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The Effects of Mindfulness on Several Dimensions of Athletic Performance

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Abstract

Many studies demonstrate the positive effect of focus and mindfulness on athletic performance, although few have studied the specific effects of mindfulness on athletic performance because of logistical reasons. The present study hypothesizes that the practice of mindfulness meditation will improve various dimensions of athletic performance, specifically self-concept, or one's assessment of how one performed athletically; ability to focus, or whether one could keep one's mind in the game and did not become distracted by internal or external cues; and resilience, or one's ability to bounce back from internal or external stressors during athletic performance. Due to the infeasibility of executing the study, this thesis examines the work of past studies done on mindfulness meditation across different dimensions and shows how they can help improve athletic performance. Using this information, a hypothetical study is designed to demonstrate these effects of mindfulness meditation on athletic performance.

Keywords: Mindfulness meditation, focus, resilience, self-concept, collegiate athletics.

The Effects of Mindfulness on Several Dimensions of Athletic Performance

Origin and Development

Mindfulness is defined as nonjudgmental acceptance of the present moment with acceptance. It can be practiced in various ways, the most common of which is through mindfulness meditation (David & Hayes, 2011; Demarzo et al., 2012). For thousands of years, meditation has been practiced by numerous religions and cultures across China, Japan, the Middle East, and western countries (West, 1987; Manuello et al., 2016). In Kabbalah Judaism, meditation is practiced to become aware of life's misfortunes and to rid the self of egoism. Practicing mindfulness in this manner supposedly brings one closer to god. The Sufri Islam tradition practices meditation in order to become more accepting. In the mystic Christian tradition called Hesychasm, meditation is practiced to rid the self of materialistic and superficial tendencies. Each of these traditions uses a different technique to practice meditation. Many traditions practice meditation by repeating a specific chant, or mantra, while others practice by doing certain movements such as swaying back and forth or carving circles into stone (West, 1987).

Though the origin of meditation is unknown due to its practice across multiple cultures and religions, the western world attributes meditation, and more specifically mindfulness meditation, to Buddhism. Buddhism is based on a doctrine called the Four Noble Truths. These truths explain the nature of human life. The first of the Four Noble Truths state that existence is suffering. This means that every living being experiences some kind of suffering, whether is it physical or mental. The second truth states that emotional suffering comes from attachment and desire. Humans have a difficult time accepting that everything is subject to change because of the

tendency to become attached to things that cannot be controlled. The third truth explains that the only way to rid oneself of suffering is to become detached from things that change. Because humans cannot control what changes, they must alter how they react to such changes. The final truth states that the way to learn to detach from things that change is to follow what is referred to as the Eightfold Path (West, 1987; Bodhi, 2004).

The Eightfold Path is a series of ways in which one should act to detach so he can reach the ultimate goal of Buddhism: enlightenment. The Eightfold Path is as follows: right understanding, or to master all Buddhist doctrines; right intention, or to be committed to morals; right speech, or to correctly tell the stories of the Buddha; right action, or to respect others; right livelihood, or to organize one's daily routines; right effort, or to always try; right meditation and good awareness, which both mean to maintain a good state of mind (Bodhi, 2004).

Another doctrine that explains the source of suffering according to Buddhism is the Twelfefold Chain of Dependent Origination. According to the Twelfefold Chain of Dependent Origination, even though many believe that each thing exists separately from one another, everything is dependent on everything else in existence. The Twelfefold Chain of Dependent Origination explains that one cannot logically pick one occurrence or concept to ruminate over; one must consider everything else. Doing so gives a bigger point of view, which leads to greater understanding of the occurrence or concept (Piyadassi, 1959).

The lessons behind doctrines such as the Four Noble Truths, the Eightfold Path, and the Twelve-fold Path of Dependent Origination reveal the tendency that humans have towards overanalyzing situations to which they have become attached. As previously stated, this form of attachment can be considered attachment to things which change (West, 1987). Mindfulness

teaches that everything, good and bad, must eventually come to an end. It takes away the inner desire that drives humans to want to stop bad things from occurring or to hold onto good things. In allowing for freedom of suffering in this manner, mindfulness improves social relations or, in the cases above, in forming a better relationship with a higher power (Liu et al., 2013; Kabat-Zinn, Lipworth, & Burney, 1984).

During the eighteenth century at the height of the British East India Company, the British began to translate Buddhist and Hindu texts into English. Doing so gave the western world the opportunity to learn about the concepts behind the two religions, including the concepts of mindfulness and meditation. However, it was not until World War Two that western psychologists truly learned about Buddhist psychology from the Zen Buddhist tradition in Japan. When the soldiers came home from war and throughout the 1960-1970s, psychologists began to expand research done on meditation. During this time, the popular band, The Beatles, traveled to India and began to practice meditation. The rise in the practice of meditation can be greatly attributed to the band sharing their views on the matter. Clinicians began to practice meditation as a means of learning about and understanding themselves better and soon began to incorporate meditation into their clinical practices. It was not until the 1990s that mindfulness was incorporated into meditation, thus sparking thousands of in depth studies on its effects on different dimensions of psychology.

Many people seek out therapy because their thought processes are considered to be harmful to their wellbeing. For this reason, psychologists started to believe that mindfulness meditation could change those thought processes (Germer, Siegel, & Fulton, 2013). Kabat-Zinn, Lipworth, and Burney stated that, “our usual state of consciousness is severely

suboptimal...through intense mental training, it is possible to attain states of consciousness and psychological well-being beyond those currently described by traditional western psychologists, as well as profound insight into the nature of mental processes, consciousness, and reality” (Kabat-Zinn, Lipworth, & Burney, 1984, p. 164). In teaching patients to focus on and accept the current moment nonjudgmentally, mindfulness meditation has the ability to alleviate symptoms of many different disorders (Germer, Siegel, & Fulton, 2013).

Mindfulness Based Interventions

Because mindfulness is such a flexible technique, it can be adapted to fit in with many different psychotherapeutic techniques to form more specific ways of treating patients with various disorders or diseases. These interventions are called Mindfulness Based Interventions (MBIs). Black and Slavich (2016) define MBIs as “templates for teaching a modified version of ancient practices” (Black & Slavich, 2016, p. 13). It is important for the participants in any MBI to be completely nonjudgmental of sensations, thoughts, and feelings. The participant must not label emotions or thoughts, as doing so only escalates the distress they give. This nonjudgmental, open-minded, and accepting attitude cultivated in MBIs is what incites change in behavior and thought processes the participants (Bishop, 2002).

Mindfulness Based Stress Reduction

The first MBI to specifically be used in collaboration with therapy is Mindfulness Based Stress Reduction (MBSR) (Black & Slavich, 2016). The technique was created by Jon Kabat-Zinn (2005) as a means of reducing chronic pain in patients. MBSR does not require many resources, so it is especially useful for patients who cannot necessarily afford to pay for other means for alleviating chronic pain. MBSR uses mindfulness to help reduce levels of stress

associated with feeling pain. Because MBSR was extremely helpful in reducing pain in patients, doctors were not as stressed in trying to find new ways to alleviate pain that was not responding to other treatment. For this reason, MBSR became a technique to reduce stress in not only patients who suffered physically, but also patients who suffered mentally (Kabat-Zinn, 2005). It has shown to be successful in reducing diseases and disorders such as fibromyalgia, cancer, anxiety disorders, depression, severe stress, and even asthma (Grossman et al., 2004; Shapiro, 2008).

MBSR helps the patient create different attitudes towards mental and physical suffering. Rather than one looking at his pathology negatively, he is taught to create a more accepting and open point of view about what he is experiencing. This new frame of mind is taught through psychoeducation, learning new coping strategies, and many different exercises that help cultivate mindfulness (Grossman, 2004; Marchand, 2012).

Different from many therapeutic techniques, MBSR is conducted as training sessions rather than therapy sessions. The reason for this is to cultivate a better learning experience for the participants. MBSR typically lasts for a period of eight weeks (Germer, Siegel, Fulton, 2013; Baer, 2006; Grossman, 2004; Kilpatrick et al., 2011). For seven of these weeks, there are two and a half hour sessions in which a group of up to thirty people takes part. On the sixth week, however, the two and one half hour session is replaced with a full day of MBSR training (Grossman, 2004). In order to keep participants practicing mindfulness for the rest of the six days of the week, the group leader will provide homework. In most cases, the group leader will provide an audiotope to guide the participants through meditation on their own every day. The homework assigned has to do with what the group practiced that week (Baer, 2006).

The Raisin Exercise

The first session of MBSR training acts as an orientation day. The group leader explains rationale for MBSR and the different exercises that will be taught throughout the sessions. The group does an assessment and goes over why each of them is partaking in the program. During this first week of MBSR, the participants are also guided through two important exercises. The first exercise taught is the raisin exercise. The group leader gives participants a raisin and asks them to look at the raisin as if they have never seen one before. The group leader guides them to observe every detail of the raisin: its color, how the light hits each wrinkle differently, how it feels in the palm of the hand, and so on. Once they have observed the whole raisin, the group leader tells the participants to eat the raisin. When eating the raisin, the group leader explains that the participants should pay attention to how the raisin tastes and feels in the mouth. This exercise teaches participants to be curious about even the most mundane things. After they finish eating, the group holds a discussion to see how everyone felt, what they thought, and what they experienced during the exercise. This helps form a more accepting and trusting environment for the group.

Body Scan

Following the raisin exercise during the first session, the participants are guided through a type of meditation called a body scan. The participants can either lie down or sit comfortably with their eyes closed. The group leader then guides the participants to pay attention to every part of their bodies in a sequence. The sequence in a body scan begins at one end and ends at the opposite end of the body. Rather than focusing on relaxing each part of the body as the participant puts focus on it, he is told rather to take note of it. The participants are taught, much

like in the raisin exercise, to be fully aware of how the part of the body feels. They take note of any strange sensations going on in each part of the body. The participants are taught how to nonjudgmentally accept these sensations and move on to the next part of the body. This exercise is also practiced in sessions two and eight and is assigned as homework for week four.

Sitting Meditation

In every session between weeks two and seven, the participants are guided through sitting meditation. Sitting meditation is perhaps the most common way mindfulness meditation is practiced. During sitting meditation, the participants are told to sit up straight, yet comfortably; they are told to align their head with their neck and back. Participants have a choice of closing their eyes or choosing a focal point on the ground in front of them. In order to keep their awareness on the current moment, the participants are supposed to pay attention to their breathing and the sensations that breathing gives them. Paying attention to breathing patterns is a way of monitoring time as it steadily passes and to keep the mind from thinking of the past, future, or irrelevant distractions (Baer, 2006; Bishop, 2002).

It is inevitable for the mind to wander. In this situation, like in all other exercises that practice mindfulness, the participant should acknowledge to where their minds have wandered and to gently bring their minds back to the current moment. In the event of one's mind beginning to wander, participants are taught to view thoughts and emotions as events in the mind rather than representations of reality. It is also inevitable for the participant to become uncomfortable sitting still for the period of between ten to forty-five minutes for which sitting meditation is typically conducted. In this situation, the participant is taught to accept the discomfort and not to

move. Practicing nonjudgmental acceptance in these situations makes it easier to detach from sensations, thoughts, and emotions and to cultivate a better sense of “the here and now.”

Walking Meditation

Some people do not do well with having to sit still for extended periods of time. For this reason, there is another type of meditation taught to participants to avoid feelings of anxiety that could arise from sitting still. This meditation is called walking meditation and can be practiced in nearly any environment and while doing many different activities. When practicing walking meditation, the participant walks at a slow-to-moderate pace and keeps his or her eyes straight ahead. The participant focuses his awareness to the shift in weight on his feet and his balance. During MBSR sessions, walking meditation is practiced in an open room. This shows participants that there is no need for a destination when practicing walking meditation. An added benefit to learning how to do walking meditation is that one can practice it when doing virtually anything, which makes it easier to incorporate into daily life.

Hatha Yoga

There is another exercise done in MBSR called Hatha yoga that would be especially helpful for those participants who become anxious while sitting still. It is taught in sessions and then assigned as homework throughout the eight weeks. Hatha yoga teaches the participants to notice the steady change over time in their bodies' capabilities. The participants must not push their bodies too far past boundaries or strive for goals of becoming more flexible and balanced. However, the participants should invest their attention in posture and be mindful of how their body feels during the shifts between positions. Similar to walking and sitting meditation, the participants are still told to use their breathing pattern as a guide to stay in the moment.

Though mindfulness seems rather straightforward and easy to practice, it is very difficult to develop into a habit. This is why, during sessions, group leaders often incorporate poetry reading during group discussions that take place after exercises. Poetry can act as a way to motivate or inspire participants to practice mindfulness more wholeheartedly (Baer, 2006).

All-Day Meditation

As previously mentioned, the sixth week of MBSR training is conducted as an all-day meditation. Throughout the day, the participants and group leader go through all of the techniques that make up MBSR in silence. The participants are not to make eye contact with one another; rather they should remain present in each moment and not focus on the events of the day or what their fellow participants are doing. In doing this, the participants are setting aside any expectations they might have held about the all-day meditation and how it should feel or what should occur during it. The group ends the day with a discussion (Baer, 2006; Grossman, 2004).

Takeaways

Over the period of eight weeks, the group is taught how to incorporate mindfulness into their everyday lives. By increasing self-awareness during activities, the participants learn how to better approach mental, physical, or situational obstacles they may face. Overall, MBSR teaches participants to learn how to take a step back from difficult situations in order to better evaluate them. Once a participant has practiced paying attention to all the sensations of breathing and has learned how to accept his thoughts and emotions behind the current moment, he will better be able to evaluate the situation in greater detail, being more mindful to small details of it. This keeps discomfort from escalating and improves overall quality of life (Bishop, 2002; Grossman, 2004).

Mindfulness Based Cognitive Therapy

After seeing the success of MBSR on patients who were experiencing severe stress and pain, psychologists Zindel Siegal, Mark Williams, and John Teasdale created Mindfulness Based Cognitive Therapy (MBCT) (Siegal, Williams, & Teasdale, 2002). The three created MBCT because they wanted to adapt a specific therapy to prevent relapse in episodes of major depressive disorder (Baer, 2006; Williams, Russell, & Russell, 2008; Coelho, Canter, & Ernst, 2007; Marchand, 2012). More specifically, it targets rumination, which can lead to depression, anxiety, and eating disorders (Germer, Siegel, & Fulton, 2013; Feldman et al., 2010). When the participant learns how to target rumination, he can identify when a depressive episode is beginning (Marchand, 2012). Doing so leads to better cognitive balance and emotional stability (Manuello et al., 2016).

Because MBCT is based on MBSR, it uses the same techniques. The difference between MBCT and MBSR, however, is that MBCT incorporates additional exercises that are tailored more towards automatic thoughts associated with depression (Baer, 2006). Much like MBSR, MBCT is set up over an eight-week period and consists of a two-hour session once per week. Groups only go up to twelve people in MBCT. These participants must have experienced an episode of major depressive disorder, but who are in remission. Typically, MBCT works best for those who have experienced two or more depressive relapses (Baer, 2006; Coelho, Canter, & Ernst, 2007).

Aside from practicing Hatha yoga, body scans, the raisin exercise, and sitting and walking meditation, MBCT contains multiple exercises that help train the participants to assess their thoughts and feelings. These exercises help participants assess their thoughts and feelings

more openly than they normally would during a depressive relapse. These are the exercises that help adapt the participants' mindset in order to prevent relapse in major depressive disorder (Marchand, 2012, Baer, 2006).

Sessions One and Two

Because the first session is assessment and orientation, the participants do not typically begin exercises until the second session. The second session introduces the thoughts and feelings exercise. The group leader guides the participants through the thoughts and feelings exercise. While the participants close their eyes and sit comfortably, the leader describes a scenario to them in which they are walking down the street and they see someone they know on the other side of the street. The participant is told to imagine himself waving at the familiar person, but the familiar person does not see the participant waving and keeps walking. The group leader then guides the participants to explore how they feel and what they are thinking about the situation. The group then comes together to discuss their thoughts and feelings using the ABC model. In the ABC model, the participants learn that (A) a situation leads to (B) a thought or interpretation, which then leads to (C) an emotion or feeling. This model teaches the participants to become more aware of their thoughts.

Session Three

During the third week of MBCT, the participants learn and practice the three-minute breathing space. This exercise is essentially an extremely short meditation. The three-minute breathing space is broken down by its individual minutes. The participants spend the first minute putting their full awareness into their feelings. The second minute expands the center of awareness to the sensations in the body. The exercise concludes by spending the third minute

focusing awareness on the body as a whole. Because the exercise is so short, participants can practice it more flexibly. In other words, they can practice it throughout the day without having to block out long periods of time in their schedules (Baer, 2006).

Session Four

After learning general mindfulness meditation exercises, it is important for the participants to identify their automatic thoughts. For this reason, the group leader hosts a short discussion on this topic during session four. As discussed previously, holding a mindful point of view means that one does not view negative thoughts, situations, or feelings as representative of the self, but rather view them as events in the grand scheme of things (Williams, Russell, & Russell, 2008; Baer, 2006). The participants are given the Automatic Thoughts Questionnaire, which is used in research to measure the thought processes of participants with major depressive disorder. After taking the questionnaire, the group leader guides the group through a discussion. The discussion is centered on the role of automatic thoughts in depression, the different automatic thoughts held by the participants, and why the participants believe their automatic thoughts. This exercise is designed as a form of psychoeducation for depression so that participants can better recognize their trippers for relapse by creating more accepting thoughts as a response to stressful situations, feelings, or thoughts.

Session Five

Arguably the most useful of the exercises taught in MBCT is taught in the fifth session. This exercise done is to bring difficult thoughts to mind. The participants are guided to think of their most uncomfortable thoughts. These thoughts can be anything, from events to insecurities. The purpose of bringing these uncomfortable thoughts to mind is to face and not repress them.

The participants are guided through these uncomfortable thoughts and to take note of which thought or which aspect of a thought makes them especially uncomfortable. The group leader explains to the participants that the more they avoid their thoughts, the more uncomfortable the thoughts become and the more the participants will suffer as a result. By accepting these uncomfortable thoughts, the participants are able to better move forward from major depressive disorder (Marchand, 2012; Baer, 2006).

Session Six

Towards the end of the program during the sixth session, participants are given the change to apply their new mindfulness skills in guided situations for the moods, thoughts, and alternative viewpoints exercise. The group leader asks the participants to imagine two different scenarios. The first scenario is that the participant is upset because of an argument he had with a colleague. After the argument, the participant encounters another colleague who rushes away saying he “cannot talk.” Following this scenario, the group is told to write down their thoughts on the situation and how it made them feel. Then, the group is guided through a second scenario. In the second scenario, the participant imagines that he is happy because he was praised for good work. After being praised, he encounters another colleague who rushes away saying he “cannot talk.” The group is then guided to write down their feelings and thoughts about the second situation. The group leader then brings everyone back together to discuss the difference in reactions to the two scenarios. The group leader explains to the group that emotions affect mood and that it is important to be mindful in all situations because of this strong effect (Baer, 2006).

Session Seven

During the seventh session, the group begins to think about things that they enjoy doing and things they are good at doing. These two categories of activities are what MBCT uses to help in relapse prevention. The group creates a list of things that they have become good at and that bring them pleasure. If the participants can identify when they are beginning to relapse, they can refer to this list of “pleasure and mastery activities” to keep them out of another depressive cycle (Marchand, 2012; Baer, 2006). Doing pleasurable activities or activities the participant is good at will bring on a feeling of accomplishment, which keeps depression at bay.

Session Eight

The final session of MBCT continues on in relapse prevention. The group is told to think back on previous relapses and to pick out the signs that led up to the relapse. After identifying the signs, the group goes over a three-step plan to prevent further relapse. The first step of the plan is to remove oneself from the current situation to do a three-minute breathing space meditation in order to help the participant decenter. The second step is for the participant to go back to the pleasure and mastery activities list created in the seventh session and to do the most effective activity from the list. The final step is to do other activities from the list in order to begin feeling accomplishment and pleasure. If the participant sticks to this plan and keeps in mind the other aspects learned during the MBCT sessions, he should find himself experiencing fewer and fewer relapses (Baer, 2006).

Takeaways

MBCT teaches its participants how to find the connection between their thoughts and feelings. This connection is what can trigger or prevent a depressive relapse (Williams, Russell,

& Russell, 2008). Through these many exercises taught in MBCT, participants are able to establish a daily routine to which they can bring mindfulness. Through this, they are able to reduce rumination and separate themselves from their symptoms by further evaluating them. This, in turn, helps participants learn not to react to triggers of depression, but rather to respond to them mindfully. Another benefit of MBCT, like all types of group therapy, is that it provides a source support and validation for the participants so they are better able to recover from major depressive disorder (Germer, Siegel, & Fulton, 2013).

Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT) is a much more complex and widely used type of MBI. The reason ACT is so complex is that it is specifically tailored to the participant in the therapy group. It is based on the theory that mindfulness is the catalyst for any change in behavior. The change in behavior that is needed for ACT most often is because the participant exhibits what is called experiential avoidance. Experiential avoidance is when the participant is not willing to confront internal or external thoughts, feelings, or urges and thus compensates for this fear of confrontation in an unhealthy manner. ACT combats experiential avoidance by teaching participants how to be cognitively flexible.

Similar to MBSR and MBCT, ACT puts an emphasis on viewing the self as a location for thoughts, feelings, urges, and events instead of viewing it as synonymous with them. By doing this, the participant is putting a halt to the tendency of reacting to thoughts, feelings, urges, and events. One method of viewing the self as separate from thoughts, feelings, urges, and events is to add descriptions to the moment in which they occur, whether the description is for something

internal or external. This means to take note of the situation as a whole in the current moment. This helps the participant incorporate mindfulness into his coping mechanisms (Baer, 2006).

Session One

Because ACT incorporates practices from MBSR and MBCT, many of the sessions are designed in the same way. The first session is very short. It involves an introduction and discussion on the definition of mindfulness. The only exercises done during the first session done is the raisin exercise and a short, two-minute breath focus meditation. This exercise is followed by a discussion on the initial impressions of mindfulness. At the end of the session, participants are assigned three worksheets to complete and are told to try to practice mindful eating during one meal every day.

Session Two

Similar to other MBIs, each session after the first in ACT with a discussion on the homework. Typically, participants give their opinions about what they wrote on each homework module and how they felt while incorporating mindfulness into everyday activities such as eating. The first exercise done in session two is a body scan. The main discussion of the second session is on the sacrifices each participant makes because of anxiety. This is then incorporated into the homework for that week: to acknowledge a sacrifice made for anxiety at the end of each day. Participants are also given a CD that guides them through a body scan, to be done every day.

Session Three

ACT introduces a new mindfulness practice in the third session called "mindful seeing." Mindful seeing involves looking out a window and observing the outdoor environment. However, the participants are guided to take note of the different colors, textures, and movements of the

outdoor world rather than to label what they see. After practicing mindful seeing, participants practice mindful stretching, as to become more familiar with their bodily sensations and movements. Then, they go over the homework and hold a discussion on their values and goals. The group leader assigns worksheets regarding values and goals and gives each participant a CD that guides them through mindful stretching, to be completed once a day.

Session Four

The fourth session brings ACT practices back to those used in MBSR and MBCT. During this session, participants practice mindful breathing. During this meditation, the participants are told to take note of surrounding sounds and their thoughts that take place that distract them from their breath. Based on what participants notice about their thoughts and other distractions in their environment. The homework assigned helps teach participants to notice their thoughts, unwanted or wanted, that distract them from the current moment. These worksheets show participants how to detach from these thoughts in order to stay truly focused on the present moment. Participants are also given a CD that guides them through mindful breath, thoughts, and sounds.

Session Five

Acceptance begins to be practiced during the fifth session. The first exercise done is on acceptance of thoughts and feelings. This exercise takes what was learned from the fourth session and the homework assignments and applies it to a sitting meditation. The discussion during the fifth session helps differentiate control from acceptance. Participants are told to practice acceptance of thoughts and feelings meditation from a guided CD and to keep a daily diary of their acceptance.

Session Six

Participants learn to apply their acceptance to social situations. The group leader guides participants through meditation and lays out a situation for them to visualize. This situation brings up an uncomfortable social encounter that participants might have denied in the past. This allows for participants to accept what makes them uncomfortable, which would reduce social anxiety. The discussion for session six continues on from the discussion from session five. The homework assigned at the end of the session is to practice acceptance of social anxiety from a CD and to practice mindfulness exercises that help guide the participant through taking note of one's internal state.

Session Seven

In another visualization technique, the group leader guides participants through the mountain exercise. This visualization guides participants to picture a beautiful mountain and to notice all the aspects about it. Participants are then guided to visualize themselves as the mountain and to take note of how it feels to be such a lofty structure. The homework assigned after the seventh session is a daily, guided mountain meditation exercise.

Session Eight

During the eighth session, participants go through exercises that have been done in previous sessions. It begins with the acceptance of social anxiety exercise and goes on to discuss more on control versus acceptance. This is applied to conversations with other people. Participants have more of a choice as to which homework assignments they can do for the rest of the week from the eighth session until the end of the program. They are simply told to practice a different exercise every day.

Session Nine

After the first eight weeks, participants are able to go through mindfulness exercises without guidance. The ninth session begins with meditation with a focus on the breath. This meditation is not guided. The discussion from the previous week continues.

Sessions Ten

The group leader guides participants through a new exercise called the lake exercise. The lake exercise involves picturing a lake and its surroundings. The participants eventually are supposed to note if their thoughts cause the surface of the lake to become unsettled. This allows participants to take note of thoughts that could be bothersome to them.

Session Eleven

The eleventh session is replicated from the eighth session, with an unguided sitting meditation with a focus on the breath.

Session Twelve

During the final session of ACT, the group leader is given a choice of what kind of mindfulness exercise through which he or she wants to guide the participants. At the end of the session, participants have a discussion on what changes they have noticed in their lives since practicing mindfulness. They are also recommended to continue mindfulness practice once a day (Fleming & Kocovski, 2009).

Takeaways

ACT is different from other MBIs in that it incorporates more values and goals into the therapy. The participants of ACT are guided to define behaviors they want to be their goal for the end of therapy. In order to reach these goals, the participants learn to practice acceptance and cognitive diffusion. The acceptance done in acceptance and cognitive diffusion means to accept

the thoughts, feelings, and urges; to be open to these thoughts, feelings, and urges; and not to try to control them. Without acceptance, these thoughts, feelings, and urges will only worsen and increase the participants' discomfort. Cognitive diffusion means to allow for your thoughts, feelings, and urges to occur without acting upon them or putting significance into them. By allowing this to happen, the participants are reducing the emotional or physical impact they have on them. Doing so allows for the participants to understand that it is not their thoughts that cause an individual harm; it is individual's reaction to his thoughts, feelings, and urges that determines the well-being of the individual (Baer, 2006).

Past Research

Health and Pain

Mindfulness originally began as a means of treatment for chronic pain when no other treatment was effective. Because chronic pain and illness come with significant mental comorbidities such as anxiety or depression, researchers tested whether providing patients with new cognitive skills could help in their recovery process or with accepting the pain or illness (Black & Slavich, 2016; Kabat-Zinn, Lipworth, & Burney, 1984).

By definition, mindfulness helps patients detach from their feelings of pain or illness. This detachment has proven to be significantly helpful for patients in these situations. According to Kabat-Zinn, Lipworth, and Burney (1984), patients who participate in an MBSR program experience reductions in pain related behaviors. By changing one's perception of pain, one can build up the capability to live a more meaningful life with the pain (Kabat-Zinn, Lipworth, & Burney, 1984).

Another reason that mindfulness could help in pain related behaviors is that the practice of mindfulness has shown to change different immune system biomarkers related to healing processes. One's environmental stressors have a large effect on mental and physical health. Black and Slavich (2016) argue that the reason for the positive change in immune system biomarkers is that those who practice MBSR are able to change their reaction to their environmental stressors, thus taking away the effect that the stressors have on their mental and physical states.

Stress, Anxiety, and Depression

Research done on the effects of mindfulness practice on chronic pain and health has since expanded to include the doctors treating patients with such disabilities or diseases. Not only does mindfulness practice help those in pain, but it helps the doctors who treat these patients in reducing level of stress that comes with treating people whose illnesses and pain do not react to other medical treatment (Kabat-Zinn, Lipworth, & Burney, 1984).

Mindfulness techniques provide different goals than other cognitive skills taught in psychotherapy (Feldman et al., 2010). Most forms of mental or physical treatment typically aim to rid a person of a disorder or a disease by changing what the person is doing. Mindfulness, on the other hand, aims to adapt one's approach to such mental or physical disorder or disease. This adaptation requires acceptance rather than denial that can be so detrimental to one's health and process of healing (West, 1987).

This has shown to be an effect in multiple studies. Chiesa and Serretti (2009) found in their meta-analysis that a significant amount of studies using MBSR as a treatment program resulted in a reduction in not only stress level, but also in depressive rumination, paranoid ideation, interpersonal sensitivity, and other similar emotional states. These decreases in

emotional states was correlated with an increase in self-compassion across many studies, as well (Chiesa & Serretti, 2009). Because participants adapted their approach to perceiving their current state, they were better able to accept the "problem" and move on, which in itself makes the effects of the problem diminish (Feldman et al., 2010).

Similar results have also been found when using different MBIs, such as MBCT and transcendental meditation. Because MBCT was developed as a means of preventing depressive relapse, it is no surprise that reductions in depression have been found after participation in a program. In studies with both transcendental meditation and MBCT, participants resulted showed reductions in levels of depression, anxiety, and even perfectionism in one study (Liu et al., 2013; Burns, Lee, & Brown, 2011). The consistent results of each of these studies show the strong effect that an accepting and nonjudgmental attitude of the current situation can have on one's physical and mental well-being.

Aggression

Another area in which mindfulness has shown to have extremely beneficial effects is in level of aggression. Mindfulness has shown in the past to decrease level of physical and verbal aggression in patients with severe personality and mood disorders. Mindfulness teaches the importance of acknowledging the current situation, but accepting it the way it is and not judging it. When a person becomes angry and is tempted to physically or verbally aggress, practicing mindfulness can help him or her step back and think about the situation (Singh et al., 2007).

As a person experiences reduction in overall depression, anxiety, or aggression, he or she can only be expected to show increases in positive mood. Learning to accept and not to become distracted by stressors that can bring on unpleasant emotions could lead to a more positive

quality of life, as shown by West (1987) and Zeidan et al. (2010). This could be the work of mindfulness and learning more about one's locus of control. When a problem arises, the cause can be internal or external. Through mindfulness, one can learn to control his or her internal locus of control. This, in turn, could help deescalate an external situation that could otherwise lead to states of anxiety, aggression, or depression (West, 1987).

Resilience and Awareness

These results can be further applied to assist in increasing resilience. In situations of high stress, a person could struggle to be resilient because of the amount of distraction stress takes away from achieving one's goals. With the practice of mindfulness comes an increase in attention, as shown by a vast majority of researchers (West, 1987; Johnson et al., 2014; Jha et al., 2016; Zeidan et al., 2010).

When applied to soldiers preparing for deployment, mindfulness has shown to help increase one's awareness of one's internal state and external surroundings. Such awareness can help soldiers be more resilient when under high levels of stress (Johnson et al., 2014). Similarly, Jha et al., (2016) found that practicing mindfulness reduced the level of attention lapses in soldiers preparing for deployment. Having a few lapses in attention is crucial for soldiers when they are in highly stressful situations, as a lapse in attention can have a direct effect on life or death on the battlefield (Jha et al., 2016).

Anxiety and depression create fear or reduce motivation to want to push through difficult times. These factors directly reduce resilience. Even in situations such as growing old, people often become anxious and depressed because of the changes occurring in one's life. As shown by past research, the practice of mindfulness reduces levels of anxiety and depression. According to

Perez-Blasco et al. (2016), practicing mindfulness showed both reductions in anxiety and depression and improvement in resilience. Similarly to many other researchers, the reason for this change in mental state is that participants learned to adapt their perception of the situation (Perez-Blasco et al., 2016).

Self-Concept and Self-Esteem

Naturally as one begins to nonjudgmentally accept the present moment and his or her rates of depression and anxiety decrease, as per the results of previous studies, his or her self-concept and self-esteem should increase. Especially in situations in which one shows resilience as a result of practiced mindfulness will this person's self-esteem or self-concept increase (Crescentini & Capurso, 2015).

West (1987) argues that the increases in self-concept and self-esteem that are associated with the practice of mindfulness are essential to the continuation of the practice. This could be due to self-concept and mindfulness having a symbiotic relationship or a reward system. Research has shown that practicing mindfulness increases self-concept. As this increases and a person begins to feel better about himself or herself, he or she will be more inclined to want to practice mindfulness (West, 1987).

Athletic Performance

Each of these variables that have been researched in the past play a significant role in athletic performance. Mentality is arguably the most important factor in one's ability to play his or her sport well. Because of the impact that mindfulness has had on aspects such as depression, resilience, and anxiety, researchers believe that the implementation of mindfulness programs on professional or collegiate athletes could have a profound effect on how they perform during

competition (Baltzel et al., 2014; Clemente, 2009). Research in the past has also proposed that athletes have different understandings of what it means to fail or to succeed, which can impede on ability to focus. Therefore, learning new psychological skills such as mindfulness can help in motivation to persevere (Birrer & Morgan, 2010; Denny & Steiner, 2008).

Research has shown that anxiety has a larger impact on athletic performance than physiology has. This finding, in addition to the balance that needs to be kept by athletes, can act as significant hindrances on the way an athlete competes. Athletes who have practiced mindfulness in programs have reported an increase in being "in the zone" along with reductions in pessimism and anxiety (Scott-Hamilton, Schutte, & Brown, 2016).

Additionally, athletes across all backgrounds, such as collegiate or professional levels, have reported different team dynamic after practicing mindfulness. Baltzel et al., (2014) found that female, division one, collegiate soccer players reported to have a better reaction to pressure felt during competition, which helped them want to motivate their teammates more. These athletes also reported having a different perception of the negative thoughts and distractions during competition (Baltzel et al., 2014).

Present Hypothetical Study

Despite the vast amount of research that has been done on mindfulness meditation and its effects across a multitude of dimensions, there are still many gaps in current research. Though the studies discussed previously give consistent evidence of the many benefits of practicing mindfulness, there remains to be more research done to replicate the results in certain areas. For example, though mindfulness can help many kinds of people, the majority of the research done on it has been done with participants with mental disorders such as mood, personality, chronic

pain, and anxiety disorders. There has been little done on its effects on healthy participants (Chiesa & Serretti, 2009; Denny & Steiner, 2008). This is a substantial gap in research.

Resilience is an important part of human success because a person's level of resilience can affect one's self-perspective (Johnson et al., 2014). Another area that needs to be researched more is the effect of mindfulness on self-perspective, self-concept, and personality traits. Though there have been studies that measure self-concept and self-perspective, these studies typically do not have self-perspective and self-concept as their main focus. This lack of a central focus on self-perspective and self-concept leaves researchers with facts that do not have explanations (Crescentini & Capurso, 2009).

The largest gap in research on mindfulness is on the effects of mindfulness on athletic performance. Athletic performance can be affected on many dimensions, both physical and mental. One's ability to focus, stress level, resilience, pain level from injuries, and self-concept all have to do with how one performs athletically. All of these dimensions have been studied in the past, though some not as in depth as others. However, the effects of mindfulness on these dimensions have not been applied to athletic performance (Denny & Steiner, 2008).

Athletes cannot simply rely on their physical ability to play well; they must also rely on their mental strength. Mental and physical strength are interdependent on each other. In the present study, it is hypothesized that Student-athletes who practice mindfulness through a Mindful Sports Performance Enhancement program will improve in self-concept, ability to focus, and resilience during athletic competition.

Methods and Materials

Participants

Participants were gathered from a small liberal arts college in Hartford, Connecticut. Athletics at this college were part of the third division of the National Collegiate Athletic Association (NCAA), and were members in the New England Small College Athlete Conference (NESCAC). Participants with prior knowledge of mindfulness were excluded from participation.

Recruitment was done through two methods. Emails were sent out to coaches inquiring about inclusion of team members in the study and explaining the expected benefits of allowing team members to participate in the study. Participants were also recruited through contact with members of the Student-Athlete Advisory Committee. Compensation for participation was a \$5.00 gift card per session attended.

The range of ages of athletes was 18-24 years old ($\bar{x}=21$). The wide age range was due to students who participated on junior teams or took post graduate years between high school and college. The demographic of the participants varied because of the makeup of race and ethnicity of teams. However, the demographic reflected the demographic makeup of the school, with roughly 18% of participants of color and 48% female ("Trinity at a glance," 2016).

Measures

Toronto Mindfulness Questionnaire

Mindfulness was measured using the Toronto Mindfulness Questionnaire (TMQ). The operational definition used by the TMS states that mindfulness is insight to one's habitual behaviors that add to stress and, in turn, reduce the distress caused by such habits. The TMS consists of 42 items, which inquire about the perceived experience while practicing mindfulness.

(e.g. "I was more invested in just watching my experiences as they arose, than in figuring out what they could mean"). The items were rated by the participants on a Likert scale, from 0 (strongly disagree) to 4 (strongly agree). Scores were added, with higher scores signifying more experienced mindfulness during the exercise (Lao et al., 2006).

Mindfulness Attention Awareness Scale

The trait version of the Mindfulness Attention Awareness Scale (MAAS) was used to measure the change in attention promoted by practicing mindfulness meditation. This scale is made up of 14 items, which go over a wide array of areas that can be influenced by attention. Overall, the 14 items inquire about one's ability to focus in one's attention on one thing at a time: the present moment (e.g. "It seems I am 'running on automatic,' without much awareness of what I'm doing"). The participant would rate the items on a Likert scale, ranging from 1 (almost always) to 6 (almost never). Higher scores signified more mindful awareness (Brown, n.d.).

Cohen Perceived Stress Scale

Level of chronic stress was measured using the Cohen Perceived Stress Scale (CPSS). CPSS is made up of ten questions regarding level of stress and locus of control felt by the participant in the past month. Participants rated each item on a scale from 0 (never) to 4 (very often). This questionnaire was administered to assess the degree to which the mindfulness practice was successful in reducing stress (e.g. "In the last month, how often have you been upset because of something that happened unexpectedly?") Scores were rated with higher scores signifying higher levels of stress in the past month (Cohen, 1994).

Positive and Negative Affect Schedule

The Positive and Negative Affect Schedule (PANAS) was used to measure changes in the affect of the participants. The PANAS consists of 10 positive mood states, such as interested, excited, and proud, and 10 negative mood states, such as curious, ashamed, alert, and hostile. Based on how the participant feels at the time, he or she rates each mood state between 1 (very slightly or not at all) and 5 (extremely). The scores of the negative and positive mood states are separately added, giving the rater two scores between 10-50. Higher scores indicated stronger presence of the mood state (Watson, Clark, & Tellegan, 1988).

Satisfaction Scale for Athletes

The Satisfaction Scale for Athletes was used as a measure of self-concept, or satisfaction, with the participant's performance during practice or competition. The SSA contains 16 items on different aspects of the sport that could cause dissatisfaction, such as coaching or tactics of play (e.g. "The manner in which my talents are [were] employed"). Items were rated on a scale of 1 (not at all satisfied) to 3 (very satisfied). Higher scores indicated higher level of satisfaction (Caliskan & Baydar, 2016).

Resilience Scale for Athletes

Different aspects of resilience were measured using the Resilience Scale for Athletes (RSA). RSA consists of 27 items, which were rated on a scale from 0 (not at all) to 4 (extremely) (e.g. "In different times in play, I do have the courage to excel"). Scores were rated with higher scores signifying higher resilience (Subhan & Ijaz, 2012).

Procedure

Following recruitment, participants were randomly assigned to either a waitlist control group or a Mindful Sports Performance Enhancement (MSPE) group. Before the first session, all participants were sent a complete set of online measures to complete. Participants in the MSPE group took a survey regarding scheduling for the weekly session. Sessions began the first full week following the last submission of the scheduling survey.

The MSPE format was based on Pineau, Glass, and Kaufman's (2014) protocol for the program. Each of the sessions contained different types of mindfulness exercises and lasted a total of ninety minutes. Each exercise was followed by a group discussion on what the participants thought or felt during the exercise. Sessions two through six began with a discussion on the homework assigned from the last session. At the end of each session, the group went over the session and was assigned homework.

All participants took baseline measures at the beginning of the first session. After baseline, participants were told to complete each measure at different timepoints. The CPSS and RSA measures were taken at baseline and post-intervention. Participants in the MSPE group took the PANAS, MAAS, and TMS after each session. Participants took these measures online on their own time. All participants completed the SSA after each match or game.

Session One

The MSPE program began with an introduction, orientation, preliminary exercises, and an end of session discussion. The orientation explained the purpose of MSPE and gave an overview of the program. Once the participants had a better understanding of the program, the group leader guided the participants through the Candy Exercise. The Candy Exercise is another

version of the previously explained Raisin Exercise, except this exercise uses pieces of chocolate rather than raisins. This exercise lasted about twenty minutes. The group was then guided through a breath-focused, sitting meditation for ten minutes. At the end of the session, the group was assigned their first homework of doing six ten-minute sessions of sitting meditation before the next session.

Session Two

Based on the homework assignment, participants discussed how mindfulness practice could help improve their athletic performance during competition. Then, the participants were guided through a thirty-minute long body scan and a ten minute sitting meditation while focusing on the breath. The homework assigned was to do a thirty minute body scan and five ten-minute sessions of sitting meditation.

Session Three

During the third session, the participants were led through exercises that are more body-focused. After the homework discussion, participants completed forty minutes of mindful yoga with their group leader. The group also practiced sitting meditation for fifteen minutes. This sitting meditation expanded the focus to be not only on the breath, but on the body as well. Homework assigned was a forty minute mindful yoga session, a thirty minute body scan, and four fifteen minute sitting meditations, all to be practiced on separate days before session four.

Session Four

Because knowing one's bodily state during athletics is vital to how one plays, the fourth session expanded upon the third with a focus on the body. This session began with forty minutes of mindful yoga. This was followed by ten minutes of walking meditation and a three minute

version of sitting meditation. A focus was put on the diaphragm as the participants breathed.

Participants were assigned homework of one thirty-minute body scan, two forty-minute sessions of mindful yoga, and three ten-minute sessions of walking meditation.

Session Five

Towards the end of the program, participants incorporated their new mindfulness skills with their specific sport. The first exercise added to the typical sitting meditation by focusing on sounds as well as the body and breath. This lasted twenty-three minutes. The group practiced ten minutes of walking meditation, followed by a thirteen-minute sport meditation. Participants were told to apply mindfulness skills learned over the previous four weeks to their specific sports. For example, if a participant were a squash player, she would put her awareness into how it feels to hold the racquet, the different sensations that come when she hits the ball, how her legs carry her from the center of the court and how her breathing synchronizes with her movement. At the end of the session, participants spent three minutes focusing on their diaphragm while doing sitting meditation. For homework, the participants were assigned to do three twenty-three-minute sessions of sitting meditation, one session of ten-minute walking meditation, and two sessions of thirteen-minute sports meditation.

Session Six

Participants began the session with thirteen minutes of sport meditation, followed by a thirty-minute body scan, and three minutes of diaphragmatic breathing during sitting meditation. The discussion at the end of the sixth session was centered on the best ways to continue to practice mindfulness after the program. Before dismissing the final session, the group leader

explained the importance of continuing to practice mindfulness every day (Pineau, Glass & Kaufman, 2014).

Expected Results/Discussion

In this study, it is hypothesized that Student-athletes who practice mindfulness through a Mindful Sports Performance Enhancement program will improve in self-concept, ability to focus, and resilience during athletic competition. This study is one of the first that applies an MSPE program to collegiate level athletes as a means of bettering the competitive environment in which they play. This study could help athletes in two respects. The first way it could offer help to athletes is through the creation of a healthier mental and physical environment for the athlete to play his or her sport and to be better able to commit to it. In the second respect, having a better environment in which the athletes play could help by promoting increased intensity and competition in collegiate sports. If athletes are better able to control their ability to focus, more resilient, and have better self-concept on the field or court, they could better dedicate themselves to performing to the best of their capabilities during competition. The strengthened athletic environment could be reflected through the measures administered in this study.

We expect several changes in dimensions, as shown by analysis of the measures taken by participants. Participants in the MSPE group should experience significant changes in scores across all measures, especially when compared to the waitlist group. We expect the TMS scores for participants in the MSPE group to gradually increase over the course of the program, which would show the participants' improved ability to practice mindfulness. The MAAS should improve in scores, which would suggest that participants in the MSPE group became more aware

of the surroundings as a result of learning to practice mindfulness. In regards to the CPSS, we do not expect significant changes in scores of the level of stress felt, but we do expect that participants would show a different reaction to stressful situations, which would be shown in a reduction in anxiety level. This could be shown by increased scores on the PANAS. With the increases of each measure, we also expect increases in both the SSA and the RSA. Increases in these measures could suggest the overall outcome that mindfulness practice has and would be consistent with past research (Chiesa & Serretti, 2009; Crescentini & Capurso, 2009; Denny & Steiner, 2008).

The expected results of this study could be explained from many different standpoints. Firstly, improvement could be explained by changes in specific areas of the brain that are associated with emotion, attention, awareness, and motivation. It is possible that mindfulness can be ingrained into the brain due to plasticity. As a person rehearses something, the connections in the brain regarding what is being rehearsed will become stronger, thus making the rehearsal more habitual (Marks, 2008; James, 1950). The areas of the brain that would become stronger due to plasticity are the frontal cortex, insula, cingulate cortex, and amygdala.

Attention is mainly associated with different parts of the prefrontal cortex. According to previous studies done on mindfulness, both attention and awareness can improve with practice. Increased blood flow to the prefrontal cortex occurs with consistent mindfulness practice, meaning that the area of the brain is better activated to function (Barnby et al., 2015). When the prefrontal cortex functions better, it can to improved focus, which naturally involves reduction in mind wandering (Dickenson et al., 2013). Further, the dorsomedial prefrontal cortex can improve in ability to be aware of what is in one's environment in reference to oneself (Kilpatrick et al.,

2011). This increased connectivity and blood flow in different areas of the prefrontal cortex are what could be contributing to increased attention from practicing mindfulness.

Slightly different from attention, awareness is associated with both the cingulate cortex and the insula. After practicing mindfulness for an extended period of time, a person will exhibit increased thickness in the insula (Kilpatrick et al., 2011). When an area of the brain increases in thickness, it shows that there have been more neural connections being made within the area, thus strengthening its function or functions. Thus, increased thickness of the insula is signified by better emotional awareness. Similarly, the cingulate cortex has shown altered activation with continued mindfulness practice. The anterior cingulate cortex, responsible for error prediction and evaluation of future scenarios, has shown increased activation. Meanwhile, the posterior cingulate cortex has shown decreased activation, resulting in fewer distracting thoughts (Manuello et al., 2016).

The amygdala, mainly associated with anxiety and fear, has shown to change its connections to other parts of the brain after following a mindfulness program. These connections to areas such as the prefrontal cortex, nucleus accumbens, and hippocampus help modulate how the amygdala functions (Rogers, 2013; Barnby et al., 2015). During competition, the amygdala has shown increased activation. The reason for this is that an athlete needs to feel a small amount of anxiety for motivation (Thom et al., 2014). Often times, an athlete can feel too much anxiety, especially when the athlete's thoughts are distracted during competition. Practicing mindfulness increases the connection between the amygdala and the prefrontal cortex. Increased focus due to strengthening of the prefrontal cortex mediates the amount of anxiety one feels through this

connection, thus helping the athlete focus better on the current moment in competition (Rogers, 2013; Barnby et al., 2015).

These physical changes in the brain occur alongside functional changes in cognition. This can be seen across all variables measured in this hypothetical study. In fact, it is possible that all variables can actually be tied together to affect one another due to the overlap in neural pathways (Zeidan et al., 2010). Overall, researchers have argued that the reason for the effectiveness of mindfulness is that rather than learning how to fight against and change one's cognitive tendencies, one learns to accept and trust what one is feeling and thinking. Fighting against one's thoughts and feelings could incite self-doubt, which in turn could lead to significantly more unhappiness and confusion (Perez-Busco et al., 2016).

Mindfulness' effect on both anxiety and pessimism has shown to result in increased happiness while competing. The reason for this could be that when anxiety and pessimism build up in an athlete, these feelings have a larger impact on the athlete's performance than on his or her psychology. Anxiety and pessimism lead can increase how often the athlete becomes distracted, thus decreasing his or her performance. If an athlete practices mindfulness, especially in relation to one's sport, he or she would likely improve in awareness and attention, which could then lead to better ability to remain focused while "in the zone" (Scott-Hamilton, Schutte, & Brown, 2016).

An increasing amount of research has shown that perhaps the most significant impact of practicing mindfulness is the improvement in attention (Kabat-Zinn, Lipworth, Burney, 1985). The improvement in attention has shown to be the result of the ability to mediate one's thoughts and attentions as distractors when doing specific tasks (Dickenson et al., 2013). Researchers have

referred to mindfulness practice as "effective brain resource allocation" (Moore et al., 2012, p. 10; Slagter et al., 2007). By acknowledging extraneous feelings or thoughts, a person can revert his or her energy into what he is currently doing, such as playing a sport. When doing so, a person is using his or her attention as a means of detaching from what is interfering with improvement, whether that improvement is in athletics or in mental illness (Kabat-Zinn, Lipworth, Burney, 1985; Scott-Hamilton, Schutte, & Browne, 2016). In other words, this cognitive and emotional regulation during athletic competition could result in higher motivation to perform well, thus leading to more resilience (Perez-Busco et al., 2016).

An additional source of improvement when participating in mindfulness training groups such as MSPE could be the sense of support that comes with the program. Everyone participating in MSPE or any other MBI is in a variation of the same position. The participants who join MBSR groups typically suffer from chronic pain or illness. Those who participate in MBCT all are on the path to preventing depressive relapse. In MSPE, participants are struggling with their mentality during athletic practice and competition. Though MBIs are not technically forms of therapy, they do have therapeutic benefits because of the sense of group support and that the participants are not alone in recovery or improvement (Barnby et al., 2015).

However, there are some problems that could lead to my hypothesis not being supported. These reasons are due to the limitations that come with the participation in MBIs. According to the clear majority of studies conducted on the effects of mindfulness on various dimensions of life, the main limitation that has led to conflict in results is the extent to which participants follow the strict schedule of practicing mindfulness on their own (Chiesa & Serretti, 2009; Williams, Russell, & Russell, 2008; Kabat-Zinn, Lipworth, Burney, 1985; Denny & Steiner,

2009). If a habit is not rehearsed enough the pathway in the brain cannot be strengthened, thus making the habit irrelevant (James, 1950).

Additionally, practicing mindfulness in a group can lead the participants to influence one another, thus interfering with the reliability and validity of the results. For this reason, it is crucial that each participant be treated as an individual (Williams, Russell, & Russell, 2008). The current study could theoretically avoid this problem because of the makeup of the participants. Unlike in MBSR or MBCT, participants who would take part in the study would be of relatively different athletic background.

Another limitation of this study would be the reliability in athletes. Being a part of a varsity level team while still keeping grades above the minimum requirement to be able to compete requires a significant amount of time and impeccable organizational skills. Athletes often find it difficult to balance class, homework, practice, lifting, games or matches, social life, and sleep. Though the MSPE program used in this hypothetical study would only require an estimate of three to four hours per week, many athletes would find it difficult or overwhelming to participate in the study and fully commit to it. For athletes who do choose to participate, the results could be invalid because of time constraints. Though mindfulness should technically aid the athlete in feeling less anxiety and judgment and more acceptance, it is understandable that an athlete would be wary of participating.

The student body at the intended school where this study would be conducted consists of roughly 2,200 students. Of this total, 40% of students participate on varsity level teams (Trinity College, 2016). Because the study would need to be conducted while the participants are in season, roughly two-thirds of the student-athletes would be excluded from being able to

participate. This would leave an estimate of 290 athletes who could participate in the study in the available time frame. If athletes are wary of participating, this would leave fewer than 300 student-athletes who would be eligible to participate. The sample size would be incredibly small, thus the validity would be questioned.

To address such issues, the procedure of the study might have to be altered to fit the schedule of the athletes. A possible solution to some of these limitations is to develop a half-semester long course during which the sessions would be held. Athletes would be the only ones eligible to take the class. This could help because not only could this fit right into a student-athlete's schedule, but it could also be beneficial in receiving a half credit for participating in the study. This would then make it more feasible for athletes to attend each session and would save compensatory money for the participants. Perhaps if the program were viewed as a class, participants would not view it as a burden on time.

Future research in mindfulness and its effects of athletic performance could be conducted in many ways. Firstly, were someone to take this study and to conduct it, the principle investigator might want to plan the study over a period of multiple years, as to gain as many participants as possible to increase external validity. If the study were done over a longer period of time, then the principle investigator could include all three athletic seasons. This could provide the researchers with a wider variety of sports such as squash, hockey, lacrosse, tennis, soccer, and wrestling. Each of these sports is vastly different from the other, so it would be interesting to learn the results of mindfulness and its effects on each type of athlete. Another limitation can be partially solved if the study is proposed to larger state-schools, which could also give a larger range of sports and a different division level with which to test our hypothesis.

Furthermore, future research could be conducted in trying to find more practical ways to incorporate mindfulness practice into playing the sport during team practices. MSPE allows for athletes to incorporate mindfulness into certain aspects of their sport, but there could be a way for athletes to incorporate mindfulness practice even more. A possible way to do this would be to have a preliminary period before beginning MSPE training during which athletes could pay attention to the moments in which they are most frustrated or distracted during practice and competition. If the athletes write these moments down in a journal, they could evaluate the most significant problem area during which they would later incorporate sport meditation into this area during practice. All of this together has the potential to make a more beneficial and practical way to learn the effects of mindfulness on athletic performance.

If conducted, this study could change the mechanics behind collegiate sports. This would occur because the athletes' new learned ability to keep distractions at bay. An athlete's psychology has drastic effects on his or her performance. By learning new skills to observe one's thoughts and feelings and to look at the current situation (Birrer & Morgan, 2010), an athlete could become more mentally involved in the competition, and thus could give a better performance.

Dedication and Acknowledgments

I would like to dedicate this thesis to the women's squash team at Trinity College. More specifically, to RS, JLC, AE, and my assistant coach, advisor, and friend, Professor Randy Lee. Were it not for these girls and Randy, I would not have had the inspiration to write my thesis on athletic performance. I owe them a great deal of gratitude in pushing me through the anxiety that unfortunately came to me during the writing process.

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References

- Baer, R. (2006). *Mindfulness-based treatment approaches* (2nd ed.).
- Baltzell, A., Caraballo, N., Chipman, K., & Hayden, L. (2014). A qualitative study of the mindfulness meditation training for sport: division 1 female soccer players' experience. *Journal of Clinical Sport Psychology, 8*(3), 221-244. doi:10.1123/jcsp.2014-0030
- Barnby, J. M., Bailey, N. W., Chambers, R., & Fitzgerald, P. B. (2015). How similar are the changes in neural activity resulting from mindfulness practice in contrast to spiritual practice? *Consciousness and Cognition, 36*, 219-232. doi:10.1016/j.concog.2015.07.002
- 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. doi:10.1111/j.1600-0838.2010.01188.x
- Bishop, S. R. (2002). What do we really know about mindfulness-based stress reduction? *Psychosomatic Medicine, 64*(1), 71-83. doi:10.1097/00006842-200201000-00010
- Black, D. S., & Slavich, G. M. (2016). Mindfulness meditation and the immune system: a systematic review of randomized controlled trials. *Annals of the New York Academy of Sciences, 1373*(1), 13-24. doi:10.1111/nyas.12998
- Bodhi. (2011). *The noble eightfold path: Way to the end of suffering*. Chicago, IL: Pariyatti Publishing.
- Brown, K. W. (n.d.). *Mindful attention awareness scale (MAAS), trait version*.
- Burns, J. L., Lee, R. M., & Brown, L. J. (2011). The effect of meditation on self-reported measures of stress, anxiety, depression, and perfectionism in a college population. *Journal of College Student Psychotherapy, 25*(2), 132-144. doi:10.1080/87568225.2011.556947

- Caliskan, G., & Baydar, H. O. (2016). Satisfaction scale for athlete (SSA): A study of validity and reliability. *European Scientific Journal*, *12*(14), 13-26.
doi:10.19044/esj.2016.v12n14p13
- Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, *15*(5), 593-600. doi:10.1089/acm.2008.0495
- Coelho, H. F., Canter, P. H., & Ernst, E. (2013). Mindfulness-based cognitive therapy: Evaluating current evidence and informing future research. *Psychology of Consciousness: Theory, Research, and Practice*, *1*(S), 97-107. doi:10.1037/2326-5523.1.s.97
- Cohen, S. (1994). *Perceived stress scale*. Retrieved from Mind Garden website:
<http://www.mindgarden.com/documents/PerceivedStressScale.pdf>
- Cohen, S. (n.d.). *Cohen perceived stress scale [measurement instrument]*. Retrieved from
<http://podcast.uctv.tv/webdocuments/COHEN-PERCEIVED-STRESS-Scale.pdf>
- Crescentini, C., & Capurso, V. (2015). Mindfulness meditation and explicit and implicit indicators of personality and self-concept changes. *Frontiers in Psychology*, *6*.
doi:10.3389/fpsyg.2015.00044
- Davis, D. M., & Hayes, J. A. (2011). What are the benefits of mindfulness? A practice review of psychotherapy-related research. *Psychotherapy*, *48*(2), 198-208. doi:10.1037/a0022062
- Demarzo, M. M., Montero-Marin, J., Stein, P. K., Cebolla, A., Provinciale, J. G., & GarcÃ-a-Campayo, J. (2014). Mindfulness may both moderate and mediate the effect of physical fitness on cardiovascular responses to stress: a speculative hypothesis. *Frontiers in Physiology*, *5*, 1-8. doi:10.3389/fphys.2014.00105

- Denny, K. G., & Steiner, H. (2008). External and internal factors influencing happiness in elite collegiate athletes. *Child Psychiatry and Human Development*, 40(1), 55-72.
doi:10.1007/s10578-008-0111-z
- Dickenson, J., Berkman, E. T., Arch, J., & Lieberman, M. D. (2012). Neural correlates of focused attention during a brief mindfulness induction. *Social Cognitive and Affective Neuroscience*, 8(1), 40-47. doi:10.1093/scan/nss030
- Feldman, G., Greeson, J., & Senville, J. (2010). Differential effects of mindful breathing, progressive muscle relaxation, and loving-kindness meditation on decentering and negative reactions to repetitive thoughts. *Behaviour Research and Therapy*, 48(10), 1002-1011. doi:10.1016/j.brat.2010.06.006
- Fleming, J. E., & Kocovski, N. L. (2009). *Mindfulness and acceptance-based group therapy for social anxiety disorder: A treatment manual*. Retrieved from https://contextualscience.org/files/Mindfulness%20and%20Acceptance-based%20Group%20Treatment%20for%20Social%20Anxiety%20Disorder-%20A%20Treatment%20Manual_0.pdf
- Franco, C. (2009). Modificación de los niveles de burnout y de personalidad resistente en un grupo de deportistas a través de un programa de conciencia plena (mindfulness). *Anuario de Psicología*, 40(3), 377-390.
- Germer, C. K., Siegel, R. D., & Fulton, P. R. (2013). *Mindfulness and psychotherapy* (2nd ed.). New York, NY: The Guildford Press.
- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research*, 35-43. doi:10.1016/S0022-3999(03)00573-7

- James, W. (1950). Habits. In *The principles of psychology* (pp. 109-131). New York, NY: Dover Publications.
- Jha, A. P., Morrison, A. B., Parker, S. C., & Stanley, E. A. (2016). Practice is protective: Mindfulness training promotes cognitive resilience in high-stress cohorts. *Mindfulness*, 8(1), 46-58. doi:10.1007/s12671-015-0465-9
- Johnson, D. C., Thom, N. J., Stanley, E. A., Haase, L., Simmons, A. N., Shih, P. B., ... Paulus, M. P. (2014). Modifying resilience mechanisms in at-risk individuals: A controlled study of mindfulness training in Mmarines preparing for deployment. *American Journal of Psychiatry*, 171(8), 844-853. doi:10.1176/appi.ajp.2014.13040502
- Kabat-Zinn, J. (2005). *Coming to our senses: Healing ourselves and the world through mindfulness*. New York, NY: Hachette Books.
- Kabat-Zinn, J., Lipworth, L., & Burney, R. (1985). The clinical use of mindfulness meditation for the self-regulation of chronic pain. *Journal of Behavioral Medicine*, 8(2), 163-190. doi:10.1007/bf00845519
- Kaufman, K. A., Glass, C. R., & Arnkoff, D. B. (2009). Evaluation of mindful sport performance enhancement (MSPE): A new approach to promote flow in athletes. *Journal of Clinical Sport Psychology*, 3(4), 334-356. doi:10.1123/jcsp.3.4.334
- Kilpatrick, L. A., Suyenobu, B. Y., Smith, S. R., Bueller, J. A., Goodman, T., Creswell, J. D., ... Naliboff, B. D. (2011). Impact of mindfulness-based stress reduction training on intrinsic brain connectivity. *NeuroImage*, 56(1), 290-298. doi:10.1016/j.neuroimage.2011.02.034
- Lau, M. A., Bishop, S. R., Segal, Z. V., Buis, T., Anderson, N. D., Carlson, L., ... Devins, G. (2006). The toronto mindfulness scale: Development and validation. *Journal of Clinical Psychology*, 62(12), 1445-1467. doi:10.1002/jclp.20326

Liu, X., Xu, W., Wang, Y., Williams, J. M., Geng, Y., Zhang, Q., & Liu, X. (2013). Can inner peace be improved by mindfulness training: A randomized controlled trial. *Stress and Health, 31*(3), 245-254. doi:10.1002/smi.2551

Magyar-Moe, J. L. (2009). Positive psychological tests and measures. In *Therapist's guide to positive psychological interventions* (p. 52). Retrieved from http://booksite.elsevier.com/9780123745170/Chapter%203/Chapter_3_Worksheet_3.1.pdf

Manuello, J., Vercelli, U., Nani, A., Costa, T., & Cauda, F. (2016). Mindfulness meditation and consciousness: An integrative neuroscientific perspective. *Consciousness and Cognition, 40*, 67-78. doi:10.1016/j.concog.2015.12.005

Marchand, W. R. (2012). Mindfulness-based stress reduction, mindfulness-based cognitive therapy, and zen meditation for depression. *Journal of Psychiatric Practice, 18*(4), 233-252. doi:10.1097/01.pra.0000416014.53215.86

Moore, A., Gruber, T., Derose, J. R., & Malinowski, P. (2012). Regular, brief mindfulness meditation practice improves electrophysiological markers of attentional control. *Mindfulness, 6*.

Perez-Blasco, J., Sales, A., Meléndez, J. C., & Mayordomo, T. (2015). The effects of mindfulness and self-compassion on improving the capacity to adapt to stress situations in elderly people living in the community. *Clinical Gerontologist, 39*(2), 90-103. doi:10.1080/07317115.2015.1120253

Pineau, T. R., Glass, C. R., & Kaufman, K. A. (2014). Mindfulness in sport performance. *The Wiley Blackwell Handbook of Mindfulness*, 1004-1033. doi:10.1002/9781118294895.ch52

- Piyadassi. (1959). *Dependent origination*. Kandy, Ceylon: Buddhist Publication Society.
- Rogers, H. B. (2013). Mindfulness meditation for increasing resilience in college students. *Psychiatric Annals*, 43(12), 545-548. doi:10.3928/00485713-20131206-06
- Scott-Hamilton, J., Schutte, N. S., & Brown, R. F. (2016). Effects of a a mindfulness intervention on sports anxiety, pessimism, and flow in competitive cyclists. *Applied Psychology: Health and Well-Being*, 8(1), 85-103. doi:10.1111/aphw.12063
- Segal, Z. V., Williams, M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. Retrieved from 1-57230-706-4
- Shapiro, D. H. (2008). *Meditation: Self-regulation strategy and altered state of consciousness*. New Brunswick, NJ: AldineTransaction.
- Singh, N. N., Lancioni, G. E., Winton, A. S., Adkins, A. D., Wahler, R. G., Sabaawi, M., & Singh, J. (2007). Individuals with mental illness can control their aggressive behavior through mindfulness training. *Behavior Modification*, 31(3), 313-328. doi:10.1177/0145445506293585
- Slagter, H. A., Lutz, A., Greischar, L. L., Francis, A. D., Nieuwenhuis, S., Davis, J. M., & Davidson, R. J. (2007). Mental training affects distribution of limited brain resources. *PLoS Biology*, 5(6), e138. doi:10.1371/journal.pbio.0050138
- Subhan, S., & Ijaz, T. (2012). Resilience scale for athletes. *FWU Journal of Social Sciences*, 6(2), 171-176.
- Thom, N. J., Johnson, D. C., Flagan, T., Simmons, A. N., Kotturi, S. A., Van Orden, K. F., ... Paulus, M. P. (2014). Detecting emotion in others: Increased insula and decreased medial prefrontal cortex activation during emotion processing in elite adventure racers. *Social Cognitive and Affective Neuroscience*, 9(2), 225-231. doi:10.1093/scan/nss127

Trinity College. (2016, December). Trinity at a glance. Retrieved April 9, 2017, from

<http://www.trincoll.edu/AboutTrinity/Pages/CollegeFacts.aspx>

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070. doi:10.1037//0022-3514.54.6.1063

West, M. A. (1987). *The psychology of meditation: Research and practice*. New York, NY: Oxford : Clarendon Press; New York: Oxford University Press.

Williams, J. M., Russell, I., & Russell, D. (2008). Mindfulness-based cognitive therapy: Further issues in current evidence and future research. *Journal of Consulting and Clinical Psychology*, 76(3), 524-529. doi:10.1037/0022-006x.76.3.524

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition*, 19(2), 597-605. doi:10.1016/j.concog.2010.03.014