Effects of Imagery and Mindfulness on Anxiety, Confidence, Mental Well-Being, and Performance in Shot Putt Throwers: A Case Study

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Abstract

The purpose of the present study was to introduce imagery and mindfulness to athletes as tools to help deal with competition anxiety, and improve confidence, mental well-being, and performance. Two female varsity level throwers (M_{age} = 20) met individually with the researcher twice a week during the competitive season (25 weeks). Athletes were introduced to breathing and relaxation techniques, followed by basic imagery scripts and mindfulness. Results revealed that both athletes decreased their anxiety levels, while increasing their self-confidence, mental well-being, and performance. The findings highlight the positive effect of employing a combination of imagery and mindfulness in sport life.

Keywords: imagery, mindfulness, anxiety, confidence, well-being, sport

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Athletes experience positive outcomes related to their physical and psychosocial health through their participation in sport (Coakley, 2007). However, athletes may encounter challenges and difficulties due to the competitive, demanding, and stressful environment they are exposed to, leading to detrimental outcomes (e.g., injuries, burnout, anxiety, low confidence, and well-being; Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). Accordingly, research in sport psychology has focused on performance enhancement and the personal development of athletes by employing various mental training programs (Sappington & Longshore, 2015).

Imagery is a popular and powerful psychological skill that has been employed in numerous interventions to facilitate performance and enhance positive psychological outcomes (e.g., motivation, arousal level, and self-confidence; Callow, Hardy, & Hall, 2001; Hammond, Gregg, Hrycaiko, Mactavish, & Leslie-Toogood, 2012; Jones, Mace, Bray, MacRae, & Stockbridge, 2002; Mellalieu, Hanton, & Thomas, 2009). Imagery uses a number of different senses (i.e., visual, auditory, tactic, etc.) to create or re-create an experience in the mind (Vealey & Greenleaf, 2010). Athletes use imagery for various functions, but these functions can be divided under two general categories of cognitive (i.e., sport-specific skills, game plans and routines) and motivational (i.e., goals and emotion regulation; Pavio, 1985). In cognitive imagery interventions, studies have shown the positive impact that imagery has had on performance (e.g., Munroe-Chandler, Hall, Fishburne, Murphy, & Hall, 2012), whereas in motivational imagery interventions studies, there is evidence supporting the impact of imagery on psychological variables, such as motivation, arousal level, and self-confidence (Mellalieu et al., 2009). The level of effectiveness seems to vary based on the timing of the imagery practice, the level of the athlete, and ability of the athlete to create and control the images. For example, Gardner and Moore (2006) performed a comprehensive review regarding psychological skill training and, while most studies show positive effects, they reported six studies that showed minimal effects of imagery on performance enhancement.

Previous studies have also combined different psychological skills, such as imagery and self-talk, to examine their effects on different psychological constructs, such as mental toughness, self-esteem, and self-efficacy (Edwards & Steyn, 2008; Golby & Wood). For example, Edwards and Steyn found that a psychological skills program (PST) implemented to athletes (both individuals and in groups), improved their overall well-being (i.e., self-acceptance, autonomy, purpose in life, personal growth, positive relations with others, and environmental mastery) at both the individual and group level. More recently, following a psychological skills training program, Golby & Wood (2016) found that student-athlete rowers improved their perceived self-efficacy, self-esteem, and positive affect.

Mindfulness, another psychological technique, is a form of mental training that has become increasingly popular in sport, as well as other areas, such as clinical psychology and psychiatry. For example, mindfulness practice has been effectively used in the reduction of stress and depression symptoms and the treatment of binge eating disorder, substance abuse and dependence (e.g., Roemer & Orsillo, 2009). Kabat-Zinn (1994) defined mindfulness as being aware in the present moment, in an accepting and nonjudgmental way. To date, there is limited research on the effects of mindfulness interventions in sport. One approach that has been developed and used is the Mindfulness-Acceptance and Commitment approach (MAC; Gardner & Moore, 2007). The MAC approach was designed specifically for performance populations and promotes acceptance of one's internal experience through seven modules (i.e., psychoeducation, introducing mindfulness and cognitive diffusion, introducing values and value driven behaviour, introducing acceptance, enhancing commitment, skill consolidation poise, and maintaining, enhancing mindfulness, acceptance, and commitment; Gardner & Moore, 2007). Results have shown that MAC is able to increase mindfulness and improve both physiological and psychological outcomes (e.g., anxiety, performance, and flow; for a review see Bühlmayer, Birrer, Röthlin, Faude, & Donath, 2017). Despite these promising results, more research is needed to both extend and confirm previous findings. Furthermore, more performance-based outcome measures are needed, as research has primarily focused on precision sports (e.g., darts).

Track and field athletes can benefit from employing imagery (e.g., Gregg, Hall, & Hanton, 2007) and could also potentially benefit from the use of mindfulness. Track and field includes several different disciplines, and, to our knowledge, there are studies looking at track and field athletes/teams, grouping different events together (Abma, Fry, Li & Relyea, 2002; Edwards & Steyn 2008), but few case studies, and even fewer studies, looking specifically at throwers (shot putt). For instance, Henriksen, Stambulove, and Roessler (2010) looked at the role of the environment in the development of track and field athletes, finding that focusing on performance process was important for success. In a case study of three female track and field athletes, Moore (2010) found that these athletes, who were clinically depressed, believed that self-efficacy was the most important factor in their athletic performance and mental readiness was of higher importance than physical readiness. In Olympic track and field athletes, Zuleger (2014) investigated the coach-athlete relationship via multiple interviews. For all three athletes, an autonomy-supportive environment, a caring relationship, and mental strength emerged as themes that were important in developing a medal winner.

Mindfulness interventions are relatively new in sport and their impact, both subjectively and objectively, still needs further empirical support. While mindfulness has been viewed as a distinct class of interventions from PST in the sport context (e.g., De Petrillo, Kaufman, Glass, & Arnkoff, 2009), some interventions have integrated imagery. For example, mindful exercises in the MAC protocol include imagery use (e.g., mindfulness of the breath exercise; Segal, Williams, & Teasdale, 2002). Additionally, Kabat-Zinn, Beall, and Rippe (1985) used imagery in their mindfulness training in sport and Baltzell and Akhtar (2014) included imagery use (i.e., recall of past performance events that involved negative feelings) in their mindfulness meditation training for sport program. Given that most research has looked at team sports rather than at individual sports, it is imperative to take a further look at the distinct sports separately from the track and field team as a whole. Therefore, the purpose of the current study was to use a case study, mixed methods approach to investigate the use of both imagery and mindfulness by two varsity throwers (shot putt) on their overall performance, anxiety, motivation, and well-being. Over the course of six months, through the athlete's preseason and competitive season, aspects of the MAC approach were used in conjunction with imagery. Only aspects were used to combine the protocol with imagery that worked for both athletes (their needs and in terms of timing of delivery during the season). It was hypothesized that both athletes would improve their performance, increase their motivation and well-being, and decrease their anxiety over the course of the intervention.

Methods

Participants

Two female athletes approached the first author (with encouragement from their coach); they were looking to improve their performance through mental techniques. At the beginning of the study both athletes were starting their season (preseason; second-year varsity track and field athletes at the same Canadian university). Athlete 1 was 20 years old, had been participating in her current sport for seven years, and on average reported practicing 10-15 hours a week. It is also important to note that Athlete 1 was born with a hearing disability, which meant that, during the intervention, all material (e.g., imagery scripts) was presented to her in written form. When working with hearing-impaired athletes, Hanrahan (1998) notes that it is important to not confuse or assume that the person may have an intellectual disability, just that, in a given situation, certain auditory cues may be missed (i.e., listening to an audiotape or during a verbal presentation). By reading the material presented to her, we believed the athlete would be able to gain and understand all the intervention information. Athlete 2 was also 20 years old, she reported having participated in her current sport for six years, and on average practiced 11 hours a week.

Procedure

At the first meeting with the athletes, they were interviewed by the first author, who asked what each athlete wanted to focus on (e.g., improve performance, reduce anxiety), as well as obtained their consent to participate in the intervention. Athletes filled out a questionnaire package at baseline (pre-season), at 5 weeks (mid-season), and at 15 weeks (end of season). During the intervention athletes met with the first author twice a week (except during university holidays; which totaled two weeks or 4 sessions), where they were able to talk about their current week (i.e., how they felt about practice, performance, technique) and then performed an imagery session (based on their needs). The intervention started with basic breathing techniques, followed by imagery scripts (for the first five weeks) that were developed week by week (becoming more descriptive and specific; see Appendix 1 and additional scripts can be obtained from the first author upon request) based on feedback from the athletes themselves. The first author took notes at each session to help develop scripts. In addition, at the end of the second session each week, athletes were asked to write in a diary, describing their week, their feelings about each imagery session (whether they were helping or not), and what they would like to focus on in the following weeks. Over the first five weeks of the intervention, the needs of the athletes shifted from more of a technique focus (imaging throwing well) to a focus on reducing pre-competition anxiety and post-throw negative reactions. To monitor the use of imagery and mindfulness apart from the session provided, the athletes were given a diary (Cumming & Ramsey 2009), where they would record how many times they employed the scripts (where and when) during the week.

Measures

Demographics: The demographic questionnaire included information on each athlete, such as age and history in sport (i.e., years playing, competitive level).

Imagery Ability: Vividness of Movement Imagery Questionnaire-2 (VMIQ-2; Roberts, Callow, Hardy, Markland, & Bringer, 2008) was employed to measure vividness of imagery for external visual, internal visual, and kinesthetic imagery. Participants are asked to rank different actions (e.g., walking, running, jumping off a high wall) from 1 (*no image at all, you only know that you are thinking of the skill*) to 5 (*perfectly clear and vivid as normal vision*). The VMIQ-2 has shown acceptable factorial, concurrent, and construct validity (Roberts et al., 2008).

Well-Being: The Eudaimonic Well-Being in Sport Scale (Kouali, Hall, & Pope, 2017) was employed to assess athletes' well-being. Five items are ranked on a 6-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*). An example item is "I like most aspects of myself as an athlete." Kouali et al. (2017) have tested the psychometric properties of the instrument and evidence of internal consistency reliability, factorial validity, nomological validity, and convergent validity was provided.

Anxiety and Confidence. The Competitive State Anxiety Inventory (CSAI-2; Martens, Vealey & Burton, 1990) was used to assess state anxiety. It is a sport-specific state anxiety scale with 27 items, made up of 3 subscales; cognitive anxiety (9 items; "I'm concerned I won't be able to concentrate"), somatic anxiety (9 items; "My body feels tight"), and self-confidence (9 items; "I'm confident of coming through under pressure"). Each item is ranked on a 4-point Likert scale from 1 (*not at all*) to 4 (*very much so)*. Evidence of validity and reliability of the CSAI-2 has been provided through previous studies (e.g., Jones & Hanton, 2001; Thomas, Maynard, & Hanton, 2004).

Methodological Rigor

We employed several strategies to enhance the overall methodological rigor of our study, to gain a more detailed and comprehensive view of the effects of the intervention on each athlete. The first author met with the athletes twice a week, developing a trusting relationship and obtaining an understanding of the athletes' views with the aid of self-report measures and diaries. Having multiple time-points, and types of measures (qualitative and quantitative) allowed for a more comprehensive view of the athletes and their success (or lack of) during the season. Finally, the second author acted as a 'critical lens', providing alternate observations and potential scenarios for scripts based on athletes' feedback during the intervention, as well as in the data analysis. All authors have backgrounds in sport and exercise psychology, studying different concepts and techniques for a minimum of 6 years and working with and teaching athletes and students, introducing them to different psychological skills for a minimum of 2 years.

Imagery Scripts

When designing imagery scripts for athletes, Williams, Cooley, Newell, Weibell, and Cumming (2013) suggest making the following considerations: (1) who will be using the script, (2) where and when will they be using the script, (3) why is the script being used, and (4) what will be imagined. These recommendations were taken into consideration when designing each script and athletes were asked for consistent feedback on the imagery scripts provided, in terms of length, content, and specific details. Based on different aspects of the competition (i.e., location), scripts were tailored to be more realistic for the athletes. More specifically, personalized aspects were incorporated into the scripts; stimulus prepositions (i.e., characteristics of the situation) and response prepositions (i.e., physiological and affective responses to the situation) were included so every image was relevant and had a particular meaning for each athlete (Lang, 1979).

The intervention started with relaxation and breathing; athletes were shown how to take deep relaxing breaths that would help during the upcoming imagery and mindfulness sessions, as well as in their sport training and competitions. Imagery scripts were focused on athletes performing in competition with success, to help reduce anxiety and gain confidence (as these are two factors both athletes wanted to address). Athletes were to imagine themselves at the upcoming competition and see themselves performing well, being successful, knowing their training had paid off. As the intervention and the athletes' seasons progressed, mindfulness was incorporated in the scripts and used frequently for both athletes, as the athletes expressed the need to be able to recover from a poor performance immediately (i.e., a first bad throw in a competition when they have two more throws to complete). Using mindfulness, the athletes were taught awareness and acceptance (i.e., acknowledging each thought, emotion, and physical sensation of their body and accepting them), as well as commitment (i.e., feeling determined to achieve their goals, keep improving, and be able to move forward in their sport).

Results

Quantitative Analysis

Data were entered and screened for missing values using SPSS© statistical software; there were no missing values from either participant.

Athlete 1

At the beginning of the intervention, on the components of the VMIQ-2, Athlete 1 scored: External (2.33), Internal (3.25), and Kinesthetic (4.33). Athlete 1 improved in all components by the end of the intervention: External (3.67), Internal (4.50), and Kinesthetic (4.75). Scores from each subscale from each instrument (CSAI-2, EWBSS) were plotted and inspected. Cognitive somatic anxiety decreased from Time 1 to Time 2 for Athlete 1. At Time 3, cognitive somatic anxiety for Athlete 1 then leveled off (see Figure 1). Self-confidence increased from Time 1 to Time 2 (see Figure 2); however, for Athlete 1, somatic state anxiety decreased between Time 1 and Time 2, but slightly increased from Time 2 to Time 3 (see Figure 3). For well-being, Athlete 1 showed slight increases from Time 1 to Time 2 and leveled off at Time 3 (see Figure 4).

Additionally, objective measures of performance were taken. The athletes were asked to give their current personal best (PB) throw. Performance was relatively consistent, as indicated by the athlete's week-by-week performance scores, but did increase from baseline to end of the intervention. At the beginning of the intervention Athlete 1 had a PB of 13.17 meters and placed fourth at the provincial championship the previous year (13.63 meters). At the end of the season, Athlete 1 had a new PB of 13.79 meters, placed second at the provincial championship, and third at the national championship.

Athlete 2

Athlete 2 scored low on all three components of the VMIQ-2 at baseline: External (2.00), Internal (1.92), and Kinesthetic (1.91). At the end of the intervention, Athlete 2 improved in all components: External (4.08), Internal (4.17), and Kinesthetic (4.75).

Cognitive somatic anxiety decreased from Time 1 to Time 2 for Athlete 2. At Time 3, cognitive somatic anxiety decreased further for Athlete 2 to scores similar to those of Athlete 1, which had leveled off (see Figure 1). Self-confidence increased from Time 1 to Time 2 for Athlete 2 (see Figure 2) and somatic state anxiety decreased from Time 1 to Time 2 (see Figure 3). For well-being, Athlete 2, similarly showed slight increases from Time 1 to Time 2 and leveled off at Time 3 (see Figure 4).

Objective measures of performance were taken. The athlete was asked to give her current personal best (PB) throw. Performance was relatively consistent, as indicated by the athlete's week-by-week performance scores, but did increase from baseline to end of the intervention. At the beginning of the intervention Athlete 2 had a PB of 13.14 meters and placed fifth at the provincial championship (13.09 meters). At the end of the season, Athlete 2 had a current PB of 13.73 meters, placed fifth at the provincial championship, and seventh at the national championship.

Qualitative Analysis

Manipulation Check: The diaries indicated that athletes increased their use of imagery on their own time by the end of the intervention. At the beginning of the intervention, athletes did not use imagery outside of the sessions, whereas by the end of the intervention, athletes indicated using imagery on their own time an average of five times a week. Participants were also asked on the second session of each week to give feedback on how they were feeling about themselves, their sport, the sessions, and what they were looking for in the future sessions.

Skill Acquisition: Throughout the intervention, Athlete 1 focused on technique, performance, and recovering from a poor throw. For example, at the end of the fifth week, Athlete 1 indicated: "I [have not] done a lot of imagery this week but when I do, it's mostly focusing on the details of my technique, which

I want to continue working on," and by week ten, Athlete 1 then stated "[my] technique is improving and it's been influencing my throws to go further, because of this, I have started feeling more confident about the season." Her disposition to wanting to continue to improve shows her commitment and development of commitment, one aspect of mindfulness that was targeted throughout the intervention.

Psychological Outcomes: A major hurtle for both athletes was reducing anxiety prior to competition. Both expressed feeling 'nervous' and 'worried' before competing, although they both had some previous strategies to help cope, such as, Athlete 1 who "…always listens to music before competing, during warmup to try and avoid talking to my teammates and getting distracted or more nervous." Athletes found that using imagery (combined with mindfulness), picturing themselves both being successful, and having a poor throw but recovering on the next throw was helpful. In the final week, Athlete 2 indicated her current stress levels were high, but that the sessions were able to help her relax and improve her overall well-being: "This week mentally and physically I am tired because of school and it has been hard training … I feel relaxed after the sessions. Imagining myself failing but still moving forward has helped me a lot through practices." Additionally, this indicates how the use of mindfulness (acceptance of mistakes and commitment to goal attainment) worked well within the sessions to help athletes deal with faults and failures, understand that experiencing bad performance is part of the sport life, and maintain focused and committed to their goals.

Overall Experience: Following the intervention, participants were interviewed and asked about their experience. Both athletes indicated that they enjoyed the sessions, finding them helpful in sport, but as well as other areas of their life, such as school. Athlete 2 felt that the sessions "taught [her] to take criticism," which helps in sport and outside of the sport domain as well. Athlete 1 indicated she would continue using imagery in the years to come, as she believes "it really did help and [she] think[s] it will only help more next [season]." Each week in the diaries, the athletes were asked what they thought of the scripts (e.g., were they realistic enough, what would they want changed). During the second half of the intervention (and the athlete's season), they were both indicating that the development of the scripts was what they wanted and no further changes needed to be made. At week 9, Athlete 1, wrote about how picturing herself making a bad throw was realistic: "I think it makes sense to picture myself having a bad throw because that happens a lot and I want to be able to not get as upset about it because then all my throws become bad."

Discussion

The purpose of the current study was to investigate the effect of imagery, combined with aspects of mindfulness in two varsity throwers (shot putt) on their overall performance, anxiety, motivation, and well-being, using a case study, mixed methods approach. Based on previous research, it was hypothesized that the athletes would improve in both objective (performance) and subjective (confidence and well-being) measures over the course of the intervention.

Our hypothesis was mostly supported; more specifically, the subjective measures of well-being, confidence, and anxiety changed as expected. As in previous studies (e.g., Mellalieu et al. 2009), cognitive state anxiety and somatic state anxiety decreased, while self-confidence and well-being increased. However, for Athlete 1, somatic state anxiety slightly increased from Time 2 to Time 3. It is possible that the timing of the third time-point (following provincial championships, going into national championships) could explain this spike, since both athletes indicated being very busy academically at this time. Objective measures of performance increased slightly and the athletes indicated being happy with their results, in terms of standings within their groups. These athletes are among the top across the universities in the country; therefore, a dramatic increase in performance would be highly unlikely. However, mental strategies, such as imagery and mindfulness, can work to discourage physical overtraining that leads to injury and burnout (Hawley, Myburgh, Noakes, & Dennis, 1997). It is important to note the difference in imagery ability at the beginning of the intervention for the two athletes. Imagery ability reflects the controllability and effectiveness of the images being produced (Cumming & Williams, 2013) and the higher the imagery ability of an athlete, the more imagery they will use (Vadocz, Hall & Moritz, 1997). Previous work has investigated imagery ability as a moderator of the imagery use and performance outcome relationship, with higher use and ability being associated with more success (Martin, Moritz & Hall, 1999; Robin et al., 2007). Moreover, higher competitive level athletes are better able to use kinesthetic aspects of imagery (Vadocz et al., 1997). In our study, Athlete 1 had much higher imagery ability scores, especially kinesthetic scores, compared to Athlete 2. This difference may be due to previous use and experience in the sport, or this may suggest that higher imagery ability may be especially helpful to individuals with a hearing impairment. Those with hearing impairments may rely more on the other senses and are better able to create and imagine using these senses, but more research is required to support this suggestion.

The current study reinforces the effectiveness of imagery for mental well-being and performance in athletes, as well as the importance of tailoring interventions to meet the individual's needs and accommodating changes throughout. In addition, the study highlights the impact of using mindfulness aspects during an intervention to help decrease anxiety and develop athletes' well-being and self-confidence. Both athletes indicated not being able to focus after a poor throw; by acknowledging and accepting the negative thoughts, emotions, and sensations experienced following a poor performance, the athletes had the capacity to let the negative experiences go and become more focused on their next throw, therefore maintaining commitment to their goals.

This study provides evidence for the use of aspects of mindfulness within imagery interventions in sport, but there are limitations that need to be addressed. Given our design, a small case-study, interventions incorporating a larger sample size, as well as different sports, incorporating males, and a more diverse population are needed for generalization. In addition, our study only incorporated aspects of the MAC protocol into the intervention sessions (to accommodate both athletes' needs as they developed over the intervention and timing of sessions during season). Perhaps a combined MAC protocol (all seven steps) intervention with imagery would be even more effective for helping athletes deal with difficult situations (such as poor performance), improving their self-confidence, and decreasing anxiety when going into competition. Furthermore, these athletes have demonstrated their commitment to their sport for many years and, although the athletes indicated benefitting from the intervention, it is unclear if their continued commitment to persist through tough situations was directly related to the delivered intervention. Lastly, other measures relevant in sport, which may vary by athlete, should also be considered (e.g., psychological needs,

motivation, and resilience). Future research should build on the present intervention to understand the full effects of imagery and mindfulness on athletes' overall well-being, anxiety, and performance.

From an applied perspective, our study looked at a specific population (throwers) that may be overlooked or grouped into a larger team sport (track and field). The study begins to help understand the impact of tailored interventions. It reinforces the importance of addressing specific sports, as well as individual athletes who may have different needs. Tailored interventions, such as mindfulness paired with imagery, may be more beneficial for some athletes than others. For shot putt throwers, who have multiple chances to demonstrate their ability (longest throw), being able to incorporate mindfulness (acceptance of a poor throw) to move forward to their next throw, could be a very valuable tool for achieving success.

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Figure 1. Competitive State Anxiety

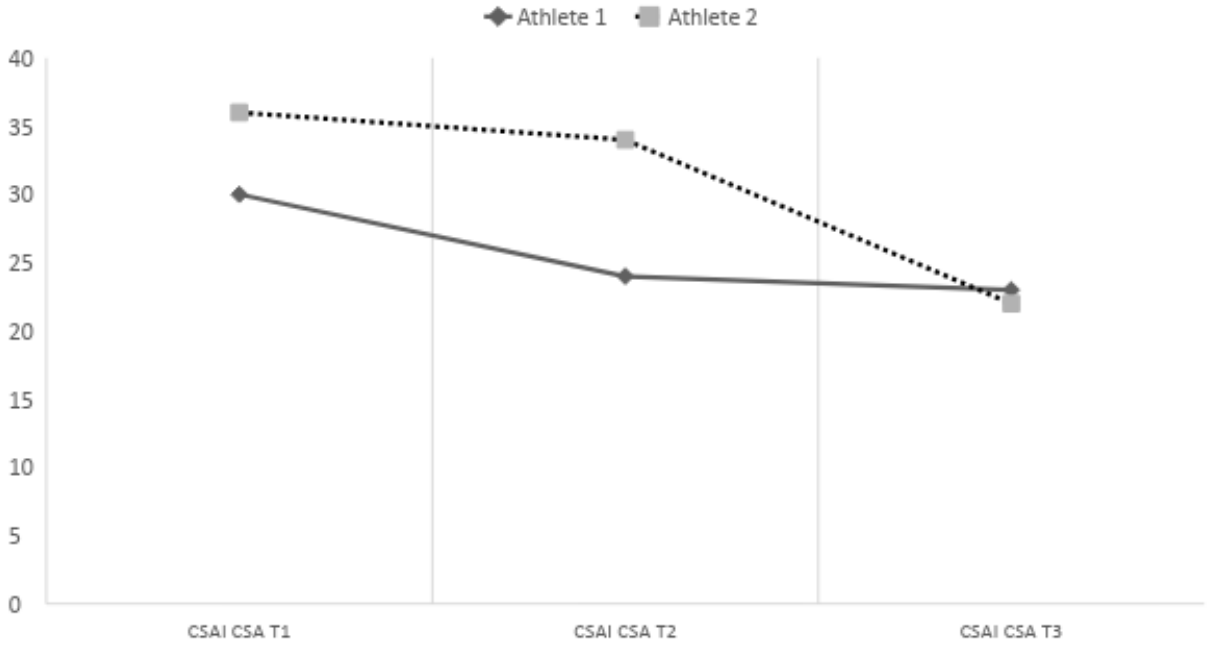


Figure 2. Self Confidence

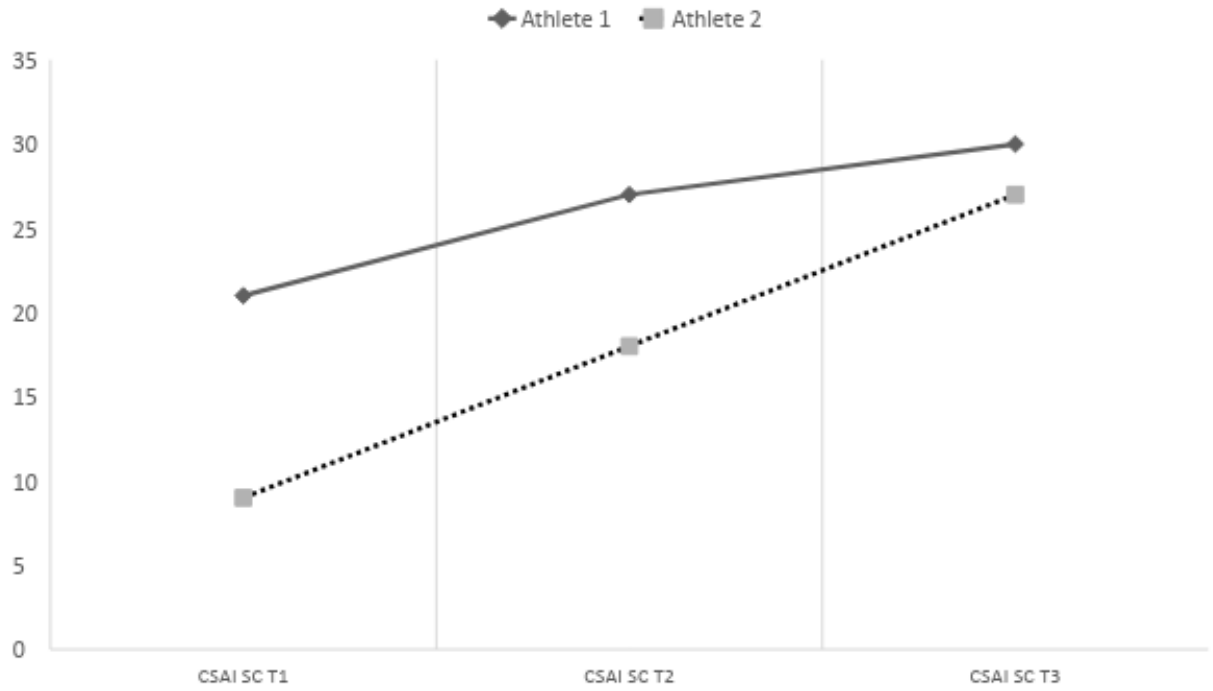


Figure 3. Somatic State Anxiety

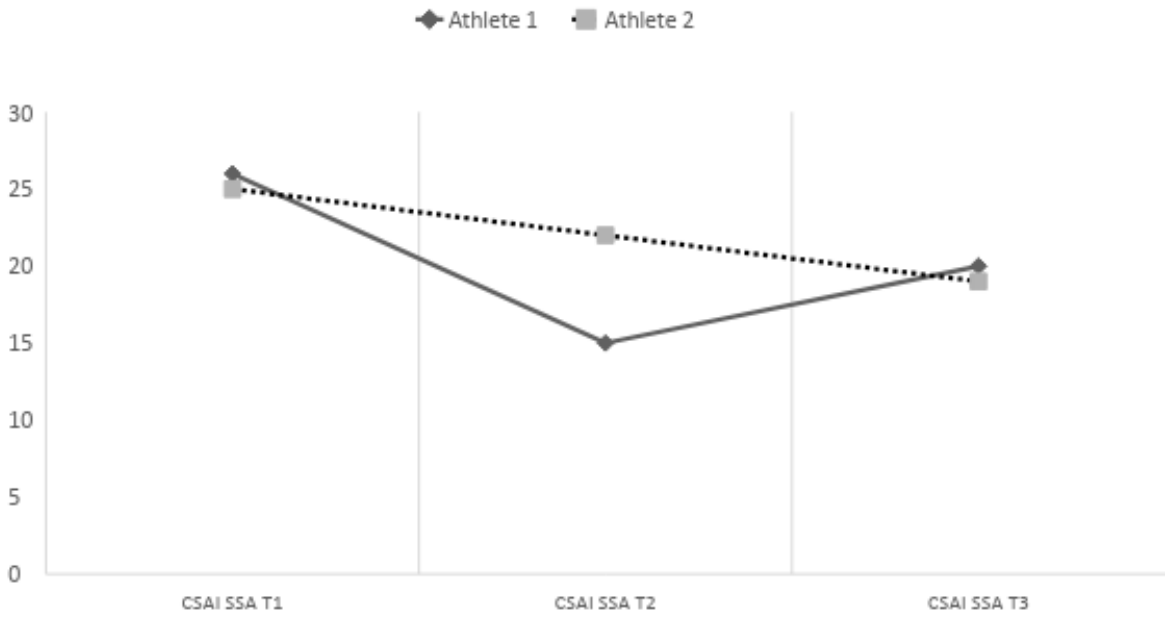
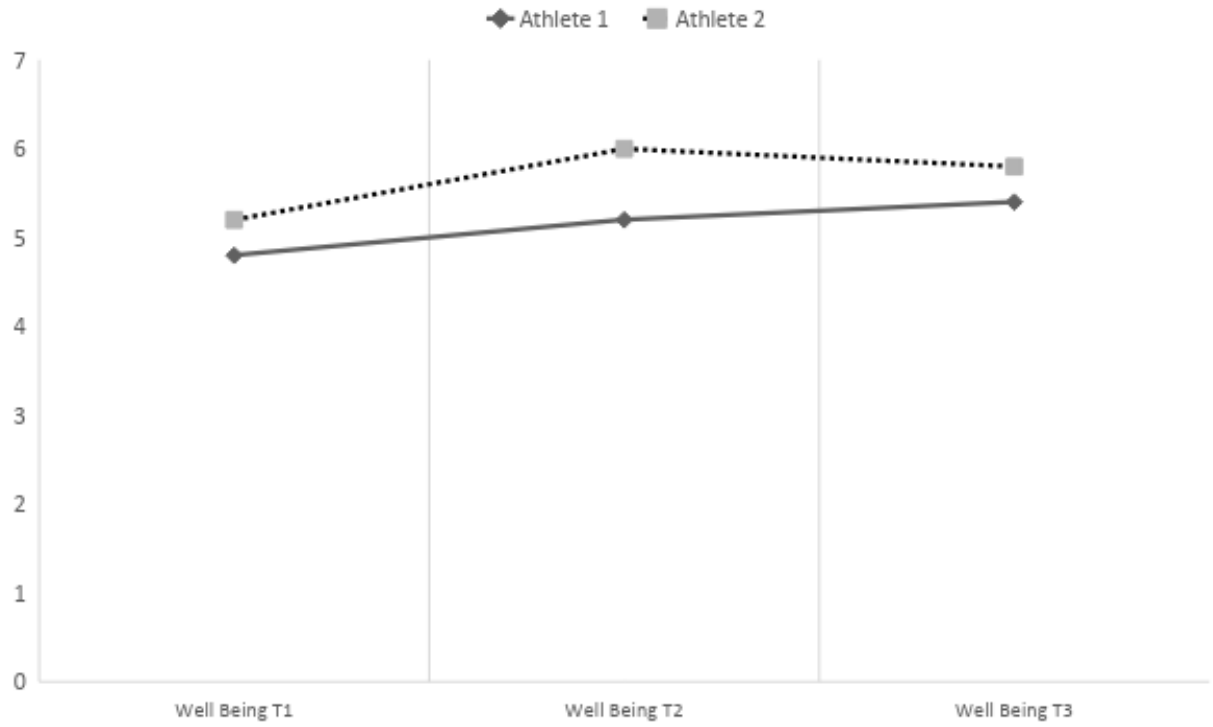


Figure 4. Well Being in Sport



Appendix 1

Get into a comfortable position and close your eyes. Focus on the center of your body and take several slow, deep breaths. With each inhalation imagine that you are pulling all of the tension from your body into your lungs. With each exhalation, imagine that you are releasing all of your tension and negative thoughts from your body. Continue this focused breathing until your body becomes relaxed and your mind is alert and open for productive thoughts [take a minute]

Imagine you are showing up for the competition this weekend; you are on home turf and you are excited to compete. Imagine getting ready. As you get ready [arriving and changing into your proper equipment], you are feeling nervous but excited. You want to do really well so, as you begin to warm up, you are focusing on feeling confident, and in control [pause]. Think about the warm up, what you are doing to get ready, what you are telling yourself to mentally prepare. Focus.

How your body feels, how your heart rate increases, the feeling of stretching your muscles. You are feeling confident and focused. You know that a good warm-up will help you perform, so you take the time and space to prepare yourself.

Now imagine that you are stepping into the circle for your first throw. What do you see? Where are you looking to? Feel the weight in your hands.
You feel strong. You feel confident in yourself. You feel ready to throw. As you take some deep breathes, you focus on keeping your hips straight, and as you begin to throw, focus on your technique. Straightening your hips takes your throw to the next level. Feel the movements as you throw. Where does your throw go? How do you feel?

Now imagine throwing again, repeating the same technique and movements. Feel every aspect of the throw; feel proud of your improvements and accomplishments despite how anyone else does.