

A SMARTPHONE MINDFULNESS-BASED INTERVENTION PILOT STUDY WITH COMPETITIVE HIGH SCHOOL BASEBALL PLAYERS

Blake Costalupes^{1*}, Jenelle N. Gilbert^{2*}, Wade Gilbert², Michael G. Coles²

¹*College of Physical Activity and Sport Sciences, West Virginia University*

²*Department of Kinesiology, California State University, Fresno*

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Costalupes B., et. al. Mindfulness-based interventions (MBIs) have shown efficacy with diverse populations. The training periods for sport MBIs range 4-10 weeks, but positive outcomes have been found during the first 2-4 weeks. This is promising as athletes have busy schedules. Additionally, smartphone MBIs are gaining in popularity, but research with them is just beginning. Therefore, the purpose of this pilot study was to investigate a brief MBI with competitive high school baseball players. Participants included four athletes (mean 15.6 years) from one club team and their head coach. The athletes completed mindfulness training via Headspace (headspace.com). Each athlete was interviewed post-intervention. The head coach was also interviewed to gain insight into any observed changes in his athletes. Consensual Qualitative Research analysis resulted in four categories: Mindfulness, Readiness for Competition, Self-confidence, and Perceptions of the Intervention. All athletes discussed the MBI as facilitative for mental preparation for competition. Further, one athlete initially reporting low self-confidence, felt that his confidence improved after participation in the pilot study. Finally, all participants identified the app as a convenient way to practice mindfulness given their busy schedules. Positive outcomes in the current study are supported in the literature and provide insight into the efficacy and acceptability of a smartphone MBI. Future directions for research and implications for applied settings are discussed.

Key Words: Mindfulness, high school, student-athlete, smartphone, baseball

Kabat-Zinn (2003) defined mindfulness as “the awareness that emerges through paying attention, on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment” (p. 145). Arising from the use of meditation practices from Asian traditions, without any religious or cultural ideology, mindful meditation has become a blend of eastern-traditional and western psychologies (Kabat-Zinn, Lipworth, & Burney, 1985). MBIs have shown efficacy in clinical populations (Baer, 2003; Garland, Tamagawa, Todd, Specia, & Carlson, 2013; Kabat-Zinn et al., 1985; Piet, Wurtzen, & Zachariae, 2013; Schmidt et al., 2011), as well as in educational settings (Harpin, Rossi, Kim, &

Swanson, 2016; Zenner, Hermleben-Kurz, & Walach, 2014). Sport-specific MBIs have also emerged to help athletes seeking to gain a mental edge in their sport performance.

One of the earliest MBIs used in sport was the Mindfulness-Acceptance-Commitment approach (MAC; Gardner & Moore, 2004). The MAC approach emphasized athletes’ self-regulation with a focus on helping them thrive in competition and in long-term training. In a recent study using the MAC approach, Gross et al. (2018) found that NCAA Division III (DIII) women’s basketball players ($n = 18$) reduced behaviors related to substance abuse, emotional dysregulation, hostility, generalized anxiety, and

psychological distress. These results were found after seven weeks of training, with each session lasting 60 minutes. Participants also increased in sport performance measures such as concentration, strength, and motivation.

Another popular MBI in sport is the Mindful Sport Performance Enhancement approach (MSPE; Kaufman, Glass, & Amkoff, 2009). In addition to sitting mindfulness meditation training, MSPE incorporates the use of walking meditation adapted to a sport-specific context. A 4-week MSPE program with recreational archers and golfers showed increases in state flow experience and mindfulness, while distance runners decreased in perfectionism and performance anxiety (De Petrillo, Kaufman, Glass, & Arnkoff, 2009; Kaufman et al., 2009). More recently, Chen, Tsai, Lin, Chen, and Chen (2019) examined the effects of a 4-week MSPE intervention on Taiwanese amateur baseball players. Results showed improvements in flow states, and decreases in disordered eating, sleep disturbances, and cognitive performance anxiety.

Additionally, Haase et al. (2015) piloted a 7-week MBI called Mindful Performance Enhancement Awareness and Knowledge (mPEAK) that specifically focused on post-intervention changes in the athletes' neural activation patterns during an interoceptive challenge. The USA Bicycle Motocross (BMX) team ($n = 7$) self-reported higher levels of awareness and mindfulness and increased scores on the describing subscale of a mindfulness assessment. Lower levels of alexithymia, and greater activation in the insula and anterior cingulate cortex (ACC) were also found. Results indicate that the intervention could lead to a greater ability to adapt to stressful and adverse situations in sport.

Common findings in studies examining MBIs using mindfulness- and acceptance-approaches in sport are that the participants report decreased general and performance-related anxiety, increased focus and mindfulness, and that they are better able to handle adversity (Noetel, Ciarrochi, Van Zanden, & Lonsdale, 2019). But most sport MBIs require a lengthy commitment (i.e., 4-8 weeks) with multiple sessions each week; additionally, each session typically lasts a minimum of 45 minutes, with some sessions taking as many as 2.5-3 hours (Kaufman et al., 2009). For athletes, coaches, and sport administrators, this time

investment can be a limiting factor in their willingness to participate. However, some studies using MBIs, such as the MAC approach (Gardner & Moore, 2004), and the MSPE approach (Kaufman et al., 2009) have garnered positive results in the first 2-4 weeks of training.

In an attempt to see if positive findings could occur in an even shorter timeframe, Cote, Baltzell, and Diehl (2019) used the 6-hour Mindfulness Meditation Training for Sport 2.0 program (MMTS 2.0). They investigated the potential impact on how NCAA DI tennis athletes ($n = 9$) dealt with competition distress. Results showed that the participants attributed the mindfulness and compassion skills gained through the intervention in helping them to respond appropriately when experiencing adverse situations in their sport. These results are promising, especially for athletes who face a great deal of sport adversity, namely baseball players.

Baseball is recognized as a game of failure. In fact, Major League Baseball Hall of Fame players' career statistics show that these elite athletes retired with batting averages near or slightly above .300 (Baseball-Reference.com, 2020) meaning that the most successful players only get a hit three out of every 10 at-bats. This high rate of failure (~70%) can be frustrating and lead to diminished self-confidence and sport performance output. Baseball players may positively benefit from engagement in MBIs, especially those in adolescence. The adolescent period is fraught with developmental milestones, and physical and psychological stress (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Etzel, Ferrante, & Pinkney, 2002), and student-athlete populations are at greater risk for developing adverse mental health conditions (Carr & Davidson, 2014; Etzel et al., 2002; Sarkar & Fletcher, 2014). With the assistance of MBI's, adolescent student-athletes who have high demands on their time may better cope (and potentially thrive) in sport competition. Given these potential outcomes, helping adolescent athletes find ways to practice mindfulness training is warranted.

Finally, MBIs using technology (i.e., smartphone) are a relatively new way for individuals to practice mindfulness training. According to Perez (2020), the top 10 grossing meditation applications (apps) for smartphones on the market in 2019 generated \$195

million in revenue and accounted for 52 million first-time downloads. Though smartphone MBIs have become increasingly available and popular amongst the public, research examining them is just beginning. For example, some studies utilizing the Headspace MBI via smartphones have shown decreased markers of stress and mind-wandering, and increased levels of mental well-being (Bennike, Wieghorst, & Kirk, 2017; Bostock, Crosswell, Prather, & Steptoe, 2019; Economides, Martman, Bell, & Sanderson, 2018; Howells, Ivtzan, & Eiroa-Orosa, 2016). Given these positive outcomes, the current pilot study to investigate a brief MBI with competitive high school baseball players is warranted.

METHODS

Participants

Participants were recruited during the summer by contacting club baseball coaches in Central California. All participants identified as aspiring to pursue baseball at the college level. Most coaches contacted ($n = 17$) did not accept the invitation to participate due to schedule conflicts. One head coach did allow his team to participate. All players ($n = 13$) engaged in the MBI; four completed the interview. These players had a mean age of 15.6 years ($SD = 0.79$). Although the coach did not engage in the MBI, he was interviewed to gain additional insight into his players' experiences with the smartphone-MBI.

Procedures

After obtaining institutional approval, and securing a team to participate, the primary researcher attended a team meeting. At this time, the study was presented to the coaches, parents, and players and assent and informed consent forms were completed. The athletes ($n = 13$) were asked to report any prior experience with mindfulness; no athletes reported previous mindfulness training. At the completion of the meeting, a \$15 iTunes gift card was distributed to each player and his cell phone number was collected.

At the start of the intervention, players were instructed to use their iTunes gift card to purchase and download *Headspace*, and to complete a minimum of three 10-minute mindful meditation sessions each week. The primary researcher sent reminder text messages to the players to help them

complete their training. At the 2-week intervention mark, the researcher returned to the field to check in with the athletes. At that time, the coach informed the researcher that the remaining tournament was cancelled, for reasons that were not explained. Though the period to engage with the MBI was meant to total four weeks, the coach's announcement cut this short, resulting in a 2-week intervention period. Following the intervention period, the researcher contacted all 13 athletes several times to organize the individual interviews and complete data collection. The interviews were supposed to occur at the tournament that was cancelled. Six athletes responded, however, only four actually scheduled and completed the interview. At this time, it was decided to invite the coach to also participate in the interview process. Though he did not use *Headspace* himself, he was aware of the pilot study's focus and spent a lot of time with his athletes. As such, he could provide insight into potential changes in his athletes and discuss athlete conversations regarding their use of *Headspace*, their perceptions, and other potentially valuable information. All interviews were conducted at a time and place mutually convenient for the researcher and athlete or coach.

Instruments

Headspace is currently the most peer-reviewed mindfulness app on the market and has led the way in investigating the efficacy of online-based mindfulness training (Jayewardene, Lohrmann, Erbe, & Torabi, 2017; Lim, Condon, & DeSteno, 2015). The *Headspace* app scored the highest on engagement, functionality, visual aesthetics, and information quality in comparison to some other leading mindfulness apps on the market at the time (Mani, Kavanagh, Hides & Stoyanov, 2015). Thus, *Headspace* was chosen for this study.

A recent study on qualitative interviewing and epistemics highlighted the importance of interviewer training and that impact that this can have on shaping the interaction between the interviewer and the interviewee (Roulston, 2018). Prior to the participant interviews, the primary researcher engaged in interview training with the secondary researcher. Key points addressed in this interview training included appropriate body language, the use of eye contact, how to effectively probe participants for additional

information, and the use of neutral interviewer responses (i.e., stating, “thank you for sharing that” instead of “good” or “great” after the participant finished speaking). This interview training occurred over a 2-week period.

A semi-structured interview guide was utilized and included 11 questions. The questions explored the athletes understanding of mindfulness, their perceptions of the MBI and whether they observed any changes in themselves as a result of their participation, and their overall perceptions regarding the efficacy and convenience of using a smartphone MBI. When appropriate, probing questions were asked (e.g., “Can you tell me a little more about ...?”) to elicit a more in-depth response. The primary researcher conducted all interviews, with each one lasting approximately 15 minutes. All interviews were audio recorded.

Data Analysis

All interviews were transcribed verbatim and analyzed following the Consensual Qualitative Research approach (Hill et al., 2005), which focuses on finding common experiences among participants (Zakrajsek, Fisher, & Martin, 2017). To start, the primary researcher identified meaning units, organized them with initial labels, and then organized them into categories. The secondary researcher reviewed the transcripts independently from the primary researcher, but the researchers met weekly to discuss the data and their organization in weekly hour-long peer review meetings. Additionally, the primary researcher, a former competitive baseball player, identified his own biases and discussed these with the secondary researcher. These conversations provided an opportunity for the research team to acknowledge and bracket any biases and capture the athletes’ voices, rather than what they may have expected them to say (Hill et al., 2005). In this way, the organizational framework (i.e., the categories, sub-categories, and meaning units) emerged with the two researchers discussing and arriving at consensus regarding the organization of the data. Each peer review meeting was documented and provided evidence of the data analysis process. Thus, an audit trail (Beck, 2009; Wolf, 2003) as just described, along with the peer review and debriefing meetings were

the primary reliability and validity tactics used for the current study.

RESULTS

The data analysis procedures resulted in four major categories: Mindfulness, Readiness for Competition, Self-confidence, and Perceptions of the Intervention. Results are presented using pseudonyms for participants in order to ensure confidentiality.

Mindfulness

Due to the athletes and coach not having any prior exposure to mindfulness, it was important to solicit their understanding. When asked to describe this in his own words, Coach Henry stated that “mindfulness means that you take into account what your thought process is as opposed to a gut reaction.” One athlete (Anthony) stated, “mindfulness basically just means just how much I can connect to my own brain and my own soul.” When discussing mindfulness, Oscar emphasized the ability to focus, handle stress and adversity as important components and provided an example of its importance in the team-specific context:

When you make an error, we don’t want the guys to stay focused on it; we want them to relax and just move on from it and keep their mind set on one thing and don’t worry about the bad things.

This quote illustrates the importance of focusing on tasks in the present moment that are going to help with performance, rather than on past mistakes. These are key aspects of mindfulness.

In summary, while each participant’s definition of mindfulness varied slightly, all included an aspect of being in the present moment. Also, each participant believed mindfulness could be specifically applied to baseball, and provided examples of how they used this tool to assist with performance (e.g., “being able to focus on the one thing you want to do”, and “lock in or focus”).

Readiness for Competition

All four athletes identified that they were mentally ready for competition on a regular basis but believed that mindfulness training provided additional benefits. These benefits related to readiness and included helping the athletes relax and

stay at ease in tough situations. For example, when asked about the difference in his approach to competition after the intervention, Oscar explained, “I was more relaxed. When I was stressing over striking out, I just took a deep breath and relaxed and didn’t let anything get to my mind.” Coach Henry identified small changes in his athletes’ readiness to compete following the intervention and stated, “You know what I’ve noticed is they’re more apt to being locked in; when we talk about the psychological part of our game they’re a little more locked in and open to trying to make an adjustment whereas before it was kind of foreign to them. With this app, it’s become a little more real to them to understand this is another part of the game.”

Overall, the athletes were ready for competition, but acknowledged that after the intervention, they were better able to remain relaxed and at ease through adverse situations. In addition, their coach claimed that the athletes had increased awareness about their psychological preparation and how best to accomplish this after the brief intervention.

Self-Confidence

Three athletes reported that they were confident prior to the present study. However, one athlete, Owen, admitted to having low confidence and found the intervention to be helpful:

I like it [the mindfulness intervention]. I used it during the time I didn’t have that much confidence in myself and I was struggling a bit. But after using the app I felt more confident in myself... I think they [levels of self-confidence] changed a lot. They helped me get through a time where I didn’t really have confidence at all.

Unlike his teammates, Owen struggled with confidence, but noted that mindful meditation was a useful tool for increasing his self-confidence, even in the short duration of two weeks.

Perceptions of the Intervention

The athletes noted that the meditation app was enjoyable and fun to use, as well as effective. Roger stated that the mindfulness intervention could help him, “get in a good mindset, not think about too many other things, just the one thing you wanna do.” Regarding his perception of the intervention, Anthony stated, “I wouldn’t change anything at all, I

think it was perfect.” The athletes also acknowledged that using the app was convenient and effective because they could choose when to meditate and practice mindfulness, even just before a game. Roger said, “I liked it...you can use it whenever you want.” Coach Henry agreed:

The age group you were working with, they’re attached to that device. So having it (meditation training) be there versus having to set aside a time of no device where they have to be locked in and meditate the old-school yoga way, which is good, but in this day and age with that age group I think this (a smartphone-based app) is definitely a good option.

The athletes enjoyed the mindfulness app and found it fun. Further, because the app was on their smartphone, they could engage in mindfulness training anytime, anywhere, at their convenience.

DISCUSSION

The purpose of this pilot study was to investigate a brief MBI with competitive high school-aged baseball players. The athletes used their smartphone to access the mindfulness app, *Headspace*. Although the intervention was scheduled for four weeks, a cancelled tournament cut the intervention time short resulting in a 2-week mindfulness training intervention. Individual interviews were conducted with four athletes and the coach to investigate their insights about the intervention. Four major themes emerged: Mindfulness, Readiness for Competition, Self-Confidence, and Perceptions of the Intervention.

Prior to the intervention, none of the athletes had participated in any mindfulness training. As such, the athletes were asked about their understanding of mindfulness as a result of participation in the intervention. Their definitions, while slightly different, shared an emphasis on connecting to oneself. They also emphasized a “now” focus and not worrying about things that were not important in the present moment. These results parallel concepts of mindfulness as it is characterized, in part, by a deliberate focus of attention in the present moment (Kabat-Zinn, 2003). Additionally, statements about feeling more relaxed in stressful situations throughout the game and being able to move on are aspects that are learned from mindfulness and acceptance-based approaches, such as in the MAC approach (Gardner & Moore, 2004). It appears that

the brief exposure to a smartphone MBI gave participants some insight into a particular key concept of mindfulness.

Some concepts of mindfulness were also apparent as they affected the participants' levels of mental readiness before competition. Engaging in mindfulness could be an asset when attempting to prepare for a sporting performance. Coach Henry believed that the athletes gained a novel awareness of the mental aspect of baseball, which helped them be more mentally ready for competition. The athletes self-reported that mindfulness could present further benefits to mental readiness, such as gains in relaxation in the midst of adversity. This finding is consistent with athletes who used the MAC approach and were able to recognize and "let go" of unhelpful/stressful thoughts and emotions rather than try to eliminate or get rid of them (Dehghani, Saf, Vosoughi, Tebbenouri, & Zarnagh, 2018; Gardner & Moore, 2004). Though they used the 8-week Mindful Performance Enhancement, Awareness & Knowledge (mPEAK) protocol (Haase et al., 2015), elite Bicycle Motocross (BMX) riders showed similar results. More specifically, they reported being better able to physically and emotionally adjust to adverse conditions. Finally, NCAA DI tennis players who completed the 6-hour MMTS 2.0 perceived the mindfulness skills as important means for learning how to "respond optimally to adversity through observing, accepting, and offering self-compassion toward negative internal states on and off the court" (Cote et al., 2019, p. 203).

Self-confidence emerged as another key theme in the pilot study, and while three of the four athletes described themselves as having a lot of self-confidence, the same could not be said for the fourth. Owen struggled with self-confidence, but felt an increase in this area that he attributed to the MBI. As the only athlete who identified low confidence, the MBI could be considered, if only by self-report, as being beneficial in increasing his level of self-confidence. This finding is consistent with Kaufman et al. (2009). In their investigation of the MSPE approach, a mindfulness intervention specifically designed to achieve flow, these authors identified increased self-confidence as one of the outcomes. Owen's self-reported increase in self-confidence after the intervention is promising especially when

considering that he engaged in mindfulness training using the *Headspace* app for only two weeks. The athletes shared several insights about their experiences with their brief mindfulness training period. To start, the smartphone app was identified as a convenient method of engaging in mindfulness practices because the athletes could choose when to use it based on their individual needs and schedules. One consideration for the use of a smartphone app to practice mindfulness is the amount of time that adolescents already spend on their phone each day, with some reporting seven or more hours (Jacobo, 2019; Kamenetz, 2019). The growing body of literature on screen time in children and adolescents suggests that the adverse effects of addictive use of mobile phones is due, in part, to content and media type (Lissak, 2018). As a result of the benefits shown through exposure to mindfulness protocols with adolescents regarding health and well-being (Harpin et al., 2016; Zenner et al., 2014), it may be possible that empowering youth to use their phones to practice mindfulness may mitigate their exposure to negative content and media types, while promoting cognitive and emotional benefits.

According to Mani and colleagues (2015), *Headspace* was the highest rated app when compared to other MBIs offering similar types of training. Participants in the present study believed that the app was an acceptable means of engaging in mindfulness training. A positive experience with the app might increase the frequency of the users' engagement, and ultimately lead to a more positive perspective on mindfulness training. Since the publication of Mani and colleagues' work, and the initiation of the current study, several other mindfulness apps have emerged. These include *Aware- Meditation & Mindfulness*, *Calm- Meditate*, *Sleep, Relax*, *The Mindfulness App*, and *Lucid*, and may offer similar benefits when accessed through an adolescent's smartphone. A smartphone MBI, whether it is *Headspace* or one of the others listed above, could prove to be a more practical approach to traditional and time intensive MBIs.

When looking to the literature on mental skills training, which is related to mindfulness training, there is evidence that short interventions can lead to positive outcomes. For example, a short 10-20-minute self-talk intervention helped participants

maintain proper squat kinematics while engaging in a high repetition strength training protocol (Macias, Gilbert, Pryor, & Baldis, 2017). Similarly, a 2-week imagery intervention with youth soccer players showed efficacy in increasing levels of confidence (Munroe-Chandler, Hall, & Fishburne, 2008). Thus, results of the pilot study contribute to the limited knowledge about the practical application of a smartphone MBI with student-athletes, as well as brief interventions and their potential outcomes.

Limitations and Future Directions

The mindfulness training intervention period was initially planned for four weeks, but at the 2-week mark, the coach stated that the remaining tournament was cancelled which ended the intervention period early. This cancellation came without warning to the research team, and reasons were not provided by the coach. This shortened intervention period and the small athlete sample size shows a limitation of conducting research in the field with real people. Things don't always go as planned and athletes who provide their assent (and parental/guardian consent) to participate, can withdraw at any time without penalty. For the future, researchers may want to have more regular check-ins with their participants as a way to keep them engaged, especially the participants' gatekeeper, which in this situation was the coach. Regular check-ins may not have made a difference as the tournament cancellation may have been out of the coach's control. However, if the primary researcher and coach had been in contact more frequently, the coach may have communicated earlier about the tournament being cancelled. In this case, the coach may have been willing to have an additional practice or training session for the sake of the research. In this scenario, the primary researcher would still have had an opportunity to conduct the interviews while the athletes were together at an event, and this may have led to a greater number of completed interviews.

This pilot study was a smaller scale study than originally conceptualized, and due to its small sample size, the results should not be generalized to other adolescent sport contexts. Although only four of the original 13 athletes completed the interview, it is notable that these individuals appreciated, and gained valuable experience from the MBI. More

specifically, the adjusted 2-week intervention still revealed notable findings related to athletes' understanding of mindfulness, mindfulness' impact on their readiness for competition and self-confidence, and their enjoyment of and experience with mindfulness training using a smartphone MBI (i.e., *Headspace*).

In terms of future directions, researchers may want to examine 2-week, as well as longer intervention periods. Notable findings did emerge after the athletes' 2-week engagement with *Headspace*, but 2-weeks may not be long enough to elicit significant, lasting changes in sport-specific cognitive processing. In addition, researchers may wish to use a randomized controlled trial approach, and include validated measures related to levels of mindfulness and other aspects of sport performance. This may add to the qualitative knowledge on the effectiveness of smartphone MBIs with adolescents.

CONCLUSION

Competitive club baseball players engaged in a 2-week mindfulness meditation training program via a smartphone app. Results suggest that these male adolescent baseball players benefitted from engaging in mindful meditation and found the intervention to be efficacious and acceptable. Specific benefits reported include greater understanding of the mental side of baseball, how to connect to the present moment, and benefits related to mental readiness to compete, as well as increased confidence. Finally, they enjoyed the mindfulness training and appreciated the convenience afforded to them by a smartphone app.

These findings present a variety of implications for practitioners, including coaches and sport psychology professionals, though given the small sample size of the pilot study, they should be generalized with caution. For example, positive associations with the app could help create buy-in from athletes, increasing their willingness to engage in mental training modalities. In addition, using a smartphone MBI for student-athletes can present a new alternative for applied sport psychology practitioners. With high cellphone usage in adolescent populations, empowering youth to engage with technology in a positive manner could provide a more developmentally appropriate means

of presenting mental training concepts. This includes student-athletes being able to engage in mental training at their own discretion. Further, convenience of this type of intervention is extended to coaches and sport psychology consultants. An MBI of this sort can be implemented in a team setting or on an individual basis and can be used to introduce or enhance mental skills training in conjunction with other modalities.

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***Address correspondence to:**

Blake Costalupes
Email: bc0104@mix.wvu.edu

Jenelle Gilbert, Ph.D.
Email: jgilbert@csufresno.edu

This research was completed while the first author, Blake Costalupes, was at the Department of Kinesiology at California State University, Fresno.