16.98</td>
<td>59.72</td>
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Note: *** p ≤ .001; ** p ≤ .01; * p ≤ .0
Effect size
The effect sizes between PEAK and waitlist group at posttest was for ACSI-28 $d=0.08$ for OMSAT-3 $d=0.24$, for mCSAI-2(cog) $d=0.32$, for mCSAI-2(som) $d=0.41$, for mCSAI-2(conf) $d=0.20$, for MAAS $d=0.003$ and for PSQ $d=0.03$. These effect sizes should be interpreted as small (>0.20) or non-existent (<0.20) according to Cohen (1988).

The effect sizes within the PEAK group after completed programme compared to pretest was for the ACSI-28 $d=-0.18$, for OMSAT-3 $d=-0.20$, for mCSAI-2(cog) $d=0.13$, for mCSAI-2(som) $d=0.09$, for mCSAI-2(conf) $d=-0.16$, for MAAS $d=0.03$ and for PSQ $d=0.16$. The effect sizes within the waitlist group for comparison with the control period was for the ACSI-28 $d=0.02$ for OMSAT-3 $d=0.09$, for mCSAI-2(cog) $d=0.11$, for mCSAI-2(som) $d=0.30$, for mCSAI-2(conf) $d=-0.14$, for MAAS $d=-0.06$ and for PSQ $d=0.10$. These effect sizes should be interpreted as small (>0.20) or non-existent (<0.20) according to Cohen (1988).

Compliance to PEAK programme
Participation in the PEAK programme lasted for six weeks. Of all 35 participants 18 (51%) received all six modules within the allocated time frame. The minimum number of modules assigned was one, while the highest number was six. For an overview of the number of assigned modules, see Table 3.

<table>
<thead>
<tr>
<th>Number of modules</th>
<th>Assigned modules</th>
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<tbody>
<tr>
<td>1 module</td>
<td>35 (100%)</td>
</tr>
<tr>
<td>2 modules</td>
<td>32 (91%)</td>
</tr>
<tr>
<td>3 modules</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>4 modules</td>
<td>27 (77%)</td>
</tr>
<tr>
<td>5 modules</td>
<td>22 (63%)</td>
</tr>
<tr>
<td>6 modules</td>
<td>18 (51%)</td>
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Qualitative evaluation
The majority of participants stated that participation in the PEAK programme had been a positive experience. Almost everyone stated that they would recommend the PEAK programme to other athletes. On the negative side, most participants thought the programme had been time-consuming and contained more information than they could absorb. Because of their time-consuming sport activities they had not been able to spend as much time as they had wished on the programme. This study shows that the most positive aspect of participating in the PEAK programme includes the opportunity to become more aware of the thoughts, feelings and behaviors that can affect optimal sport performance. Also, the home assignments and the fact that mental training has become more concrete and manageable was stated as positive.
Participants stated that they have changed their attitudes towards psychological skills training, and now see this form of exercise as a more important part of their athletic performance. They also express a greater self-awareness concerning their own psychological skills and how they can understand and handle them. All participants stated that the support from their contact person had been very helpful and guiding throughout the programme. Some participants however, wished for more contact time and a more personal relationship to their contact person. The attitude towards working with an internet based programme differs. Some think it was very practical and effective due to the fact that they can work with the material at any time and any place, while others feel that the lack of face-to-face interaction is an obstacle, resulting in a more shallow relationship than desirable with their contact person.

Discussion

This study has aimed to investigate the effects of an internet-based psychological skills programme on coactive elite athletes. The results showed no significant effects on the outcome variables used. Effect sizes were calculated for the outcome variables and results showed small effect sizes for OMSAT-3, mCSAI-2(cog), mCSAI-2(som), and for mCSAI-2(conf) and no effect on the other variables. However, qualitative data showed satisfactory experiences towards the PEAK programme. This demonstrates the complexity in measuring increased psychological skills in a group of high-functional elite athletes.

Effects of the PEAK programme

The group of coactive elite athletes in the PEAK programme showed no significant improvements concerning their psychological skills measured by the outcome variables used in this study. However, trends could be seen on the subscales somatic anxiety and cognitive anxiety on modified CSAI-2 showing a decrease in perceived anxiety. This might be an effect of learning alternative, more flexible ways to handle situations. With a larger sample size, significant result might be found. A contributing factor to the small effect sizes in this study might have been the use of a mixed effect model. This method of analysis produces larger standard deviations due to the fact that they are converted through standard error. Larger standard deviations result in smaller effect sizes. However, using a more conservative method like mixed effect model avoids the risk of making type 1 errors (Gueorgieva & Krystal, 2004). The lack of significant results can be understood and analyzed through different perspectives.

First of all, one should remember that the group of coactive athletes is considered to be a high-functional population concerning this type of skills. One does not reach the top elite level without having any psychological preparedness. This assumption about elite athletes has been supported by Weinberg and Gould (2007) and in a recent study by MacNamara et al. (2010). With this in mind, one can understand the lack of significant results as a result of already established high
capacity in the area of psychological skills. Smith et al. (1995) report means for a category of normal sport achievers (n=469) on the ASCI-28 as 46.61. In this study means at pretest were 47.37 for PEAK group and 48.80 for waitlist group. These results could support the assumption that elite athletes are more high-functional and have greater capacity regarding psychological skills than average sport achievers. In earlier studies (Andersson et al., 2002; Carlbring et al., 2006; Beck & Fernandez, 1998) CBT has been used mainly as a mean to make non-functional and painful behaviors (e.g., anxiety, depression, social phobia, anger and tinnitus) more manageable and functional. In clinical studies the interventions effectiveness can be measured through diagnostic criteria, which establish, for example; whether someone suffer from depression or not. This is not the case with athletes; instead it is more about developing an already existing skill to improve performance. To see significant improvement on already existing and functional skills demands great progress. Instead of finding results of improvement, there is a risk that ceiling effect occurs due to the fact that athletes might achieve better than an average population. Elite athletes are considered as a high-functional group, making the improvements with CBT complex and hard to demonstrate. These research issues regarding measuring athletes' improvement are not new to the sport science field and have been discussed by researchers for a long time (Gardner & Moore, 2006).

Second, one should take into consideration that even a small improvement can be beneficial and crucial for an athlete in a competitive situation (Birrer & Morgan, 2010). For example, being able to handle a negative thought occurring in a critical moment can be the difference between winning or ending up in second place.

Third, most of the coactive elite athletes that participated in the study were not in their competitive season. This might have effected their motivation and the amount of time spent on the PEAK programme. It might also have contributed to their chances to practice the skills in real competitive settings. Not being able to practice psychological skills in competitive settings might lead to a lack of opportunity to receive immediate feedback and reinforcement on new behaviors and coping skills. Feedback and reinforcement is considered as important factors for successful CBT outcomes (Kåver, 2006). However, many researchers suggest that psychological skills should initially be implemented during off-season or preseason and then practiced daily to eventually be integrated into actual competitions (Weinberg & Williams, 2006). This might be accomplished better with a longer psychological skills training programme and a follow-up after six months.

Fourth, all participants did not carry out all six modules and therefore did not obtain all material presented. This might have resulted in the fact that they did not gain all knowledge required to develop all skills. Speculations about the numbers of completed modules necessary to see effect in internet-based CBT has been made by Hedman et al. (2011). According to these authors 5 modules predicted a more positive outcome but still more research is needed to generalize this to other areas and populations.
Discussion about the PEAK programme

The study was conducted using the internet for the entire duration of the programme without any face-to-face interaction; this comes with many benefits but also some issues to take in consideration. The amount of personal contact has in previous studies showed importance for treatment outcome (Spek et al. 2007). According to Palmquist et al. (2007) there is a significant positive correlation between amount of personal contact and treatment outcome. On the other hand, according to Hirai and Clum (2006) a minimal amount of personal contact, for example only e-mails, is enough to accomplish a better treatment outcome. In this study many participants stated positive attitudes towards participating in an internet-based programme and also stated that they received enough contact to keep them motivated. However, some expressed a need for more interaction claiming it would have been more helpful if such contact had been provided. How can this be understood? According to Bordin (1979) three components can be seen as characteristic of a therapeutic alliance; goal, task and emotional connection. The two first components should have been covered in the text material which the participants worked with on their own during the duration of the programme. The third component, the interaction between contact person and participant, however could be seen as quite compromised. Some of the participants expressed a lack of sufficient emotional connection. This could affect the way the forms have been filled out rating no improvement in psychological skills if the individual participant felt that he/she got less emotional connection than they had expected.

Some participants found the material and home assignment easy and accessible but some found the texts hard to understand and wished for simpler material. Making a programme like this may require even more precise material where the text is simple but still specific. Yet a solution like this may result in some individuals who find the programme and its features too easy which might affect their motivation to complete the programme. The fact is that the group coactive elite athletes may not be particularly homogeneous, which might have contributed to producing these different opinions. The athletes in this study differed concerning age, type of sport and amount of time spent practicing. This fact also shows that the definition of elite athletes differs among sports, for example in this study one participant at the age of 53 is an elite athlete in gliding. This would probably not be possible in a more physical demanding coactive sport like track and field. Internal and external demands of different sports also differ, with some athletes experience higher external demands from coaches and federations to complete this kind of training. Participation in the PEAK programme for most athletes in this study might be more motivated by internal rather than external factors. This could be both positive and negative. Internal motivation is important for psychological skills training but without any external demands, especially for this group, a lack of motivation might occur. To solve this problem, maybe coaches and federations should be more involved in this kind of programmes. Further, making a material suitable for a whole range of elite athletes might not be an effective approach. To make the internet-based psychological skills programme more effective and suitable might require a more individual touch, in which the specific elite athletes needs is in focus. This might be accomplished by making the
future internet-based psychological skills programme more tailored. In line with this, tailored psychological skills training programmes for high-intensity sports in an attempt to meet the specific demands of these sports has been suggested by Birrer and Morgan (2010).

The modules of the PEAK programme consisted of six different areas assumed to be important for psychological skills improvement. In traditional CBT this different areas (e.g. thoughts, emotions and behavior) cohere and interact, making it possible to adjust each session to each person (Kåver, 2006). In the PEAK programme these areas were separated which might have caused a loss of comprehensive picture for some of the participants. It can also be discussed whether the chosen areas were the most beneficial for optimal sport performance. Perhaps other aspects of elite athlete lifestyle such as debriefing, motivation and social support could be incorporated into the PEAK programme for a better level of recognition.

Another important issue to discuss is the time duration of the PEAK programme. Much research suggests that programmes for improvement of psychological skills requires at least 2 months in training (Weinberg & Williams, 2006). This programme only lasted 6 weeks and lack of time might have been a contributing factor to why no significant results were found on the outcome variables. This issue was also supported by most of the participants when analyzing the qualitative data of the posttest. Research in the physical sport science suggest that learning to perform a new ability or skill takes about 10 000 hours or as long as 10 years (Ericsson, Krampe & Tesch-Römer, 1993), this might not be the same for psychological skills but one should not neglect the fact that skill improvement might take some time. In fact, it might be assumed that skill improvement due to the PEAK programme can be seen in these athletes later on given that they continue practicing the skills learned in the programme. Therefore, a follow-up study is desirable in order to detect potential long-time effects.

Perhaps a more interactive approach would suit this group better, making it possible to be more involved in the process of developing one’s own psychological skills. Maybe additional web-based applications could be a solution, for example use of a free video-calling application for a more personal contact with each athlete. This more interactive approach could also help to prevent misunderstandings along the way. To more benefit the structure of the PEAK programme as totally internet-based a more interactive and flexible material could be used to meet the needs of the athletes.

Methodological discussion
All forms were completed online and all participants received the same instructions. The estimated time for filling out the forms was 45 minutes, which is a long time and might have impacted the level of motivation for fulfilling the forms. However, the participants could complete the forms at any given time during a period of two weeks. With this in mind, it might be assumed that the athletes who completed the forms late at night might have experienced more tiredness than the
ones filling out the forms at daytime. This might have had impact on the results, but it is hard to control due to the fact that some athletes might have been in another time zone when filling out the forms making it hard to determine whether they answered the forms during the day or during the night. On the other hand, this kind of flexibility is also necessary and one of the benefits of an internet-based programme (Andersson et al., 2008). The fact that all participants did not complete the whole programme might also have affected their answers and attitudes towards it. It is assumable that a participant that has completed all six modules has gained more skills training than one who only completed 3 modules. In other words, it is a fair assumption to believe that the more modules the participants completed the better their answers reflect the PEAK programme as a whole. The forms used in this study are all well used with reported high validity and reliability. MAAS and PSQ are not particularly designed for the sport field but are widely used in other areas. Despite of this, the forms do measure some of the psychological skills associated with athlete performance such as the ability to cope with stress and to stay focused. ASCI-28, OMSAT-3 and mCSAI-2 are some of the most used forms for measuring psychological skills for athletes, and they measure traditional psychological skills such as goal-setting, relaxation, focus and imagery. Some of these skills are widely questioned, especially for the lack of evidence-based studies proving the contribution of the skills to athletic performance (Gardner & Moore, 2006). This is why the new skills in the area of psychological skills training has to be evaluated in further research.

The purpose of the PEAK programme was to incorporate evidence-based methods well-used in clinical areas into the field of sport psychology. It is possible that the outcome variables of this study did not measure the skills presented in the PEAK programme, leaving a gap between variables and actual skills trained in the programme. This discrepancy has been one of the problem areas in making the research on sport psychology more evidence-based (Gardner & Moore, 2006). To come to terms with this, a recommendation could be to modify the instruments to fit the demands of evidence-based research better.

**Further research**

This study has produced valuable directions to take into consideration for future research in this area. The instruments that are used to measure psychological skills today cover many areas but not explicit CBT methods. One desirable focus would be to develop or modify existing instruments to measure the effects of CBT as one method of psychological skills training for athletes. It is crucial that the instruments are modified in line with new approaches to psychological skills training to enable accentuating the research with evidence.

Another important aspect concerning internet-based psychological skills training involves the importance of individualizing and tailoring the interventions to each athlete. This might help to overcome the variation between athletes and the various psychological demands of different sports. This could be achieved by interviewing the athlete prior to initiating the programme and give each athlete a chance to influence which modules to work with. Thinking in terms of “one size fits
all” might not fit the athletes in coactive sports, and this is probably the case for more interactive types of sports as well.

Apart from tailored programmes, timing is another important factor. When to implement the psychological skills programme is very crucial for the outcome and motivation. It is a challenge to investigate when the most optimal time for introducing psychological skills programmes are because this might differ between sports. Some sport might benefit more from implementing these skills more intensively off-season while some might benefit more from using them for a longer period of time. Further research in this area is needed, for example to try out this type of programme in a more homogenic, sport-specific group.

Internet offers many different ways to interact. This could be used to make the psychological skills training programmes even more accessible, for example through the use of video-calling, instant messaging and audio-files. Also the huge growth of apps for smartphones could enable the material to be more accessible and portable for the athletes to use in the future.

References


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