

EVALUATION OF THE EFFECTIVENESS OF THE MINDFULNESS-ACCEPTANCE-
COMMITMENT (MAC) APPROACH IN RECREATIONAL GOLFERS

A Thesis
by
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Abstract

EVALUATION OF THE EFFECTIVENESS OF THE MINDFULNESS-ACCEPTANCE-COMMITMENT (MAC) APPROACH IN RECREATIONAL GOLFERS

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Although gaining popularity in the field of sport psychology, there is little empirical support behind the MAC approach. Moreover, none of these studies have examined the effectiveness of the MAC approach when applied to recreational or non-competitive athletes. The purpose of the present study was to examine the effects of the MAC approach on recreational golfers. Nineteen participants were randomly assigned to either the MAC treatment or control condition. Participants completed baseline and post-intervention golf performance tasks, as well as measures of mindfulness, flow, thought occurrence, and anxiety. Results showed that compared to the control group, the MAC treatment group exhibited significant increases in levels of mindfulness, and a trend towards significance in levels of flow. However, no significant changes were found on the golf performance tasks in the MAC and control groups from baseline to postintervention. Several potential explanations for these findings are discussed, as well as directions for future research.

Keywords: MAC approach, golf, mindfulness, acceptance, sport performance

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Foreword

This thesis is written in accordance with the style of the *Publication Manual of the American Psychological Association (6th Edition)* as required by the Department of Psychology at Appalachian State University.

Evaluation of the Effectiveness of the Mindfulness-Acceptance-Commitment (MAC)

Approach in Recreational Golfers

Mitchell Glenn Plemmons

Appalachian State University

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Evaluation of the Effectiveness of the Mindfulness-Acceptance-Commitment (MAC)

Approach in Recreational Golfers

In recent years, considerable research examining various methods of sport performance enhancement has accumulated. Although the majority of research has focused on physical mechanisms of enhancement (such as physical conditioning, diet, and supplements), several potential psychological methods of sport improvement have also been investigated. For example, a set of sport enhancement techniques, collectively referred to as Psychological Skills Training methods (PSTs), have been commonly recommended to athletes to improve performance outcomes. Developed on the premise that negative thoughts, emotions, and physiological experiences lead to impairment in sport performance, PSTs aim to help athletes control negative thoughts and emotions, increase self-confidence, and improve their ability to cope with external demands and internal processes (Gould, Eklund, & Jackson, 1992; Gould, Weiss, & Weinburg, 1981; Orlick & Parington, 1988; Whelen, Mahoney, & Meyers, 1991).

Although research supports the efficacy of PSTs, there is minimal evidence for their hypothesized mechanisms of change. In fact, some research appears to contraindicate efforts aimed at regulating internal experiences as they can result in negative outcomes, including a paradoxical increase in the thoughts, emotions, and physiological experiences the individual is attempting to control or avoid (Clark, Ball, & Pape 1991; Hayes, Follette, & Linehan, 2004; Purdon, 1999; Wegner, 1994; Wenzlaff & Wegner, 2000). Processing Efficiency Theory suggests that attention to task-irrelevant information (e.g., anxiety-related cues) consumes valuable mental resources, leaving less cognitive energy for focusing on the

performance task and resulting in suboptimal performance (Eysenck & Calvo, 1992). Research to date appears to support this theory, as studies suggest that task-irrelevant attention is related to poor athletic performance (Gould et al., 1992) and interventions that enhance task-focused attention appear to enhance performance (Crocker, Alderman, & Smith, 1988). Based on these observations, researchers have begun to examine the effectiveness of alternative strategies aimed at enhancing task-oriented concentration and subsequent performance by minimizing focus on negative cognitions or emotions.

Acceptance and Commitment Therapy

Acceptance and Commitment Therapy (ACT) (Hayes, Strosahl, & Wilson, 1999) is a form of behavior therapy that integrates mindfulness into a larger treatment protocol. ACT is based in Functional Contextualism, or a type of psychological pragmatism that emphasizes the ongoing act-in-context (Hayes, Strosahl, & Wilson, 2012) and attempts to integrate cognition and language into a behavioral analytic framework (Rector, 2013). The theoretical basis for ACT is Relational Frame Theory (RFT), which posits that the core of human language and cognition is the ability to learn to relate events under arbitrary contextual control (Hayes, Follette, & Linehan, 2004). In contrast to nonarbitrary stimulus relations (e.g., physical size), which are based on the formal properties of stimuli, arbitrary contextual control refers to the ability of humans to abstract aspects of relational responding and bring them under contextual control so that relational learning will transfer to events that are related on the basis of arbitrary cues rather than formal properties (Hayes et al., 2004). For example, although a nickel is physically larger than a dime, humans are able to learn that a dime can be “larger” based on arbitrary (i.e., nonformal or conventional) stimulus relations,

or the social convention that a dime is worth more than a nickel (Hayes et al., 2004). RFT asserts that humans think, reason, and communicate by deriving relations among stimuli (i.e., words and events), and it is necessary to analyze cognition in order to understand human behavior.

From an ACT perspective, psychological dysfunction is primarily the result of the tendency to misapply problem solving and language to “normal instances of psychological pain” (Hayes et al., 2012, p. 19). Attempts to respond to and control language can lead to experiential avoidance, inflexible attentional processes, and reduced attempts to pursue valued behaviors, which in turn results in psychological inflexibility. Based on this conceptualization, the primary focus of ACT treatment processes is the promotion of psychological flexibility, or the ability to contact the present moment fully, and change or persist in behavior in the service of chosen values based on situational context. ACT attempts to enhance psychological flexibility via six core processes of change: acceptance, contact with the present moment, self as context, cognitive defusion, value-driven behavior, and committed action towards value-driven behavior (Twohig, 2012).

A growing body of literature has provided empirical support for the efficacy of ACT in promoting psychological flexibility and increasing acceptance of negative internal experiences (Bond & Bunce, 2000; Hayes et al., 2004; Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009; Pull, 2009). Based on these observations, researchers have recently begun to apply ACT interventions to athletes in various sports as a method of sport enhancement with promising results. In one study, an ACT program led to higher levels of performance on a canoeing task among elite canoers than the hypnosis intervention (Garcia,

Villa, Cepeda, Cueto, & Montes, 2004). Similarly, another study found that that an ACT-based intervention led seven out of seven young, elite golfers to improve their national ranking compared to only two of six golfers in a control condition (Bernier, Thienot, Codron, & Fournier, 2009). In addition, golfers who completed the ACT program reported increased awareness of their surroundings and themselves, and improved ability to deal with anxiety-provoking situations in competition (e.g., club selection, distractions, and hesitation) (Bernier et al., 2009). Although the results of preliminary research on the utility of ACT-based interventions appear supportive, additional research is needed to evaluate the effects on sport performance enhancement.

The MAC Approach

Based on the lack of research supporting PSTs over the past 30 years and accumulating evidence supporting mindfulness and acceptance-based interventions, Gardner and Moore (2001) developed the Mindfulness-Acceptance-Commitment (MAC) approach to sport performance enhancement. The MAC approach is comprised of a combination of mindfulness exercises and ACT techniques, and is designed to enhance sport performance and general psychological well-being. Whereas the focus of traditional PSTs is on the attainment of optimal internal states (i.e., reduction or control of one's cognitions, physiological sensations, and emotional states), the MAC approach aims to enhance performance through the promotion of a non-judging, present-moment awareness and acceptance of one's internal status, attention focused on task-relevant external stimuli, and effortful values-driven commitment to behaviors that support athletic goals (Gardner & Moore, 2012).

The MAC program consists of seven weekly meetings between the client and a consultant, and includes out-of-session homework exercises. The first session provides participants with the rationale and goals of the MAC approach, and includes an explanation of the role of self-regulation of attention in sport performance, the importance of self-awareness, and an introduction to the idea of allowing cognitive events to be experienced without letting them affect performance. The next step in the MAC approach is to introduce the concept of mindfulness, and participants are provided instruction on proper techniques to engage in mindful awareness so that they can become more self-aware and experience external and internal events in a nonjudgmental way. The program then transitions into a discussion of cognitive defusion and the utility of values-driven behavior. Participants identify values and learn of the importance of acting in a manner that is congruent with these values instead of being influenced by their emotions. The concept of acceptance is introduced and described as critical in maintaining values-driven behavior. Next, specific behaviors and situations are defined so that participants may practice the mindfulness, commitment, and acceptance skills and concepts that they have learned thus far. The development of exposure hierarchies and out-of-session exposure activities are critical in this stage. Finally, potential obstacles are explored, and the ability to engage in future practice of mindful awareness, self-regulation of attention, and commitment to values-driven behavior is discussed (Gardner & Moore, 2007).

Although the MAC approach is based on empirically supported cognitive and behavioral principles and is gaining popularity in the field of applied sport psychology, there is limited research on its efficacy in sport enhancement. The first empirical test of the MAC

approach was conducted via two case studies of an elite adult weightlifter and a collegiate swimmer (Gardner and Moore, 2004), with results indicating that, upon completion of the program, the swimmer scored significantly lower on a sport anxiety measure than at baseline, while the power weightlifter lifted 15% beyond her previous best. Two subsequent case studies found similar results with a collegiate lacrosse player (Lutkenhouse, 2007) and an elite adolescent swimmer (Schwanhausser, 2009). Although these results are promising, case studies are only preliminary investigations into the effectiveness of an intervention.

Two open trials have also evaluated the effectiveness of the MAC approach in collegiate athlete samples. In one study, results indicated that collegiate field hockey and volleyball players who had completed the MAC intervention demonstrated a significant increase in self and coach ratings of athletic performance, task focused attention, and practice intensity compared to those who were in a no-intervention control group (Wolanin, 2005). Another study comparing the MAC approach to a traditional PST program for 19 collegiate athletes of various sports indicated that athletes in the MAC group displayed significant increases in their ability to describe ($d = .61$) and be nonreactive toward internal sensations ($d = 1.25$), accept present-moment experiences ($d = .95$), and commit to behaviors directly related to achieving their athletic goals ($d = 1.39$). However, no significant differences between the groups on self and coach ratings of athletic performance were found, and the small sample size did not provide enough power to assess performance changes. There were also no significant differences regarding effectiveness of the intervention across sports (Hasker, 2010).

To date, there has only been one randomized controlled trial examining the MAC approach (Lutkenhouse, Gardner, & Moore, 2007). In this study, 118 collegiate athletes from the sports of soccer, field hockey, crew, and wrestling were randomly assigned to complete the MAC program or a traditional PST program. Results revealed that the MAC participants exhibited significantly greater increases in coach ratings of performance, more aggressive practice and game behaviors, and reduced experiential avoidance and increases in flow experiences compared to a traditional PST program (Lutkenhouse et al., 2007). However, performance was only assessed using subjective report measures, limiting the ability to draw conclusions regarding the objective impact on athletic performance.

Given the promising but limited research regarding the efficacy of the MAC approach as a sport performance enhancement method, the methodological limitations inherent in each of the studies, and the growing popularity of the MAC approach among clinicians and athletes, it is critical that additional research examine the efficacy of the MAC intervention. Further, despite accumulating research indicating that recreational-level athletes frequently seek out sport enhancement strategies in an effort to improve their performance, researchers have yet to examine the effectiveness of the MAC program in recreational-level athletes. Thus, the purpose of this study is to examine the effects of the MAC approach on sport performance in a group of recreational golfers. It was hypothesized that participants who completed the MAC training protocol would exhibit significantly greater performance enhancement than participants assigned to a no-intervention control condition. In addition, consistent with previous research, it is anticipated that MAC participants will report

significant increases in mindfulness and higher levels of flow in comparison with control participants.

Methods

Participants

A sample of 19 Caucasian males was recruited for the study via an undergraduate psychology research pool and local advertisements. To qualify for the study, participants had to be in good physical health and have at least two years of golf experience. Participants ranged in age from 18 to 63 ($M = 24.37$, $SD = 12.24$) and had an average of approximately three years of golf experience ($M = 3.42$, $SD = 1.07$) prior to participation in the study. The minimum of two years of golf experience was required to reduce the possibility that low skill level would obscure the ability to detect an impact of the MAC program. Participants were randomly assigned to either the MAC treatment ($n = 10$) or control condition ($n = 9$). All participants used the same set of Ping G-15 irons, driver, and putter.

Measures

Performance Tasks. The driving and putting tasks described below are the primary performance tasks in the study.

Five Facet Mindfulness Questionnaire (FFMQ). The FFMQ (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006) is a combination of five existing mindfulness questionnaires and is designed to measure five global aspects of mindfulness: description, acting with awareness, nonjudging, nonreactivity, and observation. The FFMQ consists of 39 items that are rated on a 5-point Likert Scale from *Never or Very Rarely True* (1) to *Very*

Often or Always True (5). The measures that the FFMQ draws items from show good internal consistency, construct validity, and incremental validity.

Toronto Mindfulness Scale (TMS). The TMS (Lau et al., 2006) is a self-report measure designed to assess levels of mindfulness immediately following a mindfulness exercise. It is a 13 item scale with ratings from *Not at All* (0) to *Very Much* (4), and includes curiosity and decentering subscales. Results show that the TMS is a reliable and valid measure of mindfulness (Lau et al., 2006). The TMS was administered in addition to the FFMQ because the TMS is more sensitive to immediate fluctuations in mindfulness levels as a result of mindfulness practice, as opposed to the more global assessment of mindfulness that the FFMQ assesses. The TMS was given to participants immediately following the performance tasks to determine if they had changed in their levels of mindfulness during the golf tasks as a result of the MAC intervention.

Flow State Scale (FSS). The FSS (Jackson & Marsh, 1996) is a measure of flow in sport and athletic activity. The 36-item questionnaire contains nine scales: challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, concentration, sense of control, loss of self-consciousness, transformation of time, and autotelic experience. The FSS is rated on a scale from *Strongly Disagree* (1) to *Strongly Agree* (5). Internal consistency and construct validity estimates were found to be acceptable for the FSS, and supported the nine subscales (Jackson & Marsh, 1996).

Sport Anxiety Scale-2 (SAS-2). The SAS-2 (Smith, Smoll, Cumming, & Grossbard, 2006) is a 15-item multidimensional scale of anxiety in sport and athletic settings. Each item is rated on a four-point Likert Scale ranging from *Not at All* (1) to *Very Much* (4). The scale

contains three subscales measuring somatic anxiety, worry, and concentration disruption. Results assessing the scale's internal consistency, test-retest validity, convergent validity, discriminate validity, and predictive validity all prove promising in regards to the scale's psychometric properties (Smith et al., 2006).

Thought Occurrence Questionnaire for Sport (TOQS). The TOQS (Hatzigeorgiadis & Biddle, 2000) is a 17-item questionnaire that assesses cognitive interference athletes may encounter during competition. Each item is answered on a yes or no basis. The TOQS includes three subscales that evaluate task-related worries, task-irrelevant thoughts, and thoughts of escape. Analyses have shown that the scale has satisfactory convergent validity, concurrent validity, discriminant validity, and internal consistency (Hatzigeorgiadis & Biddle, 2000). The instructions were modified in the current study to reflect the driving and putting tasks.

Procedure

Participants in the MAC group met with a graduate student clinician and an undergraduate assistant for nine sessions. Participants completed two MAC sessions per week for five weeks. The first and last sessions were conducted on an individual basis and included all questionnaires and performance tasks. The second through eighth sessions consisted of the MAC Approach, and all sessions were modeled after the Gardner and Moore (2007) treatment manual. The first session lasted approximately 90 minutes, and each subsequent session lasted approximately 60 minutes.

The participants in the control group completed the first and ninth sessions, with the same time interval between these two sessions as in the MAC groups. However, they did not complete any of the intervention sessions.

Baseline Assessment Session. The first session included a semistructured interview described in Gardner and Moore (2007) to ensure that all participants expressed a desire to improve performance as a reason for seeking consultation and did not exhibit significant developmental, intrapersonal, or interpersonal psychological traits that would inhibit performance. Following the interview, participants completed a series of questionnaires that included the FFMQ, TMS, SAS-2, TOQS, and FSS and a baseline driving task.

The driving task was completed using a P3ProSwing Indoor Golf Simulator located in the Appalachian State University Indoor Golf Lab. Participants completed a series of 20 shots, using different clubs, on the virtual driving range. Participants completed two practice shots with each of the clubs utilized in the driving task (driver, three iron, five iron, seven iron, nine iron, pitching wedge) prior to the initiation of the 20 recorded shots. The distance of each of the 20 shots, as well as the distance off-center from the intended target, was recorded. Each participant completed the same series of shots using the same series of clubs in each driving task they completed. The order of shots and clubs was selected to mimic the experience of a typical nine-hole course on the golf simulator.

Once the driving task was completed, participants completed the baseline putting task which took place in an indoor putting room in the Appalachian State University Indoor Golf Lab. The putting task consisted of six different holes, varying in distance from 5 to 20 feet from the starting location. The order in which a participant completed these holes was

randomized in an attempt to minimize practice effects. Participants putted a golf ball until they made the golf ball into the hole. After each shot a participant took before making the hole, the distance from the hole to the closest edge of the ball was recorded. The participant then putted the ball again, from the location where their last shot stopped, until they completed the hole. After the putting task, participants completed another series of questionnaires concerning thought occurrence in the golf tasks, mindfulness, and a flow state scale.

First MAC Session. The first module of the MAC approach provided psychoeducation, including the rationale for the MAC approach and the role of self-regulated attention in performance, and related the information to the participant's personal athletic experience. The paradoxical effect of attempting to control negative internal events during competition was discussed, and participants were asked to consider how their performance may be impacted by simply allowing internal experiences to exist as temporary events in the mind that do not have to affect their performance. A brief centering exercise was completed at the end of the module to teach participants how to engage in mindful self-awareness. Clients were asked to practice this exercise before the next session.

Second MAC Session. The second session of the MAC approach began with the brief centering exercise and a discussion of homework and the participants' thoughts about the previous session. The rationale and importance of mindfulness was introduced, and a mindfulness exercise was assigned for homework. The goal of this session was to promote the idea of present-moment attention and simple, nonjudgmental acceptance of any thoughts

or emotions that may arise. The recognition that these internal events are temporary and not absolute truths was discussed, and the concept of cognitive defusion was introduced.

Third MAC Session. The third module expounded on the discussion of mindful awareness by introducing the idea of values-driven versus emotion-driven behavior. Commitment towards behaving in a manner congruent with a client's values even in the presence of temporary discomfort was discussed and contrasted with the experiential avoidance, or the avoidance of situations that are undesirable in an effort to prevent negative thoughts or emotions. Several other mindfulness exercises were introduced, and participants were reminded of the importance of frequently engaging in the practice of mindfulness to develop their self-awareness.

Fourth MAC Session. The focus of the fourth meeting was to discuss acceptance in detail. The ability to accept negative internal states while engaging in values-driven behavior was compared to the alternative method of avoiding uncomfortable thoughts and emotions. This was defined as poise, and the main goal of this session was to help participants develop and maintain poise and commitment while experiencing undesirable negative internal states.

Fifth MAC Session. The fifth module of the MAC approach is designed to enhance commitment by outlining the relationship between values, goals, and behaviors. Specific behaviors that reached participant's personal performance goals were discussed, and the achievement of these goals as a reflection of engaging in values-driven behavior was also explored.

Sixth MAC Session. The sixth MAC session began with several mindfulness exercises and culminated in the creation of exposure-based activities designed to enhance

poise. Participants identified difficult performance-related situations and grouped them into a hierarchy. Participants were asked to engage in one of these difficult situations in the following week while keeping in mind the ideas of present-moment awareness, acceptance of negative internal states, and commitment to values-driven behavior.

Seventh MAC Session. The final module included a review of the entire MAC approach and the main principles of mindfulness, acceptance, and commitment. Plans were made for the participants to continue to engage in future practice of self-regulation of attention after the program was completed.

Post-Intervention Assessment. The post-intervention session was completed by participants on an individual basis and included the completion of the baseline series of questionnaires and the driving task and putting task.

Results

Participant Demographics

One-way ANOVAs and chi-square analysis indicated that the MAC and control groups did not differ significantly in age, race, gender, or previous golf experience (see Table 1; all p 's > .16).

Preliminary Analyses

One-way ANOVAs indicated that the two groups differed on several of the outcome measures at baseline. See Table 2 for baseline means and standard deviations for the outcome measures. Consistent with the recommendations of Overall and Doyle (1994), to control for group differences at baseline, study hypotheses were tested using condition by time (2x2) mixed-model analyses of covariance (ANCOVAs), with baseline scores included as a

covariate. Significant interaction effects were analyzed by examining within-group simple effects and post hoc mean comparisons.

Analyses of covariance (ANCOVAs) were utilized. Baseline scores on each measure served as the covariate, post-treatment scores were entered as the dependent variable, and group assignment was entered as the independent variable.

Performance Tasks Baseline

A 2x2 repeated-measures ANCOVA of average shot distance indicated the group by time interaction effect exhibited a trend toward significance, $F(1, 16) = 3.73, p = .07, \eta_p^2 = .19$. Although a comparison of the change in shot distance by group was not statistically significant, the control group increased their average shot distance by 8 yards from baseline to post-intervention, whereas the MAC group exhibited a 7-yard decline in average shot distance.

A 2x2 repeated-measures ANCOVA of average shot accuracy did not reveal a significant or trend-level interaction effect, $F(1, 16) = 1.25, p = .28, \eta_p^2 = .07$.

A 2x2 ANCOVA of putting accuracy indicated that the main effect was nonsignificant, $F(1, 16) = 2.11, p = .17, \eta_p^2 = 0.12$. Similarly, the interaction effect on average distance of the missed putts from the holes on the putting task was also nonsignificant, $F(1, 16) = 0.35, p = .56, \eta_p^2 = 0.02$.

Questionnaire Analyses

After controlling for baseline differences, results of a 2x2 ANCOVA of TMS scores revealed a significant group by time interaction, $F(1, 16) = 7.91, p = .01, \eta_p^2 = 0.33$. Post hoc analyses revealed that the MAC group exhibited a significant increase in mindfulness from

baseline to post-intervention, $F(1, 9) = 5.44, p = .045, \eta_p^2 = 0.37$, whereas the control group did not ($p = .58$). Post hoc mean comparisons indicated that the MAC group exhibited significantly higher mindfulness scores on the TMS at post-intervention compared to the control condition, $t(17) = 4.11, p = .001$.

In contrast, a 2x2 repeated measures ANCOVA of FFMQ scores failed to indicate a significant interaction effect ($p = .39$).

A 2x2 ANCOVA of FSS scores revealed a significant interaction effect, $F(1, 16) = 9.19, p = .008, \eta_p^2 = 0.37$. Post hoc analyses revealed a trend level increase in flow states among the MAC group, $F(1, 9) = 3.24, p = .10, \eta_p^2 = 0.27$. In contrast, the control condition's FSS scores at baseline and post were consistent ($p = .95$). Post hoc mean comparisons revealed that the MAC group exhibited significantly higher FSS scores at post-intervention compared to the control condition, $t(17) = 2.97, p = .009$.

Repeated measures ANCOVAs of SAS-2 and TOQS scores failed to reveal significant interaction effects ($p > .30$).

Discussion

The MAC approach is a relatively new intervention in the field of applied sport psychology. Past research examining the effectiveness of the MAC approach is promising, but previous studies exhibit methodological limitations. Furthermore, researchers have yet to examine the intervention with populations other than competitive, high-level athletes. Therefore, the purpose of the present study was to assess the effects of the MAC approach on the sport performance of recreational golfers. It was hypothesized that participants who completed the MAC program would exhibit significantly greater performance enhancement

than participants in a control group, and would experience significant increases in mindfulness and flow in comparison to controls.

Results of the present study failed to support the hypothesis that the MAC approach would lead to significant improvement in sport performance. Results revealed nonsignificant changes in driving distance and driving accuracy in the MAC and control groups from baseline to post-intervention. Previous studies have shown mixed results when assessing the impact of the MAC approach on sport performance. The results in the present study are consistent with the findings in Hasker (2010), where no significant differences emerged between athletes in a MAC group and athletes in a control group on self and coach ratings of performance. In contrast, studies by Wolanin (2005) and Lutkenhouse et al. (2007) found significant sport enhancement following completion of the MAC program. However, it is important to note that these studies relied exclusively on subjective reports of performance. In the current study, behavioral measures of athletic performance were utilized to minimize the effects of bias inherent in subjective reporting. Specifically, the use of standardized golf tasks provided objectively quantifiable performance data, which may permit a more accurate representation of performance change than subjective self-perceptions. Thus, the results of the present study, in conjunction with previous research, suggests that completers of the MAC approach may report subjective improvement in performance, though objective measures of performance have failed to provide confirmatory behavioral evidence of sport performance enhancement.

The current study may have failed to find significant performance enhancement as a result of the MAC approach for numerous reasons. For example, the MAC approach may not

significantly impact sport performance among recreation-level athletes. The program, as outlined in Gardner and Moore (2007), was designed with the focus of enhancing performance among high-level and professional athletes who may be more committed to maximizing their performance, as skilled and professional athletes may rely on their performance for occupational, financial, or personal fulfillment. Amateur players do not experience the same demands from their performance, as their reasons for play may be largely due to recreational, social, or fitness reasons. Therefore, the ideas of committed action to athletic goals may not be as important to amateur athletes as it may be to highly skilled and professional players. Alternatively, is it possible that increased nuisance variance among recreation-level golfers obscured the ability to detect changes in performance. Specifically, recreational golfers possess a wider range of physical ability and performance variability, and are more prone to commit technical or strategic errors in golf compared to more skilled players, which may have overshadowed the impact of the mental effects of the MAC approach and resulted in a failure to detect subtle differences.

It is also possible that the specific performance tasks selected for the present study were not sensitive to the effects of the MAC approach. Although the performance tasks, simulator, and putting room were used in an effort to minimize the impact of environmental influences on the dependent variable, it is possible that the high level of standardization failed to present participants with the number/type of shots or environmental stimuli necessary to allow MAC participants to employ the techniques they learned in an efficacious manner. Indeed, previous studies that have found positive effects from the MAC approach on performance were implemented in naturalistic settings (e.g., Wolanin, 2005; Lutkenhouse et

al., 2007). Additional research will be needed to determine whether the MAC approach generates positive effects on objective measures of performance, and if so, under what specific circumstances.

The transfer of skills from instructional sessions to implementation in the performance tasks provides another area to be explored. All sessions of the MAC approach were discussed in the context of actual performance situations, using examples of how to implement certain techniques and strategies into each participant's golfing experiences. However, modeling of the use of the MAC approach during the actual objective performance tasks was not performed, perhaps limiting the transfer of skills from the sessions to the performance situations. Future studies should focus on the transfer of the MAC approach into the actual athletic context, to increase the generalizability of the program from sessions to real performance situations.

Although the MAC intervention did not appear to impact performance measures, analyses of relevant self-report measures provided partial support for the second hypothesis of the current study. Specifically, golfers who completed the MAC program reported significant increases in self-awareness and mindfulness during the golf performance tasks, as assessed by the TMS, whereas the control condition did not. These findings are consistent with the results of several other studies, which have also found improved mindfulness levels following completion of the MAC approach (Hasker, 2010; Lutkenhouse et al., 2007; Wolanin, 2005). In contrast to the observed changes in scores on the TMS, neither condition exhibited significant changes on the FFMQ. The results are inconsistent with findings from Hasker (2010), which found that athletes who completed the MAC approach were better able

to describe experiences, be nonreactive towards internal sensations, accept present-moment situations, and commit to behaviors in service of their athletic goals, which are all qualities assessed by the FFMQ. One potential explanation for the results may be that participants were focused on applying the practice of mindfulness in the athletic domain, rather than in all areas of life. Although the MAC approach promotes the use of mindfulness in everyday life, the purpose of the program is geared towards performance enhancement. This may explain why significant improvements were found on the questionnaire assessing mindfulness levels during the golf tasks while no significant differences emerged on the questionnaire examining global aspects of mindfulness.

In addition to the mindfulness questionnaires, the FSS was included to measure changes in flow. Several studies (Aherne et al, 2011; Lutkenhouse, 2007) have observed changes in flow state as a result of mindfulness practice in athletic contexts, and flow has been associated with enhanced sport performance (Jackson & Csikszentmihalyi, 1999; Ravizza, 2002). Flow state has been thought to include greater levels of concentration, sense of control, and external focus. Results of the present study were somewhat consistent with prior research in that the golfers in the MAC group displayed a trend toward significant increases on the FSS whereas the control group did not, which suggests that the MAC approach may enable athletes to experience greater concentration and focus.

Changes in sport-related anxiety as a result of the MAC intervention were assessed using the SAS-2. No significant differences emerged between the MAC group and the control group on the SAS-2. Additionally, no significant differences were found on the TOQS between the MAC group and the control group. The TOQS examines the emergence

of thoughts and worries during athletic activity. Although Gardner and Moore (2004) found a reduction in sport anxiety in a case study of a swimmer who completed the MAC approach, the theoretical rationale behind the program may explain the current study's findings. Based on ACT, the focus of the MAC approach is not to reduce or eliminate negative thoughts and emotions (Hayes et al., 1999; Gardner & Moore 2012). Rather, the acceptance of negative internal events and maintaining committed action towards athletic performance goals is emphasized. Therefore, observing a reduction of sport-related anxiety or changes in the frequency of negative thoughts and worries related to athletic activity would not necessarily be expected after undergoing the MAC approach.

Several limitations inherent in the design of the present study are noteworthy and may have impacted findings. One of the primary limitations of the present research was the use of a relatively small sample. Although the sample size was similar to the sample sizes used in previous research, small sample size limits the ability to detect small to medium effect sizes. Thus, it is also possible that the effects of the MAC approach on sport performance and mindfulness levels may be smaller than originally anticipated. The current sample was also limited by scheduling constraints, the time available to complete the study, and the time commitment involved in completing the MAC program. Results may have been different with a larger sample. For example, the results from the current study show no significant differences between groups on the FFMQ at the $p = .05$ level, although the differences do appear to be approaching significance. With a larger sample size, a future study may show that participants who completed the MAC approach may have significantly higher scores on the FFMQ after the program when compared to a control group.

Despite these limitations, several notable strengths add to the research basis of the MAC approach. For example, the use of solely recreational golfers adds an entirely new population to the literature on the program. As there are relatively few interventions designed specifically for recreational athletes, continuing to examine the utility of the MAC approach with this population would expand the scope of the research on methods for sport performance enhancement for recreational athletes. In addition, the present study also included participants across the age spectrum, ranging from 18 to 63. Whereas previous studies on the MAC approach have used college student samples, which limits the external validity of findings, the inclusion of both college students and members of the community increases the generalizability of these findings. Finally, the current study is the first to utilize objective performance tasks to assess the MAC approach's effectiveness on performance. By using controlled tasks, the present study was better able to isolate the impact of the intervention on performance than in previous studies. Although no significant performance enhancement was found after participants completed the MAC approach, the current study provides an initial investigation into the effectiveness of the program in a controlled setting and offers insight for future directions of research.

References

- Aherne, C., Moran, A. P., & Lonsdale, C. (2011). The effect of mindfulness training on athletes' flow: An initial investigation. *Sport Psychologist, 25*(2), 177-189.
- Baer, R., Smith, G., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment, 13*(1), 27-45.
- Baer, R. A. (2011). Measuring mindfulness. *Contemporary Buddhism: An Interdisciplinary Journal, 12*, 241-261.
- Barlow, D. H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic* (2nd ed.). New York: Guilford Press.
- Bernier, M., Thienot, E., Codron, R., & Fournier, J. F. (2009). Mindfulness and acceptance approaches in sport performance. *Journal of Clinical Sport Psychology, 3*(4), 320-333. doi:10.1037/a0030220
- Bond, F. W., & Bunce, D. (2000). Mediators of change in emotion-focused and problem-focused worksite stress management interventions. *Journal of Occupational Health Psychology, 5*, 156-163. doi:10.1037//1076-8998.5.1.156
- Clark, D. M., Ball, S., & Pape, K. (1991). An experimental investigation of thought suppression. *Behaviour Research and Therapy, 31*, 207-210. doi:10.1016/0005-7967(91)90115-J
- Chambless, D. L., & Hollon, S. D. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology, 66*, 7-18. doi:10.1037//0022-006X.66.1.7

- Chiesa, A., & Serretti, A. (2010). A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine, 40*(8), 1239-1252.
doi:<http://dx.doi.org/10.1017/S0033291709991747>
- Crocker, P. R. E., Alderman, R. B., & Smith, M. R. (1988) Cognitive-affective stress management training with high performance youth volleyball players: Effects on affect, cognition, and performance. *Journal of Sport and Exercise Psychology, 10*, 448-460.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
- Davidson, R. J. (2002). Toward a biology of positive affect and compassion. In R. J. Davidson & A. Harrington (Eds.), *Visions of compassion: Western scientists and Tibetan Buddhists examine human nature* (pp. 107–130). New York, NY: Oxford.
- Deeny, S., Hillman, C., Janelle, C., & Hatfield, B. (2003) Cortico-cortical communication and superior performance: An EEG coherence analysis. *Journal of Sport and Exercise Psychology, 25*, 188-204.
- Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition and Emotion, 6*, 409-434
doi:[10.1080/02699939208409696](https://doi.org/10.1080/02699939208409696)
- Garcia, R.F., Villa, R.S., Cepeda, N.T., Cueto, E.G., & Montes, J.M.G. (2004). Efecto de la hipnosis y la terapia de aceptación y compromiso (ACT) en la mejora de la fuerza física en piraguistas. *International Journal of Clinical and Health Psychology, 4*, 481–493.

- Gardner, F.L., & Moore, Z. E. (2001, October). *The Multi-level Classification System for Sport Psychology (MCS-SP): Toward a structured assessment and conceptualization of athlete-clients*. Workshop presented at the annual conference of the Association for the Advancement of Applied Sport Psychology, Orlando, FL.
- Gardner, F. L., & Moore, Z. E. (2004). A mindfulness-acceptance-commitment-based approach to athletic performance enhancement: Theoretical considerations. *Behavior Therapy, 35*(4), 707-723. doi:10.1016/S0005-7894(04)80016-9
- Gardner, F., & Moore, Z. (2006). *Clinical sport psychology*. Champaign, Il.: Human Kinetics.
- Gardner, F. L. & Moore, Z. E. (2007). *The psychology of enhancing human performance: The mindfulness-acceptance-commitment (MAC) approach*. New York: Springer Publishing Company.
- Gardner, F. L., & Moore, Z. E. (2012). Mindfulness and acceptance models in sport psychology: A decade of basic and applied scientific advancements. *Canadian Psychology, 53*(4), 309-318. doi:10.1037/a0030220
- Gould, D., Eklund, R. C., & Jackson, S. A. (1992). 1988 U.S. Olympic wrestling excellence: Mental preparation, precompetitive cognition, and affect. *The Sport Psychologist, 6*, 358-382.
- Gould, D., Weiss, M., & Weinburg, R. (1981). Psychological characteristics of successful and unsuccessful Big Ten wrestlers. *Journal of Sport Psychology, 3*, 69-81.

- Hasker, S. M. (2010). Evaluation of the Mindfulness-Acceptance-Commitment (MAC) approach for enhancing athletic performance. *Dissertation Abstracts International*, 71(9-B), pp. 57-90.
- Hatzigeorgiadis, A., & Biddle, S. H. (2000). Assessing cognitive interferences in sport: Development of the thought occurrence questionnaire for sport. *Anxiety, Stress & Coping*, 13(1), 65. doi:10.1080/10615800008248334
- Hayes, S. C., Follette, V. M., & Linehan, M. M. (Eds.). (2004). *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition*. New York: Guilford Press.
- Hayes, S. C., Strosahl, K., & Wilson, K. G., (1999). *Acceptance and commitment therapy: An experiential approach to behavior change*. New York: Guilford Press.
- Hayes, S. C., Strosahl, K., & Wilson, K. G. (2012). *Acceptance and commitment therapy: The process and practice of mindful change*. New York: Guilford Press.
- Hillman, C. H., Apparies, R. J., Janelle, C. M., & Hatfield, B. D. (2000). An electrocortical comparison of executed and rejected shots in skilled marksmen. *Biological Psychology*, 52, 71-83. doi:10.1016/S0301-0511(99)00021-6
- Jackson, S., Csikszentmihalyi, M. (1999). *Flow in sports: The keys to optimal experiences and performances*. Champaign, IL: Human Kinetics.
- Jackson, S. A., & Marsh, H. (1996). Development and validation of a scale to measure optimal experience: The flow state scale. *Journal of Sport & Exercise Psychology*, 18(1), 17-35.
- Janelle, C. M., Hillman, C. H., & Hatfield, B. D. (2000). Concurrent measurement of

electroencephalographic and ocular indices of attention during rifle shooting: An exploratory case study. *International Journal of Sport Vision*, 6, 21-29.

Kabat-Zinn, J., Massion, A. O., Kristeller, J., Peterson, L. G., Fletcher, K. E., & Pbert, L. (1992). Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. *American Journal of Psychiatry*, 149, 936-943.

Kabat-Zinn, J. (1994). *Wherever you go, there you are*. New York: Hyperion.

Kee, Y. H., & Wang, J. C. K. (2008). Relationships between mindfulness, flow dispositions and mental skills adoption: A cluster analytic approach. *Psychology of Sport and Exercise*, 9, 393–411. doi:10.1016/j.psychsport.2007.07.001

Khoury, B., Lecomte, T., Fortin, G., Masse, M., Therien, P., Bouchard, V., & ... Hofmann, S. G. (2013). Mindfulness-based therapy: A comprehensive meta-analysis. *Clinical Psychology Review*, 33(6), 763-771. doi:10.1016/j.cpr.2013.05.005

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

Linehan, M. M. (1993). *Skills training manual for treating borderline personality disorder*. New York: Guilford Press.

Lutkenhouse, J. M. (2007). The case of Jenny: A freshman collegiate athlete experiencing performance dysfunction. *Journal of Clinical Sport Psychology*, 1, 166-180.

Lutkenhouse, J., Gardner, F. L., & Moore, Z.E. (2007). *A randomized controlled trial comparing the performance enhancement effects of Mindfulness-Acceptance-*

- Commitment (MAC) performance enhancement and psychological skills training procedures.* Manuscript in preparation.
- Moore, Z. E. (2003). Toward development of an evidence based practice of sport psychology: A structured qualitative study of performance enhancement interventions (Doctoral dissertation, La Salle University, 2003). *Dissertation Abstracts International-B*, 64, 5227.
- Orlick, T., & Parington, J. (1988). Mental links to excellence. *The Sport Psychologist*, 2, 105- 130.
- Overall, J. E. & Doyle, S. R. (1994). Implications of chance baseline differences in repeated measurement design. *Journal of Biopharmaceutical Statistics*, 4, 199-216.
- Powers, M. B., Zum Vörde Sive Vörding, M. B., & Emmelkamp, P. G. (2009). Acceptance and commitment therapy: A meta-analytic review. *Psychotherapy and Psychosomatics*, 78(2), 73-80. doi:10.1159/000190790
- Pull, C. B. (2009). Current empirical status of acceptance and commitment therapy. *Current Opinion in Psychiatry*, 22(1), 55-60. doi:10.1097/YCO.0b013e32831a6e9d
- Purdon, C. (1999). Thought suppression and psychopathology. *Behaviour Research and Therapy*, 37, 1029-1054. doi:10.1016/S0005-7967(98)00200-9
- Rapee, R. M., & Lim, L. (1992). Discrepancy between self and observer ratings of performance in social phobics. *Journal of Abnormal Psychology*, 101, 728-731. doi:10.1037//0021-843X.101.4.728
- Ravizza, K. (2002). A philosophical construct: A framework for performance enhancement. *International Journal of Sport Psychology*, 33, 4-18.

Rector, N. A. (2013). Acceptance and commitment therapy: Empirical considerations.

Behavior Therapy, 44(2), 213-217. doi:10.1016/j.beth.2010.07.007

Ruiz, F. J. (2012). Acceptance and commitment therapy versus traditional cognitive

behavioral therapy: A systematic review and meta-analysis of current empirical

evidence. *International Journal of Psychology & Psychological Therapy*, 12(3), 333-357.

Sbrocco, T., & Barlow, D. H. (1996). Conceptualizing the cognitive component of sexual

arousal: Implications for sexuality research and treatment. In P. M. Salkovskis (Ed.),

Frontiers of cognitive therapy (pp. 419-449). New York: The Guilford Press.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive*

therapy for depression. New York: Guilford Press.

Smith, R. E., Smoll, F. L., Cumming, S. P., & Grossbard, J. R. (2006). Measurement of

multidimensional sport performance anxiety in children and adults: The sport anxiety

scale-2. *Journal of Sport & Exercise Psychology*, 28(4), 479-501.

Schwanhausser, L. (2009). Application of the Mindfulness–Acceptance–Commitment

(MAC) Protocol with an adolescent springboard diver: the case of Steve. *Journal of*

Clinical Sports Psychology, 3, 377–396.

Stopa, L., & Clark, D. M. (1993). Cognitive processes in social phobia. *Behaviour Research*

and Therapy, 31, 255-267. doi:10.1016/0005-7967(93)90024-O

Teasdale, J. D., Segal, Z., & Williams, J. M. (1995). How does cognitive therapy prevent

depressive relapse and why should attentional control (mindfulness) training help?

Behavior Research and Therapy, 33, 25-39. doi:10.1016/0005-7967(94)E0011-7

- Thompson, R. W., Kaufman, K. A., De Petrillo, L. A., Glass, C. R., & Arnkoff, D. B. (2011). One year follow-up of Mindful Sport Performance Enhancement (MSPE) with archers, golfers, and runners. *Journal of Clinical Sport Psychology, 5*, 99-116.
- Twohig, M. P. (2012). Introduction: The basis of acceptance and commitment therapy. *Cognitive and Behavioral Practice, 19*, 499-507. doi: 10.1016/j.cbpra.2012.04.003
- Wegner, D. M. (1994). Ironic processes of mental control. *Psychological Review, 101*, 34-52. doi:10.1037//0033-295X.101.1.34
- Wenzlaff, R. M., & Wegner, D. M. (2000). Thought suppression. *Annual Review of Psychology, 51*, 59-91. doi:10.1146/annurev.psych.51.1.59
- Wehlen, J., Mahoney, M., & Meyers, A. (1991). Performance enhancement in sport: A cognitive behavioral domain. *Behavior Therapy, 22*, 307-327.
- Wolanin, A. T. (2005). Mindfulness-Acceptance-Commitment (MAC) based performance enhancement for Division I collegiate athletes: A preliminary investigation (Doctoral dissertation, La Salle University, 2003). *Dissertation Abstracts International-B, 65*, 3735-3794

Table 1

Demographic Information

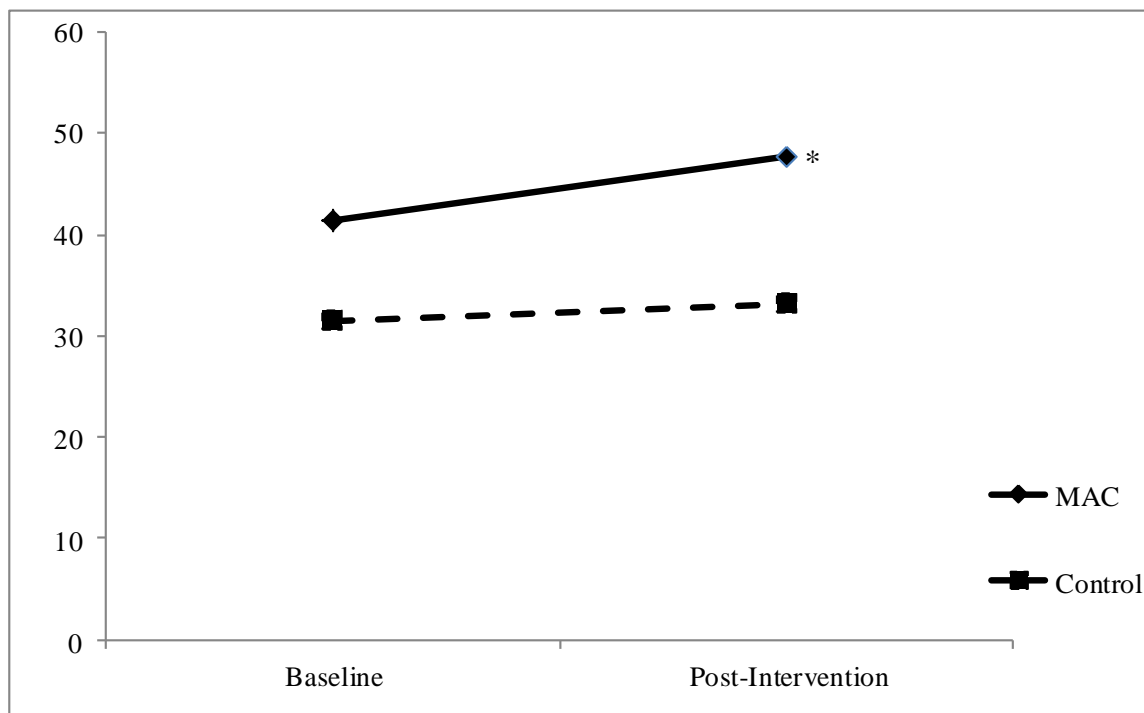
	<u>MAC (n = 10)</u>			<u>Control (n = 9)</u>		
	<i>n (%)</i>	<i>M</i>	<i>SD</i>	<i>n (%)</i>	<i>M</i>	<i>SD</i>
Age		28.90	15.80		19.33	1.41
Gender						
Male	10 (100%)			9 (100%)		
Race						
Caucasian	9 (90%)			8(89%)		
Other	1 (10%)			1 (11%)		
Average Rounds of Golf per Month		3.90	3.38		4.92	5.98
Average Round Score		85.22	12.11		85.33	5.92

Table 2

Baseline and Post-intervention Means and Standard Deviations for Average Driving Distance, Average Driving Accuracy, Number of Putts Needed to Make the Hole, Average Distance of Missed Putts, FFMQ, TMS, FSS, TOQS, and SAS-2

	MAC				Control			
	Baseline		Post-intervention		Baseline		Post-intervention	
	M	SD	M	SD	M	SD	M	SD
Driving Distance (yards)	171.56	19.41	163.22	22.09	170.55	39.27	178.71	27.42
Driving Accuracy (yards off center)	32.36	11.96	31.01	10.83	26.56	8.41	30.94	9.58
Putts Needed To Make Hole	1.98	0.25	1.95	0.19	2.18	0.39	1.92	0.18
Average Distance of Missed Putts (inches)	26.19	9.01	23.32	8.97	31.47	10.55	20.07	4.51
TMS	41.40	8.37	47.70	6.29	31.56	9.36	33.22	8.90
FSS	139.40	19.86	147.90	11.88	130.78	20.01	130.44	13.77
FFMQ	141.00	15.62	146.60	21.39	127.44	13.80	123.67	13.72
TOQS	27.30	3.97	32.50	1.35	26.78	4.87	33.00	1.22
SAS-2	22.70	7.02	22.60	5.44	22.56	6.44	20.33	3.94

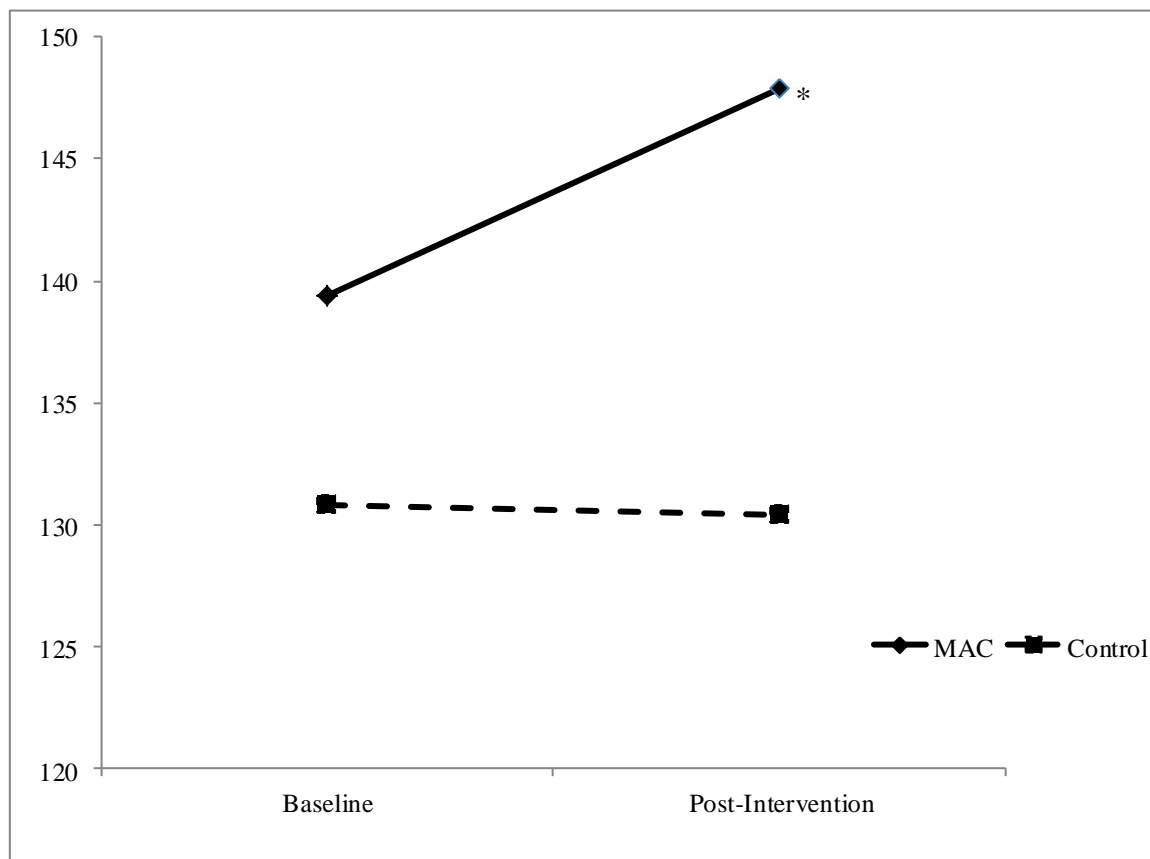
TMS



Note. *= Significant increase in TMS scores, $p < .05$

Figure 1. Mean TMS scores at baseline and post-intervention by condition.

FSS



Note. *= Trend level increase in FSS scores, $p = .10$

Figure 2. Mean FSS scores at baseline and post-intervention by condition.

Appendix A

To: Mitch Plemmons
Psychology
CAMPUS MAIL

From: Dr. Stan Aeschleman, Institutional Review Board Chairperson

Date: 9/16/2013

RE: Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)

Study #: 13-0055

Study Title: Evaluation of the Effectiveness of the Mindfulness-Acceptance-Commitment (MAC) Approach in Recreational Golfers

Submission Type: Renewal

Expedited Category: (7) Research on Group Characteristics or Behavior, or Surveys, Interviews, etc.,(4) Collection of Data through Noninvasive Procedures Routinely Employed in Clinical Practice

Renewal Date: 9/16/2013

Expiration Date of Approval: 9/15/2014

The Institutional Review Board (IRB) approved this study for the period indicated above. The IRB found that the research procedures meet the expedited category cited above. IRB approval is limited to the activities described in the IRB approval materials, and extends to the performance of the described activities in the sites identified in the IRB application. In accordance with this approval, IRB findings and approval conditions for the conduct of this research are listed below.

Regulatory and other findings:

The IRB waived the requirement to obtain a signed consent form for some or all subjects because the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context.

Approval Conditions:

Appalachian State University Policies: All individuals engaged in research with human participants are responsible for compliance with the University policies and procedures, and IRB determinations.

Principal Investigator Responsibilities: The PI should review the IRB's list of PI responsibilities. The Principal Investigator (PI), or Faculty Advisor if the PI is a student, is ultimately responsible for ensuring the protection of research participants; conducting sound

ethical research that complies with federal regulations, University policy and procedures; and maintaining study records.

Modification and Addendum: IRB approval must be sought and obtained for any proposed modification or addendum (e.g., a change in procedure, personnel, study location, study instruments) to the IRB approved protocol, and informed consent form before changes may be implemented, unless changes are necessary to eliminate apparent immediate hazards to participants. Changes to eliminate apparent and immediate hazards must be reported promptly to the IRB.

Approval Expiration and Continuing Review: The PI is responsible for requesting review in a timely manner and receiving continuing approval for the duration of the research with human participants. Lapses in approval should be avoided to protect the welfare of enrolled participants. If approval expires, all research activities with human participants must cease.

Prompt Reporting of Events: Unanticipated Problems involving risks to participants or others; serious or continuing noncompliance with IRB requirements and determinations; and suspension or termination of IRB approval by an external entity, must be promptly reported to the IRB.

Closing a study: When research procedures with human subjects are completed, please complete the Request for Closure of IRB review form and send it to irb@appstate.edu.

Websites:

1. PI responsibilities:

<http://researchprotections.appstate.edu/sites/researchprotections.appstate.edu/files/PI%20Responsibilities.pdf>

2. IRB forms: <http://researchprotections.appstate.edu/human-subjects/irb-forms>

CC:

Joshua Broman-Fulks, Psychology

Appendix B
Student Participant Consent Forms (MAC and Control group)

MAC Approach Group Consent Form:

Sport Performance in College Students

Principal Investigator: Mitchell Plemmons, Dr. Joshua Broman-Fulks

Department: Psychology

Contact Information: Dr. Joshua J. Broman-Fulks

Psychology Department
Appalachian State University
Boone, NC 28608
(828) 262-2726
bromanfulksj@appstate.edu

What is the purpose of this research?

You are being invited to take part in a research study about the effects of a brief training program on amateur golfers. You must be at least 18 years old, have at least two years of golf experience, and be right-handed to take part in this study. If you take part in this study, you will be one of about 20 people to do so. By doing this study, our hope is to examine how thought patterns influence sport performance.

What will I be asked to do?

The research procedure will be conducted at the Varsity Gymnasium. You will need to come here nine times during the study. Each visit will last about one hour. The total amount of time you will be asked to volunteer for this study is at most nine hours.

In the first session, you will be asked to fill out several questionnaires, undergo a semi-structured interview with the principal investigator regarding past sport performance, and complete a series of golf tasks. In the second through eighth sessions, you will undergo a psychological skills training program. In the ninth session, you will complete several questionnaires and a series of golf tasks.

What are possible harms or discomforts that I might experience during the research?

The potential risks involved in the study are minimal. There are no foreseeable risks. As with any physical activity, there may be some minor physical discomfort, but no more than would be encountered in daily life.

What are the possible benefits of this research?

You may experience personal benefit from this study as applying mindfulness techniques may improve your golf swing. Information gained from this research may also be used to help others in the future. The findings from this study may provide support for the usage of mindfulness techniques in enhancing sport performance.

Will I be paid for taking part in the research?

You will not be financially compensated for your participation. If you are signing up through SONA for this study, you will receive 10 ELC credits. Professors provide non-research alternatives to obtain the same amount of ELC credits.

How will you keep my private information confidential?

Your information will be combined with information from other people taking part in the study. When we write up the study to share it with other researchers, we will write about the combined information. You will not be identified in any published or presented materials

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information or what that information is. Your information will be deidentified, and your name will not be connected to any of the information we collect from you. You will be assigned a participant number that will be used to organize data without identifying participants from whom it was collected.

All information about participants will be kept in a locked filing cabinet for the duration of the study. Only researches involved in this study will have access to participant's records.

Data will be stored for a minimum of 7 years after the final report has been published. Data will be stored in digital format on a computer that is password protected so that only the experimenter and research assistants will have access to it. Paper questionnaires will be destroyed via a professional grade shredder. Digital data, which in no way will be connected with individual names or identifying information, will be kept indefinitely.

Who can I contact if I have questions?

The people conducting this study will be available to answer any questions concerning this research, now or in the future. You may contact Dr. Josh Broman-Fulks, Principal Investigator, at (828) 262-2726. If you have questions about your rights as someone taking part in research, contact the Appalachian Institutional Review Board Administrator at 828-262-2130 (days), through email at irb@appstate.edu or at Appalachian State University, Office of Research and Sponsored Programs, IRB Administrator, Boone, NC 28608.

Do I have to participate? What else should I know?

Your participation in this research is completely voluntary. If you choose not to volunteer, there will be no penalty and you will not lose any benefits or rights you would normally have. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. There will be no penalty and no loss of benefits or rights if you decide at any time to stop participating in the study.

This research project has been approved, as required, by the Institutional Review Board of Appalachian State University. This study was approved on October 1, 2013. This approval will expire on October 1, 2014 unless the IRB renews the approval of this research.

I have decided I want to take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should indicate your agreement:

- I have read (or had read to me) all of the above information.
- I affirm that I am at least 18 years old.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I understand that I can stop taking part in this study at any time.
- I understand I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

Participant's Name(PRINT)

Signature

Date

Control Group Consent Form:

Sport Performance in College Students

Principal Investigator: Mitchell Plemmons, Dr. Joshua Broman-Fulks

Department: Psychology

Contact Information: Dr. Joshua J. Broman-Fulks

Psychology Department
 Appalachian State University
 Boone, NC 28608
 (828) 262-2726
bromanfulksj@appstate.edu

What is the purpose of this research?

You are being invited to take part in a research study about the effects of a brief training program on amateur golfers. You must be at least 18 years old, have at least two years of golf experience, and be right-handed to take part in this study. If you take part in this study, you will be one of about 20 people to do so. By doing this study, our hope is to examine how thought patterns influence sport performance.

What will I be asked to do?

The research procedure will be conducted at the Varsity Gymnasium. You will need to come here two times during the study. Each visit will last about one hour. The total amount of time you will be asked to volunteer for this study is at most two hours. In each session, you will complete several questionnaires and complete a series of golf tasks.

What are possible harms or discomforts that I might experience during the research?

The potential risks involved in the study are minimal. There are no foreseeable risks. As with any physical activity, there may be some minor physical discomfort, but no more than would be encountered in daily life.

What are the possible benefits of this research?

You may experience improved performance in your golf game. Information gained from this research may also be used to help others in the future in enhancing sport performance.

Will I be paid for taking part in the research?

You will not be financially compensated for your participation. If you are signing up through SONA for this study, you will receive 10 ELC credits. Professors provide non-research alternatives to obtain the same amount of ELC credits.

How will you keep my private information confidential?

Your information will be combined with information from other people taking part in the study. When we write up the study to share it with other researchers, we will write about the combined information. You will not be identified in any published or presented materials

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information or what that information is. Your information will be deidentified, and your name will not be connected to any of the information we collect from you. You will be assigned a participant number that will be used to organize data without identifying participants from whom it was collected.

All information about participants will be kept in a locked filing cabinet for the duration of the study. Only researchers involved in this study will have access to participant's records.

Data will be stored for a minimum of 7 years after the final report has been published. Data will be stored in digital format on a computer that is password protected so that only the experimenter and research assistants will have access to it. Paper questionnaires will be destroyed via a professional grade shredder. Digital data, which in no way will be connected with individual names or identifying information, will be kept indefinitely.

Who can I contact if I have questions?

The people conducting this study will be available to answer any questions concerning this research, now or in the future. You may contact Dr. Josh Broman-Fulks, Principal Investigator, at (828) 262-2726. If you have questions about your rights as someone taking part in research, contact the Appalachian Institutional Review Board Administrator at 828-262-2130 (days), through email at irb@appstate.edu or at Appalachian State University, Office of Research and Sponsored Programs, IRB Administrator, Boone, NC 28608.

Do I have to participate? What else should I know?

Your participation in this research is completely voluntary. If you choose not to volunteer, there will be no penalty and you will not lose any benefits or rights you would normally have. If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. There will be no penalty and no loss of benefits or rights if you decide at any time to stop participating in the study.

This research project has been approved, as required, by the Institutional Review Board of Appalachian State University. This study was approved on October 1, 2013. This approval will expire on October 1, 2014 unless the IRB renews the approval of this research.

I have decided I want to take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should indicate your agreement:

- I have read (or had read to me) all of the above information.
- I affirm that I am at least 18 years old.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I understand that I can stop taking part in this study at any time.
- I understand I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

Participant's Name(PRINT)

Signature

Date

Vita

Mitchell Glenn Plemmons was born in Charlotte, North Carolina to Les and Lyn Plemmons. He graduated from Appalachian State University in Boone, NC in May 2012. He earned a Bachelor of Science degree, majoring in psychology. He remained at Appalachian State University in fall 2012 to begin study toward a Master of Arts degree in Clinical Health Psychology. He earned this degree in May 2015, and is planning on obtaining licensure and beginning practice in North Carolina.