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The Impact of Mindfulness Training in a Division I Gymnastics Team: A Pilot Study

by

Nicholas Cherup

A thesis submitted to the Graduate College
in partial fulfillment of the requirements
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The Impact of Mindfulness Training in a Division I Gymnastics Team: A Pilot Study

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Western Michigan University, 2017

The physical and psychological demands of sports can place an athlete under a variety of stressors. Subsequently, the way in which athletes deal with such stressors can positively or negatively affect their performance (Mellalieu, Hanton, & Fletcher, 2009). Flow is defined as a type of experience where one is completely engaged in an activity and optimally functioning. Recently, an increase in mindfulness and acceptance based approaches have been utilized as a means to augment negative emotions in sport and many have suggested a link between mindfulness and flow (Birrer, Röthlin, & Morgan, 2012; Kaufman, Glass, & Arnkoff, 2009; Gardner & Moore, 2004). Thus, if mindfulness can positively influence flow, perhaps performance can also be positively affected. There has also been a need to determine optimal intervention lengths to successfully teach mindfulness practices within sports teams (Gardner & Moore, 2014; Baltzell & Akhtar, 2014). The purpose of the current study was to examine the effects of a mindfulness training program on mindfulness scores, dispositional flow scores, and perceived stress scores within a population of Division I female collegiate gymnasts. Results from a repeated measures ANOVA indicated that athletes who participated in the mindfulness training demonstrated a statistically significant difference in the dispositional flow dimensions of loss of self-consciousness and the autotelic experience. These results suggest that mindfulness may influence factors associated with athletic performance.

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Nicholas Cherup

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INTRODUCTION

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An elite athlete has been described as one who possesses great physical skills and can perform under extremely demanding conditions (Whelan, Mahoney & Meyers, 1991). Optimal performance necessitates the integration of not only physical components, but also psychological skills throughout training and the competitive season. Successful athletes often describe their best performances as a state of being in the zone (Cooper, 1998). Typically, this feeling comprises the fusion of the mind and body where the individual responds to challenges fluidly and with poise, unencumbered by performance anxiety or distraction. An analogous construct known as flow describes experiences where individuals are completely immersed in an activity, perceive a match between their goals and skills, and are optimally functioning (Csikszentmihalyi 1990, 1992; Jackson, 1996). Past literature has examined dispositional characteristics of peak performance in sport, and it has been suggested that for an athlete to reach their fullest potential during competition, an underlying flow state must concomitantly occur (Jackson & Roberts, 1992).

Athletes also experience a wide range of stressors during their career and failure to successfully navigate emotions and other obstacles may be antithetical to overall performance and flow attainment (Russell, 2001). In the past, sports psychologists have approached mitigating stress and other barriers to performance using techniques that encourage the suppression of negative emotions while emphasizing more "ideal" mental states (Hardy, Jones, & Gould, 1996; Birrer & Morgan, 2010; Birrer, Röthlin, & Morgan, 2012). Although literature has shown this method to be indirectly beneficial, few studies have shown clear performance effects (Birrer et

al., 2012; Garner & Moore, 2004, 2012). Alternatively, over the last two decades mindfulness based approaches in sport have gained popularity as a means to augment negative emotions and bolster cognitions associated with enhanced well-being and optimal performance (Gardner & Moore, 2004, 2012; Kaufman, Glass, & Arnkoff, 2009). The method behind such practices differs from previous approaches insofar as mindfulness techniques utilize acceptance of unwanted mind states or stressors instead of trying to avoid or suppress negative thoughts. Consequently, navigating negative emotions through mindfulness practices is still not fully understood and necessitates additional studies (Aherne, Moran, & Lonsdale, 2011; Bernier, Theinot, Codron, & Fournier, 2009; Birrer et al., 2012).

Determining optimal intervention lengths (i.e., dosage effects) has also been a point of interest for sport researchers, as past approaches often require a substantial time commitment which may not be practical for the demanding and dynamic schedule of sports teams. Though previous studies have manipulated overall program lengths, ideal combinations to achieve benefits have yet to be determined (Moore & Gardner, 2014; Baltzell & Akhtar, 2014). In addition, given that sports teams are placed under demanding schedules (i.e. out of state competition, practice, etc.) there is a need to find ways to teach mindfulness to athletes in a time frame that is amenable to their schedule. Therefore, the current study used a training protocol containing twelve 1-hour sessions spanning the course of eighteen weeks. The current protocol was adapted from previous mindfulness interventions in sport (Gardner & Moore, 2004 & Kaufman et al., 2009) with the additional component of being flexible in the meeting requirements. Ultimately, this framework allowed mindfulness to be taught in a timeframe that coincided with the demanding schedule of a Division I female gymnastics team starting in the preseason and continuing into the competitive season.

Mindfulness

Mindfulness is a deeply rooted concept embedded in many eastern philosophies. The central theme of this contemplative practice is maintaining non-judgmental and open awareness of the present moment. The operational definition of mindfulness as a theoretical construct was initially presented by Bishop and colleagues (2004) and serves as a foundation for subsequent research. The definition is broken down into two components. The first element focuses on the regulation of internal attention at any given time, and the second element is concerned with a specific orientation toward the subjective experience in question. This quality of awareness primarily emphasizes curiosity and an open and accepting view of the present moment free of expectations. It is important to distinguish that the practice and overarching goal of mindfulness is not concerned with suppressing thoughts and feelings, but acknowledging and accepting reality and all its contents as a matter of conscious experience (Bishop et al., 2004). As a mechanism, research has indicated that mindfulness practices may help an individual to change their perception of emergent thoughts (i.e., see them as just thoughts) as opposed to identifying with or attaching to those thoughts (Shapiro, Carlson, Astin, & Freedman, 2006). In line with this view, it is understood that the content of thoughts and emotions remains the same but the relationship between the subject and those thoughts is altered. Researchers have also indicated that this change in perception can lead to increased calmness in the presence of external factors (Birrer et al., 2012). Ultimately, this frame of reference may provide positive outcomes when considering the potential stressors an athlete is faced with during the competitive season.

Mindfulness in Sports

Traditionally, professionals have approached psychological impediments to athletic performance using cognitive behavioral therapy (Jones & Hardy, 1990; Whelan et al, 1991; Wady

& Hanton, 2008). Often referred to as psychological skills training (PST), techniques which include imagery, mental rehearsal, arousal management, goal setting, and self-talk are practiced to help athletes foster a sense of self control (Vealey, 2007; Moore, 2009). The goal of PST is to focus attention on ideal performance skills while suppressing or discarding negative emotions or bodily states (Hardy et al., 1996). Though many professionals find this approach helpful, current information regarding its utility remains limited (Birrer et al., 2012; Garner & Moore, 2004, 2012). Mindfulness based practices offer a different approach to such problems insofar as they discourage the control or circumvention of internal experiences and suggest that the individual accept them as natural events that emerge in consciousness. Further, it may be that an athlete's ability to disengage from negative cognitions through acceptance mechanisms could allow them to move forward and perform more optimally in the future.

Although Kabat-Zinn and colleagues (1985) were the first to implement mindfulness training in collegiate and Olympic athletes, a recent increase in published research has surfaced with the use of mindfulness to increase sport performance. Past studies have scrutinized the effects of mindfulness training in a variety of sports including; archery, golf (Kaufman et al., 2009), long distance running (Thompson, Kaufman, De Petrillo, Glass, & Arnkoff, 2011), swimming (Schwanhausser, 2009; Garder & Moore, 2004), basketball (Gooding & Gardner, 2009), and soccer (Goodman, Kashden, Mallard, & Schumann, 2014; Baltzell, Caraballo, Chipman, & Hayden, 2014) and have generally found a positive impact on factors related to performance. Specifically, it has been proposed that mindfulness may alter elements such as attentional resource allocation, self-regulation, flexibility in thought, and less rumination, through the of reframing of stress or negative emotions (Birrer et al., 2012). Additionally, mindfulness interventions have been shown to decrease worrying, increase self-confidence,

increase enjoyment of participation in a specific sport, increase adherence to training regimens (Gardner & Moore, 2004), lessen perceived stress, (De Petrillo, Kaufman, Glass, & Arnkoff, 2009; Goodman et al., 2014), and decrease the risk of injury among athletes (Ivarsson, Johnson, Anderson, Fallby, & Altemyer, 2015).

Types of Mindfulness Interventions in Sports

Interventions such as the Mindfulness-Acceptance-Commitment (MAC) based approach to athletic achievement (Garner & Moore, 2004, 2007), the Mindful Sport Performance Enhancement (MSPE) program (Kaufman et al., 2009), and the Mindful Meditation Training for Sport (MMTS) program (Baltzell & Akhtar, 2014) all use techniques that encourage an athlete to stay in the present moment with the intent of canceling out external stressors that may inhibit their success during competition (i.e., draw on cognitive resources that may otherwise tax the athlete during competition). As previously indicated, the efficacy of such interventions has been examined in a wide variety of sports (Kaufman et al., 2009; Thompson et al., 2011; Schwanhausser, 2009; Gardner & Moore, 2004; Gooding & Gardner, 2009; Goodman et al., 2014; De Petrillo et al., 2009) and generally it has been found that such approaches have been effective for enhancing psychological traits associated with optimal performance. Specifically, decreased worrying, increased optimism, and increased enjoyment of sport participation underscore such factors. However, these interventions require a substantial time commitment that can place constraints on the dynamic nature and demanding schedule of collegiate athletics. For example, the MSPE approach is four weeks in length with each session lasting from 2.5-3 hours whereas the MAC approach contains seven modules that can be taught over twelve weeks. Though both interventions have produced fruitful outcomes within a performance enhancement context, researchers (Moore & Gardner, 2014; Baltzell & Akhtar, 2014) have suggested further

studies on the determination of optimal intervention lengths. Specifically, there is a need to develop shorter and more flexible individual sessions in an effort to export mindfulness concepts in a more efficient manner. Moreover, to our knowledge, there is a minimal amount of research examining the use of mindfulness training within a population of gymnasts (Smrdu & Kordeš, 2016).

Flow and Performance

The concept of flow was developed in the mid-seventies through the pioneering research of Csikszentmihalyi (1990, 1992). He interviewed individuals participating in challenging activities ranging from rock climbing to surgical procedures and distilled commonly reported experiences into nine interrelated dimensions: 1) attainment of challenge skill balance, 2) merging of action and awareness, 3) clear goal realization, 4) unambiguous feedback, 5) increased concentration, 6) paradox of control, 7) loss of self-consciousness, 8) transformation of time, and the 9) "autotelic experience" (Csikszentmihalyi 1990, 1992; Jackson, 1996; Jackson, 2000). Ultimately, the subjective experience of complete emersion in the specific activity, accompanied by implicit focus and joy, embodies the flow state. It has also been suggested that athletes who are completely immersed in their given sport and perceive a match between their skills and objectives find more intrinsic enjoyment of the task at hand (Jackson, 1996). Moreover, it has also been proposed that flow and optimal or peak performance are interrelated constructs (Privette, 1983), and that athletes perceive themselves as performing at their best during states of flow (Jackson & Roberts, 1992). Subsequently, finding ways in which to enhance such experiences or decrease the threshold at which they occur, may help an athlete's overall success and allow them to perform at their fullest potential during the competitive season.

Flow and Mindfulness in Sport

It has been suggested that increased attentional resources dedicated to proprioceptive cues can help an athlete to become more absorbed in a task, and thus predispose them to experience flow (Jackson &Csikszentmihalyi, 1999). Consequently, similarities between the key tenants of mindfulness and multiple dimensions of flow have led researchers to believe that mindfulness may influence the occurrence of such states (Bernier et al., 2009; Gardner & Moore, 2004, 2012). For example, it has been shown that those who participated in the MSPE and MAC programs have reported increases in flow measures (Kaufman et al., 2009; Schwanhausser, 2009; Gardner & Moore, 2012). Similarly, Aherne and colleagues (2011) found that athletes who participated in a 6-week mindfulness intervention showed increases in global flow scores as well as increases in the flow dimensions of clear goals and sense of control. When considering the trait of mindfulness in the absence of an intervention, Kee and Wang (2008) used a cluster analysis to study the relationship between mindfulness and flow in recreational athletes. Ultimately their results indicated that those who were more mindful, scored higher in the flow dimensions of challenge skill balance, clear goals, concentration, sense of control, and loss of self-consciousness. Together these findings support the notion that being more mindful may augment an individual's propensity to experience flow, however, further research is needed to examine this potential relationship across a broader range of sports, including gymnastics.

Stress as a Barrier to Optimal Performance

In direct opposition to the positive mental states associated with the construct of flow, athletes often experience a range of stressors that may have a negative impact on performance (Birrer et al., 2012; Neil, Hanton, Mellalieu, & Fletcher, 2011). Past literature has defined competitive stress as "an ongoing transaction between the individual and the environmental

demands associated primarily and directly with competitive performance" (Mellalieu, Hanton, & Fletcher, 2009, p. 4). Subsequently, these demands can influence cognitive anxiety, self-confidence (Woodman & Hardy, 2003), evaluations of athletic ability (Neil et al., 2011) and organizational stress perception (i.e coaches and coaching styles) (Fletcher & Hanton, 2003; Woodman & Hardy, 2001; Holt & Hogg, 2002), and may tax the athlete in such a way as to draw from resources that can otherwise be used to meet the demands of their sport (Birrer et al., 2012). Further, the way in which an individual appraises these stressors can positively or negatively affect their emotional response under pressure and effect how well they perform during competition (Neil et al., 2011). It is also pertinent to consider that collegiate athletes are faced with many additional stressors such as academic, physical, and social components, that may also negatively impact overall stress perception (Hwang & Choi, 2016). While past research has found that mindfulness based approaches positively impact acceptance of emotional experiences (Baltzell et al., 2014) and perceived stress among athletes (Goodman et al., 2014), there is a paucity of research looking at the effects of mindfulness training and overall stress in collegiate athletes. Therefore, the purpose of this study was to examine the effect of mindfulness training on mindfulness scores, dispositional flow state scores, and stress perception scores in a population of Division I female collegiate gymnasts. The primary hypothesis was that those who participated in the mindfulness training would report increased mindfulness scores, increased dispositional flow scores, and decreased stress scores over the twelve sessions.

METHODS

Participants

This study was conducted with seventeen Division I female gymnasts from a university in the Midwestern United Sates. The participants range in age varied from 18-21 (M = 19.59

years old, *SD* = 1.09). Sixteen (94%) of these participants were Caucasian and one (0.06%) participant identified as Asian or Pacific Islander. The participants varied in academic class and fifteen reported that they were not actively practicing mindfulness techniques prior to the start of the program. This study was approved by the university's institutional review board for human subject research.

Procedure

During the first session athletes were invited to participate in the study and it was also explained that participation in the data collection portion of the mindfulness training was completely voluntary. The athletes were also informed that they could withdraw from the research portion of the training at any time without penalty. In addition, all athletes were informed that their answers to the questionnaire data would be kept completely confidential and all scores would be analyzed as an aggregate. Informed consent was obtained from all participants and all gymnasts agreed to complete the questionnaires at pre- (session 1), mid- (session 7), and post-test (session 12). The mindfulness program used for the present study was adapted from Garner and Moore's MAC program (2007) and Kaufman et al.'s MSPE program (2009) and was led by a sport psychologist and graduate student. Specifically, the current protocol incorporated several group discussions about values, goals, and acceptance from the MAC program, along with additional mindfulness techniques from the MSPE program. One important modification from the previous approaches was that the current program utilized a flexible protocol which allowed for non-consecutive sessions to better accommodate the schedule of the team. Each session lasted approximately one hour and the total program consisted of twelve nonconsecutive sessions over an eighteen-week period that started in the preseason and continued into the competitive season. Each session was broken into two

components which included psychoeducation and group discussions about concepts related to mindfulness and performance. In addition, a formal meditation practice (10-20 minutes) with and without the practice of relaxation techniques was introduced throughout the program (body scan, progressive muscle relaxation, breathing exercises, walking mediation, imagery, yoga type stretching, and Qi Gong; see Table 1). Formal or informal mindfulness exercises were encouraged outside of the sessions, but not required.

Measures

The Five Facet Mindfulness Questionnaire (FFMQ). The FFMQ (see Appendix D) was developed by Bear, Smith, Hopkins, Krietemeyer, & Toney (2006). The FFMQ is 39-item questionnaire that measures five facets of mindfulness including: Observing, Describing, Acting with Awareness, Nonjudging, and Nonreactivity. All questions are rated on a five point Likert scale ranging from 1(never or very rarely true) to 5 (very often or always true). For example, an item asks; "When I have distressing thoughts or images I am able just to notice them without reacting." The instrument is scored by summing the items in each category (facet), and calculating the mean totals. A total mindfulness score can also be obtained by summing the individual category score means. The FFMQ has shown good internal consistency across populations and has been shown to be a valid measure of mindfulness with Cronbach alpha coefficients ranging from .72-.92 (Bear, Smith, Lykins, Button, Krietemeyer, Sauer, Walsh, Duggan, & Williams, 2008).

The Long Dispositional Flow Scale (DFS-2) - Physical. The DFS-2 (see Appendix E) was developed by Jackson and Eklund (2002) and is grounded in the theoretical framework of Csikszentmihalyi's flow theory (1990). The DFS-2 instrument was developed to assess all nine dimension of flow during a specific physical activity and include: 1) challenge skill balance, 2)

action and awareness merging, 3) clear goals, 4) unambiguous feedback, 5) concentration on the task at hand, 6) sense of control, 7) loss of self-consciousness, 8) transformation of time, and the 9) autotelic experience. The scale consists of 36 items that are rated on a five point Likert scale ranging from 1(never) to 5 (always). The participants were asked to rate the frequency of their experience of any of the nine dimensions of flow during their last practice or competition. An example question is; "I do things spontaneously and automatically without thinking too much." The instrument is scored by summing the items in each category and finding the mean totals. A total score can also be determined by summing the item averages across all categories. All nine subscales have been shown to be a reliable measure of dimensions associated with flow with Cronbach alpha measures ranging from .78-.90 (Jackson & Eklund, 2002).

The Perceived Stress Scale (PSS). The PSS (see Appendix F) was developed by Cohen, Kamarck, and Mermelstein (1983). The PSS instrument measures the degree in which an individual appraises their life as stressful over the previous month. The scale consists of 10 items and all answers are based on a 5 point Likert scale ranging from 0 (never) to 4 (very often), with four of the items reversed scored. An example question is; "In the last month, how often have you been angered because of things that are out of your control?" The instrument is scored by summing the ten items. The scale has been shown to be a reliable measure of stress perception with Cronbach alpha measures of .75-.91 (Cohen et al., 1983; Cohen & Williamson, 1988).

Statistical Analysis

To examine the effects of the current mindfulness intervention on mindfulness scores, dispositional flow scores, and perceived stress scores, descriptive statistics were analyzed along with a repeated measure ANOVA. A post hoc t-test with a Bonferroni adjustment was also used

to examine the mean differences between the pre-, mid-, and post-test scores. All data was analyzed using SPSS software.

RESULTS

Five Facet Mindfulness Questionnaire

Results from the repeated measures ANOVA indicated no statistically significant differences in the overall mean mindfulness scores at pre-(M = 115.24; SD = 12.63), mid- (M = 116.65; SD = 11.65), and post-test (M = 115.82; SD =15.75; F (2,17.098) = 0.222, p = 0.80). In addition, the results revealed no statistically significant difference in the individual FFMQ subscales including: observing, describing, acting with awareness, nonjudging, and nonreactivity (see Table 2).

Long Dispositional Flow Scale

Results from the repeated measures ANOVA indicated no statistically significant difference in the overall DFS-2 mean scores for participants at pre- (M = 13.96; SD = 1.05), mid- (M = 14.54; SD = 1.42), and post-test (M = 14.11; SD = 1.12; F (2, 32) = 1.745, p = 0.19). However, results indicated a statistically significant effect for time on two DFS-2 subscales including; loss of self-consciousness (F (2, 32) = 4.592, p = 0.02) and the autotelic experience (F (2, 32) = 5.175, p = 0.01). Specifically, a Bonferroni post hoc analysis indicated that there was a statistically significant difference between pre- (M = 9.76, SD = 3.01) and mid-test (M = 11.88, SD = 2.45) loss of self-consciousness scores with a p value below 0.05. Additionally, the post hoc analysis indicated a statistically significant difference between pre- (M = 15.76, SD = 2.19) and post-test (M = 14.18, SD = 2.13) autotelic experience scores with a p value below 0.05 (see Table 2).

Perceived Stress Scale

Results from the repeated measures ANOVA indicated that total PSS scores did not display a statistically significant difference for participants from pre- (M = 20.88; SD = 4.38), mid- (M = 20.75; SD = 4.78), or post-test (M = 20.37; SD = 5.12; F (2,30) = 0.075, p = 0.93; see Table 2).

DISCUSSION

The present study sought to determine the impact of a mindfulness intervention consisting of twelve 1-hour non-consecutive sessions on athletes' mindfulness scores, dispositional flow scores, and perceived stress scores. Results indicated that a statistically significant difference was found in the individual flow subscales of the loss of self-consciousness and the autotelic experience. These findings indicate that mindfulness practices may augment factors related to sport performance.

Five Facet Mindfulness Questionnaire

It was hypothesized that mindfulness scores would increase between pre-(session 1, i.e. preseason), mid-(session 7, i.e. preseason), and post-test (session 12, i.e. competitive season). The findings from the current study indicated that total mindfulness scores did not differ significantly over time. Surprisingly, these results differ from previous research insofar as mindfulness interventions have been shown to produce increased measures of trait mindfulness (Kaufman et al., 2009), nonjudgment, acceptance (Schwanhausser, 2009; Baltzell et al., 2014), acting with awareness, and decreased task related worries (Thompson et al., 2011) within athletic populations. When considering the results of the current study, it is important to note that while the researchers taught mindfulness exercises and other relaxation techniques during group sessions, twelve 1-hour meetings may have not been sufficient to instill a base of practice with

the athletes. Subsequently, future research should continue to examine optimal intervention lengths in order to determine the appropriate time requirement for such practices. While the non-consecutive nature of the current intervention was adaptable to the dynamic schedule of the athletic environment, unexpected cancelations as well as a 3-week hiatus due to the winter break may have had an influence on mindfulness scores. Thus, this discontinuity in the intervention sessions could have resulted in the athletes practicing less mindfulness than they would have if the meeting times were consecutive. Furthermore, while the athletes were encouraged to utilize these exercises in their daily lives, no measure was directly employed to track this progress (i.e. home meditation logs). Anecdotally, participants occasionally mentioned using mindfulness practices before bed, however in general, the majority of the athletes reported no other outside mindfulness practices. Following this line, Bishop and colleagues (2004) suggested that mindfulness is a skill that requires repetition, and that the continuation of these types of exercises (formal or informal), may help individuals to choose mindful states more frequently. Future studies should consider the use of take home logs to continually reinforce mindfulness techniques and potentially obtain more encouraging results.

Long Dispositional Flow Scale

It was hypothesized that total dispositional flow scores would increase over the course of the intervention. Results from the current study revealed that total dispositional flow scores did not differ significantly over time. However, statistically significant findings were found in the DFS-2 subscales, loss of self-consciousness and the autotelic experience.

When considering total DFS-2 scores, the current results differ from the majority of previous findings that have shown increased flow scores following mindfulness based interventions (Kaufman et al., 2009; Schwanhausser, 2009). Interestingly, the current results are

similar to those reported by Thompson and colleagues (2011), who observed no change in dispositional flow measures after a one year follow up in athletes who participated in the MSPE program. Thompson et al. (2011) postulated that lack of mindfulness practices over the twelve-month period could have resulted in decreased flow scores. Additionally, though many have articulated a potential relationship between mindfulness and flow (Gardner and Moore, 2004; Kaufman et al., 2009; Schwanhausser, 2009), further research is needed to determine if and how these constructs influence one another. Though the current results did not indicate any significant changes in total flow disposition scores over the course of the mindfulness intervention, lack of findings may also be explained by the somewhat obscure concept of flow itself. Given the elusive nature of these types of optimal experiences, self-reported measures can make it difficult to capture this phenomenon in close to real time. Moreover, the controllability of such experiences remains to be a point of interest for sports psychologists, with many indicating that specific situational factors such as lacking motivation, non-optimal concentration, and low perceived ability may make an individual more or less likely to experience and maintain flow (Jackson, 1995; Jackson, Kimiecik, Ford, & Marsh, 1998; Russell, 2001). In the current study, it may be that the way in which athletes dealt with perceived stress, increased pressure of the competitive season, as well as inconsistent attention during the meditation exercises translated into decreased flow results at the post-test.

Increases in loss of self-consciousness scores are consistent with past results, which indicate that individuals who display higher depositional mindfulness are more likely to experience this flow dimension (Kee & Wang, 2008; Cathcart, McGregor, & Groundwater, 2014). Based on the current results, the loss of self-consciousness measure was found to significantly increase from the baseline to the mid-test, however, this increase was not

significantly different from mid- to post-test. An important factor to consider is that the post-test was administered well into the competitive season. Consequently, it may be postulated that academic demands were greater at this time and these additional burdens compounded with an increase in competitive stress may have resulted in decreased self-consciousness scores. Highlighting the potential effect of stress on psychological well-being, Brown and Ryan (2003) proposed that individuals who are more mindful are potentially less perturbed by outside influences. In this context, it may be that lack of mindfulness practice, coupled with an increase in perceived academic and performance pressures, could have predisposed the gymnasts to feel concerned about competitive factors that were out of their control (i.e. judge scores, overall team progress, crowd views). Ultimately, these cognitions may have led to a decrease in the sense of self variable at the post-test.

When considering the results of the autotelic experience, it was found that this measure displayed a statistically significant decrease from pre- to post-test. This unexpected finding may also be illustrated by the competitive stressors placed on the gymnasts throughout the intervention. It is also important to emphasize that the final data collection occurred following two consecutive losses, and the autotelic experience is a measure of an individual's perception of an activity as intrinsically rewarding and deeply enjoyable. Therefore, consecutive losses prior to the post-test may have negatively affected these views. According to Jackson (1995), several features such as performance going poorly, non-optimal environmental or situational conditions, inappropriate focus and negative team play interaction, may prevent the experience of flow. Subsequently, the researchers of the current investigation noted a decrease in the team's energy during the post-test session (i.e., team expressed frustration about performance and progress) and

this deflated sense of team success may also have contributed to the decreased autotelic experience scores following the intervention.

Perceived Stress Scale

It was hypothesized that PSS scores would decrease between pre-, mid-, and post-test. Results indicated that perceived stress scores did not decrease significantly over the course of the intervention. These findings contradict previous research insofar as mindfulness training has been shown to lower perceived stress (Goodman et al., 2014), decrease worry (Gardner & Moore, 2004), and decreased perception of organizational stressors (De Petrillo et al., 2009) within athletic populations. One potential explanation for this disparity in results may also be attributed to the timing of the post-test data collection. Considering that the final questionnaires were distributed well into the competitive season and after two losses, the athletes may have harbored some frustrations over past performances. In addition, post-test measurements were collected in the middle of semester when academic and competitive demands were likely increasing. Therefore, it is possible that increased academic and athletic pressure could have influenced subjective performance appraisals and global stress scores. Correspondingly, it has been suggested that additional academic and social pressures can impact stress levels within collegiate athletes (Hwang & Choi, 2016). Lack of statistically significant changes in stress scores may also be the result of athletes not participating in mindfulness exercises on their own time. As previously mentioned, mindfulness is a skill that requires practice, and failure to commit to these techniques regularly, may hinder the emergence of more mindful states in the future.

Conclusion

Though past research has suggested a demonstrable link between mindfulness practices and factors related to enhanced sport performance (Birrer et al., 2012; Gardner & Moore, 2012), the current study failed to discern any statistically significant changes in mindfulness scores, total dispositional flow scores, and perceived stress scores following the mindfulness intervention. After reviewing these results, several important considerations have emerged.

One obvious barrier to the cultivation of mindfulness is adherence to the practices suggested. Simply asking athletes to practice, but not requiring them to do so may not have been enough of an incentive. Consequently, lack of a requirement to practice outside of the intervention sessions (i.e. home practices) may have stifled subsequent progress to achieve mindful states during the mid- and post-test. It is also important to consider that athletes are already under a demanding schedule, and asking them to perform additional tasks may be met with some resistance. Even when mindfulness can be incorporated into simple tasks throughout the day (i.e., while driving, walking to class, during meals), the mere fact that it is an additional requirement, may be a barrier for athletes to commit. It is also pertinent to address that even if home practices were tracked through logs or by other means, the researchers could never be certain that the athletes were doing the prescribed exercises. Future researchers should continue to explore interventions requiring home practice and design protocols in such a way as to accurately track individual progress.

In addition, when considering the current results, it also may be that the timing of data collection was a critical factor. Given that post-test measures were collected following two consecutive losses and during a point in the semester when academic stressors were presumably greater, measurements could have reflected a plateau in any acceptance and nonjudgment

progress gained during the intervention. Likewise, when considering the competitive nature of sports and the reality of demanding team schedules, researchers must collect data when the opportunity arises. From a practicality standpoint researchers must anticipate the emotional peaks and valleys during the season, and that these undulating views may positively or negatively influence data. It would be possible to collect data after several wins (i.e. increased positivity), however this approach may not produce an accurate representation of the team's outlook throughout the season. Thus, future research should continue to explore the timing of data collection and how it impacts team opinion (i.e. success or confidence) through instances of victory and defeat.

Another important consideration is that the design of the protocol and order in which mindfulness techniques were taught may have had an influence on the final results. Though the current protocol was flexible and allowed for brief sessions over the course of eighteen weeks, it may be that one hour of practice was not enough for the athletes to successfully cultivate mindful states throughout the season. Additionally, many different mindfulness techniques were incorporated into this intervention, and perhaps a more uniform design, consisting of fewer exercises, could have produced a better outcome. It seems likely that repetition of mindfulness exercises is a more salient factor for the cultivation of mindful states then overall time or variety of exercises. Future research should continue to examine the impact of teaching order and duration of mindfulness techniques in an effort to discern the best way to export such exercises to similar populations.

Finally, though performance aspects were not directly measured in this study, it is worth noting that five of the seventeen gymnasts finished the season with career high scores in their respective events. In addition, the team went on to break their all-time team score and set a

school record during their final meet. Moreover, the coach expressed that the team enjoyed the group sessions and felt that the program was an important aspect of their success. Anecdotally, these reports lend credence to the application of mindfulness based approaches in sport.

Limitations

Though this study brought to surface many important issues regarding the implementation of novel mindfulness interventions in sport, the use of control groups, randomization, tracking home practice, including more stringent performance measures, as well as using larger sample sizes would help to improve future studies. Consequently, many support the claim that there is a clear association between mindfulness and flow, however no study has provided a clear mechanism for how this occurs. Future research should continue to examine this relationship using more sophisticated approaches.

Tables

Table 1: Intervention protocol

Session	Discussion Topic	Relaxation Exercise	Mediation time
1	Introduction to Mindfulness	Formal Meditation	10 min
2	Introduction to Flow	Progressive Muscle Relaxation	10 min
3	Attentional Resources in Sport, Cognitive Diffusion, serial sevens exercise	Breathing Techniques	12 min
4	Anger, Controllable vs Uncontrollable Factors, Creating space between thoughts	Introduction to Qi Gong	14 min
5	Perfectionism, Resiliency, Self-Efficacy	Guided Imagery Exercise	16 min
6	Review of mindfulness practices in sport, use thus far	Raisin Exercise/ Mindful Walking	18 min
7	Values and Goals, distinction between value driven behavior and goal driven behavior	Formal Meditation	14 min
8	Self-Care through season, Fear and skillful vs unskillful ways of addressing fear	Mindful Stretching	16 min
9	Emotions toward injury, team vs individual injury, framing injury as a positive	Progressive Muscle relaxation/ Brief imagery exercise	18 min
10	Growth vs Fixed Mindset, grounding	Formal Meditation	20 min
11	Process vs Outcome	Mindful Stretching	20 min
12	Integration of mindfulness into practice and competition scenarios	Candle Exercise	20 min

Table 2: Repeated measures results with means and standard deviations

Measure:	Mean Pre	SD	Mean Mid	SD	Mean Post	SD	P-Value
Five Facet Mindfulness Questionnaire Total	115.24	12.63	116.65	11.65	115.82	15.75	0.80
FFMQ Subscales							
Observing	20.53	3.76	21.94	4.62	20.94	4.56	0.28
Describing	25.06	5.70	26.18	4.95	25.06	6.65	0.37
Acting with Awareness	24.94	6.05	23.82	5.10	24.76	5.31	0.38
Nonjudging	24.65	5.24	25.82	6.42	26.11	5.17	0.46
Nonreactivity	17.88	3.08	18.88	2.39	18.94	3.44	0.13
Long Dispositional Flow Scale 2 Total	13.96	1.05	14.54	1.42	14.12	1.12	0.19
Flow Subscales							
Challenge Skill Balance	15.24	1.52	15.82	1.94	15.82	1.98	0.39
Merging of Action and Awareness	12.47	1.87	13.24	1.60	13.0	2.18	0.42
Clear Goals	17.18	2.16	17.94	2.22	17.41	2.67	0.42
Unambiguous Feedback	15.24	2.61	16.41	2.67	16.41	2.35	0.08
Concentration on the Task at Hand	13.88	3.14	14.53	2.18	13.71	2.17	0.37
Sense of Control	14.29	1.93	14.88	1.93	14.76	2.05	0.43
*Loss of Self Consciousness	9.76	3.01	11.88	2.46	11.59	3.31	0.02*
Transformation of Time	11.82	2.01	10.65	3.82	10.18	3.57	0.12
*Autotelic Experience	15.76	2.19	15.47	2.10	14.18	2.13	0.01*
Perceived Stress Scale	20.88	4.38	20.75	4.78	20.38	5.12	0.93

Note. * indicates significance with a p value below 0.05 as a main effect for time.

Appendix A

Informed Consent

Western Michigan University
Department of Human Performance and Health Education

Principal Investigator: Carol Weideman
Student Investigator: Nicholas Cherup
Co-Principal Investigator: Zeljka Vidic
Co-Principal Investigator: Timothy Michael
Title of Study: The Impact of Mindfulness Training on Students
For Student Athletes

You have been invited to participate in a research project titled "The impact of mindfulness training on students." Information obtained from this study will be used as part of a master's thesis. Nicholas Cherup will be the student investigator and this project will satisfy the requirements of obtaining a M.S. Exercise Physiology degree. This consent document will explain the purpose of this research project and will go over all of the time commitments, the procedures used in the study, and the risks and benefits of participating in this research project. Please read this consent form carefully and completely and please ask any questions if you need more clarification.

What are we trying to find out in this study?

We would like to investigate the impact of a mindfulness training program on reports of trait mindfulness, stress perception, coping skills, self-efficacy, resiliency and flow state experiences in a population of students and student athletes. This will be done by comparing survey information obtained during the study.

Who can participate in this study?

You may participate if you are a current student athlete or student enrolled at WMU, between the ages 18 and 50, and are already participating in a mindfulness program. You may also be a student athlete or student who is not participating in a mindfulness program.

Where will this study take place?

Potential participants will be enrolled in a class or on a sports team that includes elements of formal and informal mindfulness training. Class or practice location will vary (and will likely occur where your normal practice or class takes place). If you chose to participate, you will do so during a particular course or at a designated practice session. All surveys will be distributed by the principal or co-principal investigators of the study. Adequate time will be allowed for you to complete the surveys at the beginning, midpoint and end of the mindfulness course (additional measurement may be included).

Potential participants will also be enrolled in a class or participating in a sport or class that does not have elements of formal or informal mindfulness training. If you chose to participate you will complete surveys at the beginning, midpoint and end of the semester. All surveys will be distributed by the principal or co-principal investigators of the study. All data collection will take place on the campus of WMU.

What is the time commitment for participating in this study?
Surveys will take approximately 15 – 20 minutes for you to complete on three separate occasions. You may also be asked to complete additional surveys after a performance, practice, or competition event (this will take approximately 2-4 minutes). In addition, a journal entry will be completed on the final day of the mindfulness training (10-15 minutes). If you are in a group that does not participate in mindfulness training you will not be asked to complete this final journal entry.

What will you be asked to do if you choose to participate in this study?
If you choose to participate in the study you will be asked to fill out a demographics sheet along with separate questionnaires which are designed to assess mindfulness and several other psychological variables. Surveys will be distributed at three separate intervals (pre, mid, and post time points). In addition, surveys may be distributed to you after a sporting event or other performance based activity. If you participate in the research component you will also be asked to write brief journal entry during the final mindfulness training session. Those who do not participate in the mindfulness program will not be asked to complete a final journal entry.

What information is being measured during the study?
Questionnaires - Several psychological variables will be assessed during this study. All measurements will be conducted using paper pencil based surveys. Primarily the authors are concerned with how mindfulness practices will influence the psychological profile of students and student athletes when compared to those who are not practicing mindfulness techniques.
Journal Entries - If you are in a class or on a team that is participating in a mindfulness course and agree to participate in the study, you will be asked to document any thoughts or feeling you had about the sessions completed. This will be done in the form of a final journal submission. These entries will be dated as well as coded and remain anonymous. Only the researchers will have access to this information. In addition, these entries will not be returned at the end of the semester. Only information gathered on individuals who agree to participate in the study will be used for the purposes of the research project.

What are the risks of participating in this study and how will these risks be minimized?
There are no known risks associated to you by completing the survey and demographic forms.

What are the benefits of participating in this study?
Your participation in this study will not have any individual benefits. However, information obtained from this study may add evidence to a growing body of knowledge centering around mindfulness practices in sports and performance based activities.

Are there any costs associated with participating in this study?
Time to fill out the questionnaires and the final journal entry is the only cost to you for participating in this study.

Is there any compensation for participating in this study?
There is no compensation for participating in this study.

Who will have access to the information collected during this study?
All information collected for the purpose of this study will remain anonymous through the use of a coding system. The investigators will maintain confidentiality to the best extent possible. The principal investigator (Dr. Carol Weideman) and co- principal investigators (Nick Cherup, Dr. Zeljka Vidic, and Dr. Timothy Michael) will be the only individuals with access to documents used for data collection. All data will be collected and analyzed as an aggregate (as a group and not per individual). The results may be published in an academic journal after the information has been collected and analyzed.

What if you want to stop participating in this study?
You can choose to stop participating in the study at any time for any reason. You will not suffer any prejudice or penalty by your decision to stop your participation. You will experience NO consequences either academically or personally if you choose to withdraw from this study. The investigator can also decide to stop your participation in the study without your consent. Should you have any questions prior to or during the study, you can contact the primary investigator Carol Weideman Ph.D. at 269-387-3087 or carol.weideman@wmich.edu. You may also contact the Chair, Human Subjects Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year. I have read this informed consent document.

The risks and benefits have been explained to me. I agree to take part in this study.

_____
Please Print Your Name Here

_____ _____
Participants Signature Date

Appendix B

Mindfulness Intervention Outline

Tentative Course Outline (example-subject to change)

Session 1: Sports Psychology Intro & Class Outline
Arrival and prep time: (10-15 min)

(Research Intro/Invitation) – Distribute Questionnaires (15-20 min)

- Lecture 1: Brief overview of sports psychology (psychological concepts, (positive/negative responses, coping skills, focus etc..) and the importance of maintaining the breath. The general format of the class will also be discussed. (20-30 min)

- Initial Sitting time: (5-10 min)

- Activity 1: Breathing exercises/Light Stretching (20-30 min)
    1. Basic Breath Awareness
    2. Breathing Exercises
    3. Stretching Exercises (These exercises will Include passive yoga poses. Primary muscle groups will be the main focus; quadriceps, pectorals, hamstrings, shoulders, back muscles will be stretched). Then emphasis will not be so much on the stretch itself, but what sensations and thoughts that emerge during the stretch (i.e. mindful awareness of the stretch).
    4. Discussion

Journal: (10-15 min) - All students and student athletes

Session 2: Mindfulness/Flow introduction
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture2: Mindfulness concepts will be discussed. Flow concept (multicomponent model) and experiences will be discussed. Group discussion and thoughts about the current topics. Discuss home practice – brief discussion to determine if anyone is practicing techniques outside of class. Also discuss what experience have been like if any such experiences have transpired. (20-30 min)

- Activity2: Progressive Muscle relaxation (20-30 min)
    1. Tense Relax-Guided
    2. Upper Body
    3. Lower Body
    4. Full Body
    5. Body Awareness and relaxation emphasis

6. Stretching exercise (passive stretching of various muscle groups)

Journal: (10-15 min) - All students and student athletes

Session 3: Being Present/Attention
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture 3: Continuation of mindfulness concepts and how they apply to the realm of sports. Discuss sustained attention concept. Discuss how thoughts effect behavior. Discuss the difference between avoidance and engagement. Discuss ways to attenuate the effects of cognitive diffusion (mindfulness techniques). Counting exercise with partner (partner tells a story while the other counts backwards from 100 by 7 then switch roles). Determine if partners could do both tasks simultaneously with accuracy. Discuss quality of attention and focus during day to day activities. Discuss home practice (20-30 min)

- Activity 3: Restorative/Yin Yoga (20-30 min)
    1. Long poses
    2. Focus on tension release
    3. Minimum 3-5 minute hold per muscle group/posture

Journal: (10-15 min) - All students and student athletes

Session 4: Self-Regulation, Focus & Athletic Performance
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture 4: Perfectionism, self-efficacy, and resiliency concepts will be discussed. How these factors could influence performance. Individual vs. team based sport application. Reaction to feedback. Discuss home practice (20-30 min)

Research Data Collection - Distribution of midterm battery assessment (15-20 mins)

- Activity 4: Qigong Exercise (20-30 min)
    1. Standing pose
    2. Water pulses
    3. Moon Circles
    4. Single leg pulses
    5. Water swings
    6. Carrying qi
    7. Roll the ball/Sweeps/Tapping Exercise
    8. Stretching exercise

Journal: (10-15 min) - All students and student athletes

Session 5: Stress Reactivity/Acceptance
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture 5: Physiological responses to stress and the various forms of stress will be addressed (fight or flight and its effects) along with long term effects. Physical (sport/training) vs mental stress (academic) will be addressed. Coping skills. Discuss home practice (20-30 min)

- Activity 5: Guided Body Scan Meditation (30-45 min)
    1. Rod Stryker or other recording
    2. Maintain awareness of thoughts, breath, and body sensations throughout
    3. Stretching exercise
    4. Discussion

Journal: (10-15 min) - All students and student athletes

Session 6: Values, Goals & Commitment
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture 6: Discuss challenges, persistence, and outlook with regards to adversity. Difference between motivation and commitment. What does the team want to accomplish? What does the individual want to accomplish? Discuss home practice. (20-30 min)

- Activity 6: Tai Chi (20-30 min)
    1. Intro and demo
    2. 12 forms
    3. Teach back
    4. Stretching Exercise
    5. Discussion

Journal: (10-15 min) - All students and student athletes

Session 7: Inspiration/Gratitude/Mindful Nutrition
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture 8: Motivation and inspiration. How may this help during competition? Overcoming complacency/procrastination or times when one feels there is no reason to continue. Benefits of nutrition. Informal quiz/discussion on RDA. Compare sedentary

nutrition needs to athletic needs. Cost/benefit of nutritional status. Discuss home practice (20-30 min)

- Activity 7: Yoga Flow (Vinyasa) – Higher intensity (20-30 mins)
    1. Sun salutations
    2. Inversions
    3. Dynamic stretching
    4. Discussion

    Journal: (10-15 min)

Session 8: Assimilation and Practice
Arrival and prep time: (10-15 min)

- Initial Sitting time: (5-10 min)

- Lecture 10: Maintain momentum. Does mindfulness have an impacted? Open discussion of practice outside of class. Will they continue in the future? (20-30 min)

- Activity 10: Yoga (Flow, yin, restorative combo) (20-30 min)
    1. Emphasis on body sensations
    2. Focus attention
    3. Loosen muscles

    Journal: (10-15 min) - All students and student athletes

Concluding remarks and expression of gratitude

(Final Research Day) – Distribute Questionnaires (15-20 min)

Appendix C

Demographic Survey

If Provided – Please record number given to you here _____

Please indicate which statement best describes your thoughts about mindfulness _____

Strongly Negative Negative Neutral Positive Strongly Positive

A. **Please enter your sport** _____

B. **Please enter your age** _____

C. **Please indicate your gender** _____

Male Female Transgender

D. **Please select your race/ethnicity**

American Indian or Alaskan Native Asian or Pacific Islander

African-American/Black Not of Hispanic origin Hispanic

White, Not of Hispanic Origin Bi/Racial/Multi Racial

E. **Please select the statement that best describes your current year in school**

1st Year Undergraduate Study 2nd Year Undergraduate Study

3rd Year Undergraduate Study 4th Year Undergraduate Study

5Th year Undergraduate Study Graduate Study

Post-graduate Study

F. **How long have you been practicing meditation or mindfulness?**

Have not actively practiced mediation or mindfulness 1 week to 6 months

6 months to 1 year 1 year to 3 years

Over 3 years

Appendix D

Five Facet Mindfulness Questionnaire

Description:
This instrument is based on a factor analytic study of five independently developed mindfulness questionnaires. The analysis yielded five factors that appear to represent elements of mindfulness as it is currently conceptualized. The five facets are observing, describing, acting with awareness, non-judging of inner experiences, and non-reactivity to inner experience

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

1. **When I'm walking, I deliberately notice the sensations of my body moving.**

   never or very true rarely true sometimes true often true very often or always true

2. **I'm good at finding words to describe my feelings.**

   never or very true rarely true sometimes true often true very often or always true

3. **I criticize myself for having irrational or inappropriate emotions.**

   never or very true rarely true sometimes true often true very often or always true

4. **I perceive my feelings and emotions without having to react to them.**

   never or very true rarely true sometimes true often true very often or always true

5. **When I do things, my mind wanders off and I'm easily distracted.**

   never or very true rarely true sometimes true often true very often or always true

6. **When I take a shower or bath, I stay alert to the sensations of water on my body.**

   never or very true rarely true sometimes true often true very often or always true

7. **I can easily put my beliefs, opinions, and expectations into words.**

   never or very true rarely true sometimes true often true very often or always true

8. **I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.**

   never or very true rarely true sometimes true often true very often or always true

9. **I watch my feelings without getting lost in them.**

   never or very true rarely true sometimes true often true very often or always true

10. **I tell myself I shouldn't be feeling the way I'm feeling.**

    never or very true rarely true sometimes true often true very often or always true

11. **I noticed how foods and drinks affect my thoughts, bodily sensations, and emotions.**

    never or very true rarely true sometimes true often true very often or always true

12. It's hard for me to find the words to describe what I'm thinking.

never or very true rarely true sometimes true often true very often or always true

13. I am easily distracted.

never or very true rarely true sometimes true often true very often or always true

14. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.

never or very true rarely true sometimes true often true very often or always true

15. I pay attention to sensations, such as the wind in my hair or sun on my face.

never or very true rarely true sometimes true often true very often or always true

16. I have trouble thinking of the right words to express how I feel about things.

never or very true rarely true sometimes true often true very often or always true

17. I make judgements about whether my thoughts are good or bad.

never or very true rarely true sometimes true often true very often or always true

18. I find it difficult to stay focused on what's happening in the present.

never or very true rarely true sometimes true often true very often or always true

19. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.

never or very true rarely true sometimes true often true very often or always true

20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

never or very true rarely true sometimes true often true very often or always true

21. In difficult situations, I can pause without immediately reacting.

never or very true rarely true sometimes true often true very often or always true

22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.

never or very true rarely true sometimes true often true very often or always true

23. It seems I am "running automatic" without much awareness of what I'm doing.

never or very true rarely true sometimes true often true very often or always true

24. When I have distressing thoughts or images, I feel calm soon after.

never or very true rarely true sometimes true often true very often or always true

25. I tell myself that I shouldn't be thinking the way I'm thinking.

never or very true rarely true sometimes true often true very often or always true

26. I noticed the smells and aromas of things.

never or very true rarely true sometimes true often true very often or always true

27. Even when I'm feeling terribly upset, I can find a way to put it into words.

never or very true rarely true sometimes true often true very often or always true

28. I rush through activities without being really attentive to them.

never or very true rarely true sometimes true often true very often or always true

29. When I have distressing thoughts or images I am able just to notice them without reacting.

never or very true rarely true sometimes true often true very often or always true

30. I think some of my emotions are bad or inappropriate and I shouldn't feel them.

never or very true rarely true sometimes true often true very often or always true

31. I think some of my emotions in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

never or very true rarely true sometimes true often true very often or always true

32. My natural tendency is to put my experiences into words.

never or very true rarely true sometimes true often true very often or always true

33. When I have distressing thoughts or images, I just notice them and let them go.

never or very true rarely true sometimes true often true very often or always true

34. I do jobs or task automatically without being aware of what I'm doing.

never or very true rarely true sometimes true often true very often or always true

35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.

never or very true rarely true sometimes true often true very often or always true

36. I pay attention to how my emotions affect my thoughts and behavior

never or very true rarely true sometimes true often true very often or always true

37. I can usually describe how I feel at the moment in considerable detail

never or very true rarely true sometimes true often true very often or always true

38. I find myself doing things without paying attention

never or very true rarely true sometimes true often true very often or always true

39. I disapprove of myself when I have irrational ideas.

never or very true rarely true sometimes true often true very often or always true

Appendix E

Long Dispositional Flow Scale (DFS-2)-Physical

Please answer the following questions in relation to your experience in your chosen activity. These questions relate to the thought and feelings you may experience during participation in your activity. You may experience these characteristics some of the time, all of the time, or none of the time. There are no right or wrong answers. Think about how often you experience each characteristic during your activity, then circle the answer that best matches your experience.
When participating in gymnastics

1. I am challenged, but I believe my skills will allow me to meet the challenge	Never	Rarely	Sometimes	Frequently	Always
2. I make the correct movements without thinking about trying to do so	Never	Rarely	Sometimes	Frequently	Always
3. I know clearly what I want to do	Never	Rarely	Sometimes	Frequently	Always
4. It is really clear to me how my performance Is going	Never	Rarely	Sometimes	Frequently	Always
5. My attention is focused entirely on what I am doing	Never	Rarely	Sometimes	Frequently	Always

Appendix F

Perceived Stress Scale-10 Item

Instructions: The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please indicate with a check how often you felt or thought a certain way.

1. In the last month, how often have you been upset because of something that happened unexpectedly?

___never ___almost never ___sometimes ___fairly often ___very often

2. In the last month, how often have you felt that you were unable to control the important things in your life?

___never ___almost never ___sometimes ___fairly often ___very often

3. In the last month, how often have you felt nervous and "stressed"?

___never ___almost never ___sometimes ___fairly often ___very often

4. In the last month, how often have you felt confident about your ability to handle your personal problems?

___never ___almost never ___sometimes ___fairly often ___very often

5. In the last month, how often have you felt that things were going your way?

___never ___almost never ___sometimes ___fairly often ___very often

6. In the last month, how often have you found that you could not cope with all the things that you had to do?

___never ___almost never ___sometimes ___fairly often ___very often

7. In the last month, how often have you been able to control irritations in your life?

___never ___almost never ___sometimes ___fairly often ___very often

8. In the last month, how often have you felt that you were on top of things?

___never ___almost never ___sometimes ___fairly often ___very often

9. In the last month, how often have you been angered because of things that were outside of your control?

___never ___almost never ___sometimes ___fairly often ___very often

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

___never ___almost never ___sometimes ___fairly often ___very often

Appendix G

In Class Recruitment Scripts

Experimental Group:

"Hello my name is Nick Cherup and I'm a second year graduate student at WMU. I would like to invite you to participate in a research project looking at the impact of mindfulness training on several different variables. I'm working on this project for the fulfillment of my master's thesis requirments. Participation is completely voluntary and failure to participate in the study will not impact your grade in this course or standing on your team. If you chose to participate you will fill out several forms today and at two different times during the mindfulness training. You may be asked to fill out additional forms after a practice or event if necessary. Answer the questions as honestly as possible. There are no right or wrong answers. All information collected for the purpose of this project will remain confidential. No individual answers will be examined independently and all data gathered will be analyzed as an aggregate. You may also discontinue participation in the project at any time without penalty. I appreciate your consideration on this. If you have any questions, please let me know. Thank you very much."

Control Group:

"Hello my name is Nick Cherup and I'm a second year graduate student at WMU. I would like to invite you to participate in a research project being conducted concerning health and wellness. I'm working on this project for the fulfillment of my master's thesis. Participation is completely voluntary and failure to participate in the study will not impact your grade in this course or standing on your team. If you chose to participate you will fill out several forms today and again on two separate occasions. Answer the questions as honestly as possible. There are no right or wrong answers. All information collected for the purpose of this project will remain confidential. No individual answers will be examined independently and all data gathered will be analyzed as an aggregate. If you have any questions, please ask me for clarification. You may also discontinue participation in the project at any time without penalty. I appreciate your consideration on this. Thank you very much."

Appendix H

Coaching Staff and Faculty Contact Email

Mindfulness education email:
Coach and or Dr./Mrs./Ms./Mr. _____,

Hello my name is Nick Cherup and I'm a second year graduate student in the exercise physiology program here at WMU. First off, I would like to say that I'm very passionate about health and also finding novel ways in which to facilitate performance improvements. Over the last few years, I have become very interested in mindfulness practices as a possible mechanism to increase performance. It has been shown that mindfulness training can positively influence unfavorable psychological states within students and student athletes (factors such as self-efficacy beliefs, rumination tendencies, and the way in which individuals perceives stress). Further, research indicates that these techniques may help to facilitate peak performance in athletic as well as academic settings. If these detriments to performance could be lessened, the overall results could translate into better experiences during competition and other challenging situations. I'm contacting you with the hope that we can set up a brief meeting to discuss these concepts and possibly work together in the future. I truly believe that practicing these techniques have many positive benefits and I appreciate you concern on this matter. Please get back to me at your earliest convenience.

Respectfully,

Nicholas Cherup

Control group email:
Coach and or Dr./Mrs./Ms./Mr. _____,

Hello my name is Nick Cherup and I'm a second year graduate student in the exercise physiology program here at WMU. First off, I would like to express my passion for health and wellness as a lifestyle. I am an avid supporter of exploring new way in which to enhance performance experiences. Subsequently, I'm very interested in student and athletic performance from a psychological perspective. I'm currently conducting a research project examining the effects of several psychological constructs that may be related to an individual's overall performance capacity. I'm contacting you with the hope that we can set up a brief meeting and discuss these concepts in more detail. I also hope that we may possibly work together in the future. I believe that this research is not only beneficial for students and student athletes, but the general population as well. I appreciate you concern on this matter. Please get back to me at your earliest convenience.

Respectfully,

Nicholas Cherup

Appendix I

HSIRB Approval Letters

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: August 31, 2016

To: Carol Weideman, Principal Investigator
Nick Cherup, Student Investigator for thesis
Zeljka Vidic, Co-Principal Investigator

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number 16-08-04

This letter will serve as confirmation that your research project titled "The Impact of Mindfulness Training on Students" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., ***you must request a post approval change to enroll subjects beyond the number stated in your application under "Number of subjects you want to complete the study***)." Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: **August 30, 2017**

1903 W. Michigan Ave., Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276
CAMPUS SITE: 251 W. Walwood Hall

WESTERN MICHIGAN UNIVERSITY

Human Subjects Institutional Review Board

Date: November 2, 2016

To: Carol Weideman, Principal Investigator
Zeljka Vidic, Co-Principal Investigator
Nicholas Cherup, Student Investigator for thesis

From: Amy Naugle, Ph.D., Chair 16-08-04

Re: HSIRB Project Number

This letter will serve as confirmation that the change to your research project titled "" requested in your memo received October 28, 2016 (to remove numbers associated with the Likert scale responses on the Five Facet Mindfulness Questionnaire, Long Dispositional Flow Scale, Short Flow Scale, and the Perceived Stress Scale) has been approved by the Human Subjects Institutional Review Board.

The conditions and the duration of this approval are specified in the Policies of Western Michigan University.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: **August 30, 2017**

1903 W. Michigan Ave., Kalamazoo, MI 49008-5456
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Sincerely,

Robert Most
Mind Garden, Inc.
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