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Mindfulness and Golf Performance: A Case Study

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Abstract

Mindfulness interventions have shown considerable efficacy in dealing with many health problems, such as stress, depression, and chronic pain. Only recently, however, has mindfulness intervention been used to enhance athletic performance. This paper provides a comprehensive review of the foundations of mindfulness interventions and its effectiveness in improving athletic performance. Along with the review, a case study design was used in which one male golfer, age 21, underwent a six-week mindfulness and relaxation intervention utilizing meditation and autogenic training. Progress was measured through the reporting of golf scores and statistics as well as journal entries. Golf statistics and journal entries showed no significant improvement in performance or reports of mindfulness during golf rounds. However, high mindfulness reports in journal entries positively correlated with lower golf scores. The results of the study and experiences of the participant make for valuable discussion on mental challenges faced by a competitive golfer.
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Mindfulness and Golf Performance: A Case Study

As competition in sport drives athletes to reach ever higher levels of achievement, psychological interventions aimed at maximizing performance must continue to progress. Within the past 15 years, the field of Sports Psychology has shifted toward mindfulness interventions and away from performance skills training, as a new way of dealing with mental obstacles, such as negative thoughts that inevitably interfere with an athlete's performance. The goals of this paper are 1) to document this ongoing shift in coaching and preparation styles, 2) to review the foundations of mindfulness interventions and their effectiveness in improving athletic performance, and 3) to report on a subjective test of mindfulness interventions adopted by the author who is part of the University golf team.

Traditional Performance Enhancement Methods

Performance enhancement methods have long operated under the assumption that negative mental states must be reduced so that positive states can take over and lead to greater confidence and enhanced performance (Gardner & Moore, 2007). Thus, the field of sports psychology has long attempted to control internal states through the use of goal setting, positive self-talk, arousal control and imagery known as performance skills training (Hardy, Jones, & Gould, 1996). Gould, Eklund, and Jackson (1993) reported that a majority of a sample of U.S. wrestlers that participated in the 1988 Olympics used thought-control strategies such as blocking distractions or positive self-talk. In addition, 40% used emotional-regulation through relaxing or breathing control and another 40% used visualization techniques. Similar findings were shown in U.S. Olympic figure skaters who predominantly used positive self-talk, pre-competition routines,
and anxiety control techniques to deal with the many stressors high-level competition entails (Gould, Eklund, and Jackson, 1993). These studies reinforce the assumption that the experience of negative thoughts, emotions such as anger and anxiety, and sensations of the body will interfere with performance and thus, must be controlled through increases in positive self-talk and coping strategies such as visualization and goal setting. Creating this ideal positive internal state is expected to lead to greater athletic performance (Gould & Udry, 1994).

In a sport environment, arousal is defined as "how intense, charged-up, nervous, and emotionally activated an athlete is before or during performance" (Gould & Udry, 1993, p. 478). Often, arousal is measured through both physiological and psychological assessments (Gould & Udry, 1993). The underlying idea is that different athletes have different optimal levels of arousal, whether it is low cognitive anxiety and high physiological arousal (e.g. heartbeat) or medium levels of each (Gould & Udry, 1993). Thus, finding this optimal level will lead to peak performance in athletes (Gould & Udry, 1993). If athletes reported performing best when under less physiological activation, relaxation techniques can be enacted to reduce the fight or flight response of the sympathetic nervous system. One common technique is autogenic training, a self-hypnotic technique that leads an athlete towards feelings of heaviness and warmth in their bodies (Gould & Udry, 1993). This technique has been used extensively in effectively dealing with tension headaches, hypertension, anxiety disorders, depression, and sleep disorders (Stetter & Kupper, 2002). Groslamber, Candau, Grappe, Dugué, and Rouillon (2003) conducted a six week autogenic and imagery training intervention on a group of 16 national-level biathletes, measuring effects on shooting performance and postural control. Although no significant improvement was made in shooting accuracy, biathletes significantly improved in postural control, demonstrating a greater ability to stabilize their rifles than a control group. The
researchers believe that the relaxation from the autogenic training helped remove some tension which increased stability (Grosz slamber et. al, 2003).

Gardner and Moore (2006) set out to examine in depth the efficacy of performance skills training (imagery, arousal control, positive self talk, goal-setting) and found them to be quite limited in their ability to improve performance. Gardner and Moore (2007) conducted a qualitative review of studies using performance skills training of the past 35 years that met the standards of the American Psychological Association’s Division 12 Task Force for the Promotion and Dissemination of Psychological Procedures (28 total studies). The researchers found that interventions using any one of the techniques on its own (e.g. goal-setting, imagery, self-talk, and arousal control) did not yield significant results. The only studies that did show significant performance improvements were those that packaged some of these strategies together in their intervention. Of these studies, 6 out of 12 reported performance enhancement (Gardner & Moore, 2006). For an approach that has dominated the field of sports psychology for the past 3 decades, there appears to be a surprising lack of empirical support. One possible explanation is that there is, in fact, no connection between these coping strategies and optimal performance (Gardner & Moore, 2006). Whether or not there is a connection, it is clear that no alternatives have been presented to compete with performance skills training until very recently.

Obtaining Mental Control

The process of getting our minds to our desired state whether focused, calm, happy, or simply quiet is fascinating, particularly because it proves to be quite difficult to consistently achieve. As mentioned in the prior paragraph, telling our mind what to think (e.g. “you can do this”) or giving it a goal to focus on appears to be questionable in effectiveness in a competitive sport environment. It also has the chance of being counter-productive by producing more of the
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unwanted thoughts or leading to a state of mind not directed towards the goal. The theory of Ironic Processes of Mental Control (Wegner, 1994) explains the counter-productive tendencies of trying to obtain mental control. It suggests that an attempt to consciously search for mental contents (e.g. thoughts, memories, concepts) to control our mind is followed by an unconscious search for contents that are inconsistent with the ones first gathered. Thus, instances of counter-productivity in controlling our mind are due to the dominance of the inconsistent content.

Wegner’s theory was the result of many thought suppression experiments. The first experiment is known as the “white bear” experiment, conducted on college students by Wegner (1987). Participants were broken up into two groups, one group was told to think of “white bears” while the other was told to suppress any thoughts involving “white bears” for a brief period of time. During a subsequent expression period, the suppression group reported a greater number of “white bear” thoughts than the group told to think of “white bears” from the onset (Wegner, 1987). Many similar studies have replicated this finding of the ineffectiveness and counter-productiveness of thought suppression (Wegner et. al 1991; Wegner & Gold 1995; Wenzlaff et. al 1991).

The counter-productive effects of thought suppression appear to be even more apparent when experiencing cognitive load. Wegner and Erber (1992) instructed participants to think about or suppress a certain word (e.g. “house”) and measured their tendency to respond with the target word to related and unrelated cue words (e.g. “home” or “adult”). With the addition of time pressure, participants using suppression reported the target word significantly greater times than suppressors without time pressure and non-suppressors. Further research supports this theory by demonstrating that suppression of thoughts leads to an increase in negative thoughts in
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people with depression (Beevers, Wenzlaff, Hayes, & Scott, 1999) and an increase in worrying thoughts in those with anxiety disorders (Becker, Rinck, Roth, & Margraf, 1998).

Using a cognitive anxiety test and a heart rate monitor, Woodman and Davis (2008) classified novice golfers as high anxiety, low anxiety, or repressors when presented with a task of putting a golf ball in a golf hole for a substantial financial reward. Baseline data was gathered as participants putted without any reward for successfully holing the putt. This was followed by an offering of a financial reward for a successful putt along with the instruction to not hit the ball past the hole or leave it short. Those who experienced anxiety noted by an increase of at least six heartbeats/min but reported low cognitive anxiety were classified as repressors and performed significantly worse during the test condition while the high and low anxiety groups did not change from baseline to test. This study provides some support for Wegner’s theory of Ironic processes of control as those who try to mask their anxiety are more prone to ironic errors than those who appear to have accepted their feelings of anxiety. Although it could be possible that repressors are unaware of their somatic state or confuse it with excitement, the researchers insist that this is unlikely because repressors were the only ones to suffer from ironic errors. Had the process of repression been non-effortful and unconscious, ironic errors likely would not have been shown (Woodman & Davis, 2008). The studies mentioned in this section suggest that although suppressing thoughts may seem to be an obvious solution, thought suppression is not an effective way to remove undesired thoughts.

Mindfulness

More than 2500 years ago, Siddhartha Gautama, known as Buddha, left his royal palace to seek out causes of human suffering, with hopes of helping the world release them (Coogan, 1998). Buddha first attempted long-periods of fasting, nearly leading to his death, before
realizing that only the extremes of self-indulgence need be avoided (Coogan, 1998). After years of wandering, Buddha settled beneath the “Tree of Awakening” for one final meditation, and became enlightened about the “dharma” (i.e. truth; Coogan, 1998). Buddha came to the conclusion that human desires and a lack of understanding of our own capacities make suffering an inevitable endurance for all humans (Kabat-Zinn, 2006). Thus, for the remaining 45 years of his life, Buddha wandered through Northern India preaching the “dharma” (Coogan, 1998). To address suffering or what Buddhists refer to as dukkha, the Buddha devised many meditative practices, those that lead to freedom from dukkha through paying attention to exactly what we are experiencing (Kabat-Zinn, 2006). At the center of these meditative practices is cultivation of mindfulness or “non-judgmental, present-moment awareness, the direct, non-conceptual knowing of experience as it unfolds” (Kabat-Zinn, 2005, p. 128). The Buddha insisted that suffering is caused by seeing things through a self-oriented view and clinging to what we desire. These forms of suffering are dissolved through seeing things as they truly are, in a mindful manner (Kabat-Zinn, 2006). Thus, mindfulness is a state of being in which thoughts, emotions, sensations are experienced simply as they are without judgment or an agenda attached to them (Kabat-Zinn, 2006). This ability to pay attention to the present is something that is developed and increased through meditation, commonly known as “mindfulness meditation.”

The concepts of mindfulness and meditation have stayed primarily within the realms of Eastern Cultures since Buddha’s time, but are now becoming more popular in Western Cultures. John Kabat-Zinn played a major role in bringing mindfulness meditation to Western Culture and introducing it as a secular practice open to anyone. Within the past 30 years, mindfulness meditation has spread rapidly in Western Culture as evidenced by numerous scientific and medical studies published on its positive effects (Hofmann et. al, 2012; Hölzel et. al, 2011).
Along with the medical and scientific fields, mindfulness meditation has spread in public and private schools, law firms, corporate cultures, and in sports performance (Gardner & Moore, 2007).

Two often studied therapies utilizing meditation and mindfulness are Mindfulness-Based Cognitive Therapy (MBCT; Teasdale, Segal, Williams, 1995) and Acceptance-Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999). MBCT is primarily used in dealing with depression and focuses on teaching individuals to view their thoughts as mental events rather than an aspect of themselves. Viewing thoughts in this way allows an individual to detach themselves from their negative thoughts and prevent the thoughts from intensifying. This form of therapy has been shown to significantly decrease relapses in patients with major depression disorder (Teasdale, Segal, Williams, Ridgeway, Soulsby, & Lau, 2000).

The ACT approach is very similar to MBCT and mindfulness approaches as it teaches clients to experience thoughts and emotions as they are, without judgment. It implores individuals to adopt the mindset of “I am having the thought that I am a bad person” rather than “I am a bad person” (Baer, 2003). ACT differs from MBCT in that symptom reduction is not its goal, insisting instead that difficult internal states should not be labeled as “symptoms” but rather as harmless and transient psychological events (Harris, 2006). The ACT approach has been shown to effectively treat depression, substance abuse, eating disorders, chronic pain, and work-related stress (Hayes et. al, 2004).

Mindfulness and Flow State

Csikszentmihalyi (1990) defined the concept of flow as an optimal mental state involving total absorption in the task or activity in which one is engaged. Flow state is also characterized by great enjoyment of the task and the feeling that the task is the only thing that matters at this
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moment (Csikszentmihalyi, 1990). Csikszentmihalyi has broken up flow state into nine
dimensions: a) Challenge-skill balance: known as the belief that one’s own skills are well suited
for the challenge; b) Concentration on task at hand: a feeling of deep focus; c) Merging of action
and awareness: a feeling of an action being automatic; d) Clear goals: the feeling of knowing
what one is going to do; e) Unambiguous feedback: processing of feedback of progress and
immediate adjustment based on feedback; f) Sense of total control: sense that one can control
actions without conscious effort; g) Time transformation: lack of awareness of time passing,
usually time passing faster than usual; h) Loss of self-conscious: loss of sense of self as a social
being, not concerned with judgment from self or others; i) Autotelic experience: experience of an
activity as intrinsically rewarding without concern over end result or reward.

Csikszentmihalyi and Nakamura (2002) argue that entering flow state requires a balance
between perceived skill and challenge. Those whose perceived skill falls short of the challenge
experience anxiety and those whose skills are above the challenge experience boredom. Neither
is conducive to the flow state. Flow state occurs when perceived skill is aligned with the
challenge (Csikszentmihalyi and Nakamura, 2002).

Flow state has often been theorized as the optimal psychological state underlying peak
performance (Jackson & Roberts, 1992). Visualization and hypnosis techniques have been
shown to significantly increase flow state in athletes, although research in this area is quite
limited (Nicholls & Polman, 2005; Pates & Maynard, 2000; Pates, Oliver, & Maynard, 2001;
Pates, Cummings, & Maynard, 2002). Recently, researchers have studied whether or not flow
state and mindfulness share some commonalities. Through interviews with Olympic swimmers,
Bernier, Thienot, Codron, and Fournier (2009) found experiences in flow state to be similar to a
mindfulness state. The researchers asked 10 Olympic swimmers to describe their bodily states,
cognitions, and emotions of an optimal experience in their careers. They found that most all of the reports matched up with many of Csikzentmihalyi's (1990) nine aspects of flow, eight out of 10 reporting autotelic experience, total concentration, sense of total control, unambiguous feedback and challenge-skill balance. Also highly reported was awareness and acceptance of bodily states. Many of the swimmers reported feeling a strong heartbeat, "tingling" in their muscles, and heat in their extremities. While these feelings may have been unpleasant, the swimmers reported feeling and accepting the sensations as they were instead of avoiding them. Acceptance of bodily states is not one of Csikzentmihalyi's dimensions of flow but rather a mindfulness concept discussed earlier. Since this acceptance was reported along with flow dimensions, there is some evidence of overlap between mindfulness and flow.

A recent study (Kee and Wang, 2008) examined 182 college athletes across 23 sports and compared scores on the Mindfulness/ Mindlessness Scale (MMS) and the Dispositional Flow Scale (DFS-2). Both scales measure one's propensity to be either mindful or in a state of flow. Using a cluster analysis approach, the researchers identified one low, one high, and two middle mindfulness groups based on mean scores of the MMS. DFS-2 scores were significantly greater in the high mindfulness group compared to the low, suggesting that those who are more mindful tend to have a greater propensity to experience flow. In particular, the dimensions of challenge-skill balance, clear goals, concentration, sense of control, and loss of self-consciousness correlated strongest with high mindfulness. In terms of challenge-skill balance, it is quite possible that mindfulness allows for a clearer perspective of one's skills and the challenge since mindfulness implores one to see things as they are without judgment and conceptual analysis. The researchers argue that the mindful traits of novel seeking (willingness to seek out new experiences) and flexibility (seeing events from multiple perspectives) are related to challenge-
skill balance as those high in these traits may be more willing to seek out new challenges and view their own skills as more capable.

In terms of the remaining four dimensions (clear goals, concentration, sense of control, and loss of self-consciousness), Kee and Wang (2008) argue these dimensions all have to do with self-regulation of attention, which according to Bishop, Lau, Shapiro, Carlson, Anderson, Carmody et. al (2004) is a key facet of mindfulness. More specifically, loss of self-consciousness could be more likely in those who are mindful because mindfulness promotes non-judging of one’s thoughts, feelings, and sensations and thus can reduce the cognitions that are active when self-conscious.

Similar to Kee and Wang (2008), Aherne, Moran, and Lonsdale (2011) compared mindfulness and flow, while using a situational rather than dispositional measure of flow and a mindfulness intervention. Using randomized control and experimental groups of six to seven athletes, the researchers measured pre-test mindfulness data and flow data that were completed directly after a practicing session. A six-week mindfulness training program was introduced to the experimental group using training methods such as breathing meditation, body and breath meditation, yoga, and body scan. Follow-up data showed significant increases in global flow (total of all dimensions) and the dimensions of “Clear Goals” and “Sense of Control” compared the control group. These two dimensions were also found to be related to mindfulness in Kee and Wang (2008), providing more evidence that flow dimensions involving self-regulation of attention are very relatable to mindfulness.

It appears that mindfulness may be particularly useful in helping individuals better shift their attention as needed based on the demands of the performance situation. Indeed, much research has shown that mindfulness is very effective at interrupting ruminative thoughts
unrelated to the demands of the current moment (Teasdale et. al, 2000). In terms of flow state, mindfulness practice appears to be a window into many dimensions of flow, particularly those involved in self-regulation of attention.

**Neurological Implications of Meditation and Attention**

Fundamental to the relationship between mindfulness and the brain is the concept of neuroplasticity, defined as “the ability of the brain to change its own functional and physical anatomy in response to repeated task demands” (Marks, 2008). Research has shown that meditation and mindfulness techniques can induce structural changes in the brain and alter the activity of brain regions (Marks, 2008).

Brefczynski-Lewis and colleagues (2007) compared the activation of the brain areas known for focused attention of experienced meditators versus inexperienced meditators during a focus exercise and a resting state. They found that experienced meditators were able to keep their attention longer than inexperienced meditators while activating less of the focused attention areas of the brain. This gives support to the notion that the meditative-skill of focused attention can be developed so that is it performed without much effort (Gardner & Moore, 2012). Furthermore, Lazar and colleagues (2005) found highly experienced meditators (nine years average experience) to have significantly greater cortical thickness, as shown by structural images, in their prefrontal cortexes and right anterior insulas than matched controls. The prefrontal cortex has been shown to be important in focused attention while the right anterior insula is known specifically for interoception, or the detection of one’s bodily states (Lazar et. al, 2005). Thus, there is evidence to support the idea that athletes can be trained in attentional focusing through meditation and to increase their ability to focus their attention on task-related stimuli (Marks, 2008).
What is clear is that meditation has some neurological benefits for very experienced meditators. However, a question that remains is whether or not mindfulness meditation can make an immediate impact on an athlete's performance who is not experienced in meditation. Dickenson and colleagues' (2013) study of mindfulness induction on non-practitioners gives some evidence supporting the immediate effects of mindfulness meditation. Dickenson et. al (2013) examined the brain activity of a group of non-meditators instructed to perform basic mindfulness meditation (focus on the breath) versus a control group of non-meditators told to let their mind wander or what is commonly known as the default mode network in which self-reflective thought occurs. They found that the breathing exercise activated many parts of the brain known for attention particularly in the frontal-parietal regions and also activated the insula. Activation of areas associated with the default mode network was significantly lower in the experimental versus the control group. This study supports the idea that one does not need much training in meditation to be able to focus, detect sensations within the body, and reduce the activity of the default mode network. The researchers used the breath as the object of awareness but mindfulness meditation can be done with a variety of different objects of attention (Kabat-Zinn, 2006). Thus it would seem that athletes who find themselves in a state of wandering could pick something in the present to focus their awareness on (e.g. the feeling of one's hand on a basketball or the sensations of one's feet touching the ground on a walk down the fairway) to reduce wandering and increase attention of the present moment. As Gardner and Moore (2006) argue, present-moment awareness is more conducive to high performance than the wandering state.

Further studies using EEG technology have found some notable information regarding left and right brain activation in sport. Landers et al. (1992) studied brain activation of pre-elite
archers and found that as archers gain expertise in the sport, left frontal lobe activation is decreased and right brain activation increased. This suggests that as higher levels of performance are attained, less verbal instruction from the frontal lobe is necessary as athletes are more aware of the context in which they are performing. Crews and Landers (1993) support this theory with their EEG measurements of elite amateur golfers during a putting exercise. Results from this study showed that golfers who had the least amount of error in their putting (inches from cup) had lower levels of activation in their left brains than those who had more putting error.

Crew and Landers (1993) also used physiological measures which showed the same heart rate increases as putts were approached between the successful and unsuccessful putters. Thus it does not appear that successful putters felt any less anxious than did the unsuccessful ones. The main success factor appears to be their ability to rely on the intuitive nature of the right brain rather than the verbalizing left brain. The less successful putters may have been prone to intellectualize the experience rather than being present and immersing themselves in it.

A more recent study conducted by Hatfield, Deeny, Hillman, and Janelle (2003) used similar methodology on a group of expert marksmen compared to a group of skilled marksmen. The researchers measured activity in the left temporal lobe and three midline areas of each group directly prior to firing a shot (total 40 shots), in order to test the relationship between verbal-analytic and motor process. The results showed that expert shooters had much less communication between the left temporal lobe and motor planning process relative to skilled shooters before firing. This result led the researchers to suggest that expert performance is characterized more by automaticity of motor function, where increased cognitive instructions would lead to a decrease in performance (Hatfield et al, 2003). These three studies support the
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notion that an aspect of optimal performance is characterized by low activation in the cognitive areas of the brain.

Research on Mindfulness Based Interventions in Sport

Mindfulness acceptance commitment. In response to the finding of lack of efficacy in performance skills training, Gardner and Moore created the Mindfulness Acceptance Commitment (MAC) (2006), currently the most tested mindfulness approach in sports psychology. The MAC is based primarily on MBCT (Segal et. al, 2000) and the ACT (Hayes et. al, 1999) and serves to help athletes to learn and apply mindfulness techniques to their performances. The MAC approach has three elements: 1) non-judgmental acceptance of whatever internal state one is experiencing; 2) attentional focus on stimuli relevant to task at hand rather than focus on mental processes; 3) adopting values that drive one to commit to behaviors that support their athletic endeavors. The MAC approach advocates that there is no optimal performance state and athletes can succeed under a variety of different cognitive states.

Gardner and Moore (2007) argue that the presence or absence of negative thoughts, emotions, or sensations is not what impacts performance but rather the degree to which the athlete accepts these experiences and remains focused on the task at hand. Interestingly so, the authors insist that not fully experiencing difficult internal states is a major factor in poor performance (Gardner & Moore, 2007). Thus, using the MAC model, one creates a relationship with thoughts, emotions, and physiological sensations, rather than exercising control in reducing or producing them (Gardner and Moore, 2012). The researchers offer a variety of different meditative practices to help create this relationship. One such practice is what they call “Mindfulness of the Breath Exercise” which is simply sitting for a period of 20 minutes and observing the abdomen rising and falling after each breath (Gardner and Moore, 2007).
Efficacy of mindfulness based interventions in sport. Considerable research has been done reporting the effectiveness of mindfulness and acceptance based interventions in non-sport fields, particularly in health-related fields (see Hofmann et. al, 2012 for review of mindfulness interventions; Hayes et. al, 2005 for review of ACT). Applications to sport owe a significant intellectual debt to these pioneering studies. Research examining the efficacy of mindfulness based interventions in sport has only just begun in the last 10-15 years, predominantly utilizing the MAC approach.

Gooding and Gardner (2009) conducted a study on 17 NCAA Division One basketball players measuring mindfulness, pre-shot routine, arousal level, and free throw percentage. Results from the study include a five percent increase in free throw percentage per one standard deviation increase on a mindfulness scale. Also, length of pre-shot routine and anxiety level showed no significant effect on free throw percentage providing further support that it is not arousal which influences performance but rather the capacity to be mindful and experience whatever arousal is present.

The largest study using the MAC approach was conducted by Luktenhouse and colleagues (2007), comparing a MAC protocol to traditional performance skills training. Participants in the MAC group were 60 Division 1 athletes from three sports (men’s soccer, women’s soccer, and women’s field hockey). The performance skills group consisted of 58 Division 1 athletes also from three sports (men’s wrestling, men’s crew, and women’s crew).

The six teams were randomly assigned to the two groups and no significant difference was found between the groups on athletes’ or coaches’ performance ratings. Results showed that 32% of MAC participants achieved a significant increase on coach ratings of performance (at least 20%) compared to only 10% of PST participants. Also, the MAC participants demonstrated
significantly greater improvements in aggressiveness and flow scores as well significantly
greater decreases in experiential avoidance. Experiential avoidance is a common theme in MAC
literature and is defined as avoiding important events or situations due to high levels of anxiety,
anger, or frustration (Gardner & Moore, 2007). An example of experiential avoidance is a
basketball player who plays less aggressively and turns down open shots due to an experience of
anxiety or continued negative thoughts (Gardner & Moore, 2007). The MAC approach shows
some evidence of being able to reduce experiential avoidance.

Drawing from the MAC approach, MBCT (Teasdale et. al, 1995) and the ACT (Hayes et. al, 1999), Bernier et. al (2009) studied the impact of an acceptance based mindfulness
intervention program on seven elite golfers. Golfers went through a four-month intervention
instructed by a trainer experienced in mindfulness. The first two months were devoted to the
introduction of mindfulness and awareness of breathing and body sensations; month three
addressed non-judgmental awareness of thoughts and emotions; the final month implemented a
3-step mindfulness, acceptance, and commitment approach very similar to the MAC, which
allows for focus on task-related objects. The golfers added mindfulness and acceptance skills to
their pre-shot routines during their rounds in the months following the intervention. Compared to
a control group of seven elite golfers who went through a traditional performance skills training
intervention, the experimental group showed a more significant increase on the Ottawa Mental
Skills Assessment Tool-3* (OMSAT-3*; Durand-Bush, Salmela, & Green-Demers, 2001) in the
mental skill of activation, or the ability to heighten physiological and mental states in situations
which require increased focus. Also, every golfer in the experimental group increased their world
ranking while only two did in the control group (Bernier et. al, 2009). However, it is unclear
whether or not the researchers used a matched control group, making the results difficult to generalize.

Although empirical findings of the MAC and other mindfulness programs in sport have been limited by small sample sizes and/or case study approaches, there is reasonable support for the mechanisms on which MAC is based. Future studies using larger samples sizes across many different sports have the potential to provide quantitative support for the efficacy of the MAC intervention (Gardner & Moore, 2012) where currently there are only hints and hope.

The success of this research will be due in a large part to investigators’ ability to recruit highly competitive athletes and provide reliable performances measures. Each sport has a different performance outcome and a large variety of performance indicators. Researchers must be able to identify which indicators are of the most value and develop reliable measures for these indicators.

**Inner Game Method.** There are many similarities between the MAC approach and the teachings of the “Inner Game of Golf,” a book written by Timothy Gallwey (1981), a major figure in Sports and Business coaching, which describes applicable exercises for non-judgmental awareness in the game of golf. Gallwey (1981) suggests that the majority of errors in all aspects of golf are due to over tightness in certain areas of the body caused by stress and anxiety. He argues that stress and anxiety come from a hyperactive conscious mind that gives the body unnecessary instructions on how to perform a golf task (e.g., swing, putting stroke) and then criticizes the body for performing the task in an improper fashion. He insists our conscious mind naturally doubts that we will be able to perform a task in a successful manner so it instead feeds our body with countless instructions on how to perform a task that our natural body already knows how to do. This mistrust in our body’s capabilities produces doubt and fear, which leads
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... to stress and inevitability the tightening of muscles that cause an errant shot. Thus, Gallwey (1981) asserts that using non-judgmental awareness techniques will quiet our over-active minds and quell the stress and tightness that future outcomes produce.

One awareness technique that Gallwey suggests is the “da, da” approach in which during a golf swing, a golfer says “da” out loud in his head at 4 key stages in the golf swing: the start of swing (the moment the club is taken back away from the ball), the top of the swing (the point where the club has the top of its arc), impact (where club meets ball), and the finish (the end of the arc). Gallwey argues that focusing the mind on the actual details of an event will counter the mind’s tendency to project its fearful thoughts onto the actual event. The technique is similar to the meditative exercise of focusing on one’s breath, with the idea that attention focused on what is here and now reduces the negative effect of future-oriented thoughts. Thus, rather than worrying about the proper swing technique, future score, water hazards etc., one only focuses on matching the “da” at the four different time points in the swing. While no empirical studies have tested the effectiveness of Gallwey’s methods, the underlying principles have many similarities to the mindfulness interventions currently being tested.

Case Study

The question that underlies the remaining pages of this paper is how autogenic training, mindfulness, meditation, and Gallwey’s principles can improve my own golf performance as a member of a highly competitive college team. For quite some time I’ve felt that my own internalized doubts and fears in my golf game have kept me from reaching my potential. Thus, my own desire to conquer these impediments has been one of the driving forces of my interest in
this topic. The prospect of playing without mental distractions excites me and this project gives me a method by which I may come closer to this ideal state of mind.

A case study design will be used in which I will undergo a mindfulness and relaxation intervention, and in addition I will adopt Gallwey’s “da, da” technique. My progress will be measured through the recording of golf statistics and post-round journal reflections. The aim of this study is to apply mindfulness and relaxation techniques in hopes of lowering my scores and increasing my mindfulness on the course.

**Method**

**Participants**

One University of Redlands golfer, myself, participated in the case study. I am a Caucasian male, age 21. I have competed in golf for six straight years, two at high school level and three and a half at college level. I have also competed in 20-30 amateur golf tournaments outside of school. At the start of the study, I was ranked 10\textsuperscript{th} in Division 3 golf. I have incorporated mindfulness in my daily life for four months prior to the study and practice meditation once every other week.

**Procedure**

I underwent a six week intervention utilizing mindfulness and relaxation techniques. During each week of the intervention, I played at least three nine-hole rounds, wrote a one page journal entry about the experience of the round after the completion of the round, and collected the following statistics: nine-hole scores, fairways hit, greens in regulation, approach shots within 15 feet of the hole, and putts per round. The journal entry was a reflection on what emotions, thoughts, and sensations were the most prevalent throughout the round.
Week one consisted of gathering baseline data from golf statistics and journal entries. Weeks two through four consisted of breathing meditation for 10 minutes the morning of the practice round as well as continued data collection. The meditation exercise used was three-part breathing in which three deep breaths were taken with emphasis first on the upper chest, followed by the rib cage, and ending with the abdomen. This cycle was repeated throughout the 10 minute exercise. Lastly, weeks five through seven consisted of autogenic training, which was administered through a music player for 15 minutes the morning of the practice round. The 15 minutes consisted of two minutes of breathing meditation, two minutes of progressive muscle relaxation (flexing and releasing muscles from toes to face), and concluded with a voice guiding me through feelings of heaviness in my arms and legs using statements such as “feel as if your arms are anchored to the ground and cannot be lifted.” The autogenic training was compiled and recorded by a mental skills consultant who met with the participant multiple times before the intervention.

Qualitative Data Analysis

Journal entries were analyzed using the long-table approach, a low-technology approach that allows the researcher to identify themes and categorize results (Krueger, 2009). Journal entries were labeled by the week of the study (0-6) and spread out on a floor space. Each journal entry was read over three times and sentences that were similar were cut out and grouped together. Groups that consisted of three or more sentences were conceptualized and given a name (e.g. “negative projections of the future”). Eight groups were identified under this requirement and combined into two groups, “mindful” and “non-mindful.” Previous literature on mindfulness, flow state, and MAC were used to decipher which themes were aligned with mindfulness values and which themes opposed them. The frequency of mindful versus non-
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Mindful themes was analyzed over six week study to investigate whether or not mindfulness was increased or decreased and whether or not mindful reports affected score. Comments that did not pertain to the direct experience of the round (e.g. "How do I focus everything on the task at hand without thinking about and judging what I’m doing?") were not included in the analysis but set aside to use as topics for discussion in the final section.

Results

One collegiate golfer, the researcher, underwent a mindfulness and relaxation intervention to measure its effect on reducing golf scores, improving performance statistics (greens in regulation, putts per round, fairways, approach shots within 15 feet), and reporting of mindfulness on the course.

Table 1 displays the means and standard deviations of golf statistics separated by baseline, mindfulness intervention, and autogenic intervention. A One-way ANOVA was used to test whether or not there were changes in golf statistics among baseline, mindfulness intervention, and autogenic training. No significant differences were found on the following dimensions: A) golf score: F(2,18) = 0.10, p = 0.91; B) greens: F(2,18) = 0.29, p = 0.75; C) fairways: F(2,18) = 1.88, p = 0.18 and D) putts: F(2,18) = 0.64, p = 0.54. A significant difference was found on the dimension of approach shots within 15 feet (F(2,18) = 3.7, p = 0.05). Figure 1 displays each golf score from the start of the mindfulness intervention (coded as "1") to the end of the autogenic training (coded as "18").

The long-table approach (Krueger, 2009) was used to analyze themes within the journal entries. The frequencies of reports were used to extract eight themes. The two most frequently written about themes were doubt leading to many verbal instructions and negative projections of the future (15 written reports for both). Doubt followed by verbal instructions was a process
which was repeated very frequently. The process usually began with the author doubting his ability to execute a shot, particularly during putting, followed by an attempt to remove the doubt with self-instructions such as “let it go” or “trust yourself.” Negative projections of the future consisted of times when the author found himself thinking in depth about negative future outcomes such as finishing off the current round with abnormally poor shots, playing poorly in upcoming rounds, or envisioning falling short of future goals of playing on the professional tour. Less common themes found were thoughts on swing concepts, feelings of negative self-worth following poor shots, non-judgmental awareness of thoughts, acceptance of thoughts and bodily sensations without instruction to correct or change them, trust in own abilities, and focus on task at hand.

Once themes were identified, they were categorized based on previous literature on mindfulness, flow state, and MAC. Non-judgmental awareness of thoughts, acceptance of thoughts and bodily sensations without instruction to correct or change them, trust in own abilities, and focus on task at hand were placed in the category “mindful.” The remaining four themes were placed under the category of “non-mindful:” doubt leading to many verbal instructions, negative projections of the future, thoughts on swing concepts, and feeling of negative self-worth following poor shot. It should be noted that while the feeling of negative self-worth may be unavoidable, it was the dwelling on the feeling that was reported which places it in the non-mindful group. Frequencies of mindful and non-mindful themes are separated by week and shown in Table 2.

To test for an increased or decreased frequency of non-mindful versus mindful themes, the percentage of non-mindful to mindful reports were calculated for each week and compared over the six-week span. A Pearson R correlation yielded no significant increase or decrease on
the percentage of non-mindful and mindful thoughts over the six weeks studied ($r = 0.44$, $p = 0.32$). The percentage of non-mindful and mindful reports per week are noted in Table 2.

The final statistical analysis was conducted to test the relationship between the ratio of non-mindful and mindful themes and average score for each week. Essentially, it was tested whether or not weeks of high mindful journal entries yielded significantly lower scores (greater performance) than weeks of high non-mindful journal entries. A Pearson R correlation showed a significant positive correlation between the percentage of non-mindful reports and score such that the average scores of weeks with high non-mindful reports were greater than those with low non-mindful reports ($r = 0.94$, $p = 0.01$). The correlation between the two variables is shown in Figure 2. The implications of these results and their relevance to prior literature will be discussed in the remaining pages of this report.

**Discussion**

It should be noted that, as a researcher conducting a study on myself, the results from this study cannot be generalized and are quite likely to be affected by my own personal biases. However, I argue that the mental challenges I reflected on throughout the study were very common among golfers; I offer my analysis on what methods are appropriate for dealing with them.

For me, this process was fascinating. I was conducting a case study on myself with the goal and extreme desire of improving my golf game. During this process, I was learning about mindfulness which instructs one to remove one’s attachment to the outcome. The forces of detachment and desire to improve pulled me in opposite directions as I began the study and left my mind befuddled. Thus, my mind struggled with whether I should be trying hard to improve or be more accepting of how I was currently playing. Considering how badly I wanted to improve,
it's not surprising that I went with the trying route. Through research and my own experiences, I knew how powerful getting into an optimal state of mind was for my performance. I figured if I could somehow be relaxed while maintaining my focus during the most shots possible, I would play much better and reach my potential. So what I ended up doing was, before each shot, I would tell myself “Relax!”, “Let go of the result”, “Don’t judge your thoughts or feelings”. I wouldn’t end up hitting the shot until I thought I had done a good job at getting my mind in a good place.

What I began to realize after the study was over, was that I was missing the point. This whole process of getting into the “right” mindset before each shot was not mindful. Mindfulness is simply being aware of our thoughts and feelings, not prioritizing one over the other. Furthermore, Gardner and Moore (2007) insist “Mindfulness does not reduce the frequency of distressing thoughts; nor does it in any way attempt to alter the content of one’s thoughts. Rather, mindfulness serves to break down the literal belief in one’s thoughts and internal rules” (p. 37). My goal of reducing my thoughts of fear and worry was contrary to the purpose of mindfulness. It would have been more prudent to focus on the task at hand and understand that optimal performance can happen even when experiencing negative thoughts. Had I realized this from the start of the intervention, the results may have been different.

Along with my inability to view my negative thoughts with nonjudgmental awareness, there were many other factors that limited my ability to obtain significant improvement in my performance statistics. Ideally, to best test an intervention’s effectiveness in improving performance, a medium to large sized sample size should be used. Using a sample size of one, it is very difficult to obtain statistically significant results. Another limitation was the length of the study. As ACT creator Hayes (2005) notes, acceptance of painful and difficult mental states is
something "most of us have had little or no training" and is very dissimilar to our usual problem-solving strategies. The active acceptance of thoughts and emotions as well as simple awareness of our breath are things that are rarely practiced in our very fast-paced society and can take some time to learn. A length of intervention closer to the 4-month intervention used in Bernier et. al (2009) might have been more appropriate to ensure I had enough time to learn about and apply mindfulness effectively. In terms of measuring mindfulness through journal entries, future studies would be more objective if an outside researcher were to analyze the journal entries rather than relying on the participant's own perception of their reflections.

Using golf scores as a measure of improvement entails quite a few uncontrollable variables. Weather conditions (e.g. wind, rain, heat), hole locations (placement of hole on green), and unlucky bounces or breaks can alter scores from day-to-day and may not necessarily be attributed to the skill of the golfer. While creating performance measurements that can be evaluated at locations with less variability (e.g. practice range or practice putting green) may be more reliable, competitive golfers ultimately place the most emphasis on their score. Thus, if using score as a performance measure, researchers may want to use a time-series design over several months to measure for trends of improvement. This type of study is more inclined towards highly-experienced golfers who have reached a threshold where performance is no longer rapidly improving simply with practice.

The lone significant finding of a positive correlation between non-mindful reports and golf score has two explanations. One explanation could be that greater mindfulness during my rounds led to lower scores. However, it could also be possible that after high-performance rounds, I reflected on the memorable highlights of the round and disregarded times where I was not mindful. Conversely, on low performance rounds, I may have exaggerated the role that doubt
and negative thoughts played. This may have been particularly likely during week 1 in which I reported no non-mindful themes, causing a significant finding that would not have occurred otherwise. My best estimate is that it is a combination of both explanations. The themes of non-judgmental awareness, acceptance of internal states without trying to change them, trust in my abilities, and focus on task at hand did have a positive effect on my performance. All three of the journal entries preceding an exceptionally low round (34), I reported experiencing many thoughts and judgments of my thoughts that were taking me out of the task at hand. Along with this observation, I reported a need to place more reliance in my natural ability and less in analytical thought and judgments of technique for the next round. What followed was higher reporting of non-judgmental awareness and task-focused attention as well as lower scores. Although much of my study was clouded with themes of non-mindfulness, times in which I was mindful appeared to improve my performance.

In terms of mindfulness meditation versus autogenic training, I found immediate effects of relaxation from both after the 10 minute session. However, I found mindfulness to be easier to carry over during a competition setting. Mindfulness is a very passive approach whereas autogenic is a more deliberate engagement with somatic sensations. In a golf setting where there are so many variables to take into account for each shot (i.e. distance, wind, slope), engagement with something that is present (i.e. breath, sensations) is more manageable than working to create certain sensations.

Kabat-Zinn (2006) offers a perspective on mindfulness that I found quite noteworthy. He argues that mindfulness requires continuous, disciplined practice. The more we practice the method, the greater our ability to be aware of our inward and outward experiences. Thus, this view is very progressive, with trajectory towards a desired result (e.g. wisdom, relaxation,
focus). However, at the same time, he argues being mindful, particularly during meditation, is really nothing at all. There is no going anywhere, nothing to practice, and no attainment. In this sense, it is pure awareness and embodiment of what we already are, in this moment. As Kabat-Zinn (2006) states, “You are already everything you may hope to attain, so no effort of the will is necessary and no attainment is possible” (p. 64). These two perspectives complement each other and are important to note so one does not strive too hard to attain nor does one claim to be something they are not.

This paradox of understandings as described by Kabat-Zinn is something I believe is at the core of both the MAC and Inner Game approaches. Common to both the MAC and Inner game is the idea that athletes have an innate capability to perform at an optimal level. Both insist that lack of attainment of this optimal level is due in part to our minds getting in our own way and suggest non-judgmental awareness as the solution. The MAC utilizes meditation techniques to achieve non-judgmental awareness whereas Inner Game suggests awareness techniques such as “da,da.” Similar to Kabat-Zinn’s perspective, for the MAC or Inner Game to work, one must trust in one’s natural ability and be willing to undergo a process to uncover it.

While I did not make the improvements my game that I had hoped, I did report many times in my journal entries the mindful themes for which I had been searching. Thus, it is evident that what I am looking for is already within myself and usually present when I am not trying really hard to obtain it. What gets in the way of this core potential are things that I reported quite often: judgment of my own self-worth, fears of future poor results, over-analysis of swing concepts, and doubt leading to self-instructions. As I continue with mindfulness and the practice of meditation, I will hope to be able to progress in my ability to see internal and external stimuli simply as they come, without judgment. At the same time however, I must
continue to trust my ability at this very moment and know that what I am seeking can be found within myself. Since the completion of this study, I have taken this knowledge and applied it to produce my career best tournament scores, multiple individual victories, and school-record performances. I feel more focused on the present task and less distracted by internal dialogue than ever before.

Our minds have an incredible ability to conceptualize and categorize. The game of golf invites us to use concepts and categories. We can dissect every aspect of our swings from our head movement, hip rotation, straightness of our arms, club speed, and clubface angle. We can take these different concepts and judge them as being right or wrong and try to adjust small details in our swings to look more like a "proper" swing path or technique. Thus we are, in our minds, constantly critiquing and directing our body to move in the proper fundamental fashion. What gets lost in this process is something of absolute importance: awareness. Simple awareness of what is instead of what "should be" can remove the tension and stress caused by an effort to get our bodies to do something completely foreign to them. Awareness of the present is far more beneficial in a golf round than analytical thinking.


Mindfulness and Golf


Table 1

Means and Standard Deviations of Golf Statistics for Baseline and Interventions

<table>
<thead>
<tr>
<th>Golf Statistic</th>
<th>Baseline (N=3)</th>
<th>Mindfulness (N=8)</th>
<th>Autogenic (N=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>38.7 (1.5)</td>
<td>38.4 (3.7)</td>
<td>38 (2.1)</td>
</tr>
<tr>
<td>Greens</td>
<td>6 (1)</td>
<td>5.4 (2.1)</td>
<td>5.9 (2.1)</td>
</tr>
<tr>
<td>Fairways</td>
<td>5.3 (0.58)</td>
<td>4 (1.4)</td>
<td>5.3 (1.3)</td>
</tr>
<tr>
<td>Approaches</td>
<td>2.7 (0.58)</td>
<td>1.8 (1.0)</td>
<td>3.3 (1.4)*</td>
</tr>
<tr>
<td>Putts</td>
<td>17.3 (0.6)</td>
<td>16 (1.7)</td>
<td>15.8 (2.5)</td>
</tr>
</tbody>
</table>

Note. N= golf rounds (total=21).*F(2,18) = 3.7, p = 0.05. Score = total number of golf strokes taken during a round of 9 holes. Greens = Greens in Regulation, or the number of golf holes where the ball was hit on the green in two strokes less than par (e.g. 1 stroke for par 3s, 2 strokes for par 4s, and 3 strokes for par 5s). Fairway = area of the course between the tee markers and the green where the grass is best maintained. Approaches = approach shots within 15 feet, or the number of greens hit in regulation with a shot finishing within 15 feet of the hole. Putts = total number of putts taken from the green surface.
### Table 2

*Frequencies and Percentages of Non-Mindful and Mindful Journal Reports*

<table>
<thead>
<tr>
<th>Week</th>
<th>Non-Mindful</th>
<th>Mindful</th>
<th>Non-Mindful %</th>
<th>Mindful %</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>8</td>
<td>6</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>1</td>
<td>83</td>
<td>17</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
<td>2</td>
<td>89</td>
<td>11</td>
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<tr>
<td>4</td>
<td>4</td>
<td>3</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>5</td>
<td>7</td>
<td>2</td>
<td>78</td>
<td>22</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
<td>2</td>
<td>71</td>
<td>29</td>
</tr>
</tbody>
</table>

*Note.* Percentages are round to the nearest round number.
Figure 1. Relationship between golf score and the number of the golf round played during the study. Zero X value represents the average score of the three baseline 9 hole rounds. The first blue line represents the start of the meditation. The second blue line represents the start of the autogenic training.
Figure 2. The relationship between average score per week and percent of non-mindful reports.