Yoga Based Practices Effect on Sustained Attention

Yoga Based Practices (YBP) have recently been the basis of scientific literature in recent years. An increasing number of studies find a relationship between YBP and physiological, neural, and behavioral measures (Gard et al., 2014a). Yoga based practices are a broad set of exercises that focus on movement, balance, and breathing techniques. Although these various forms of yoga have been practiced for centuries, only in recent decades has there been a scientific interest in their beneficial outcomes. Pre-post studies have shown individuals that participate in YBP experience benefits in stress (Rocha et al., 2012), executive functioning (Gard, et al., 2014b) and other various biological factors (Gard et al., 2014). Given the benefits people experience by participating in YBP, more studies need to be conducted to understand the specific benefits individuals experience from participating in yoga-based interventions.

Several populations are especially prone to participate in YBP interventions because of its beneficial effects. Specific populations that have been shown to experience benefits from participating in YBP include military veterans with chronic low-back pain (Groessl, 2008), low income older adults (Groessl el al., 2013) and healthy middle-aged adults. (Rocha et al., 2012). It is estimated that close to 15 million American adults participate in YBP on a regular schedule and indicate positive experiences with their practice (Saper et al., 2004). As the popularity of YBP in adult populations grow, the need for scientific research expands as well.

College students are a unique population to measure outcomes associated with YBP. Often newly incoming students experience hardships during their transition from high school success to the expectations of university learning (Cohen & Sherman, 2014; Yeager et al. 2016). Furthermore, as college students progress through the university setting it has been shown that attention in classes decline and this decline may be an indicator of dropout from college (Eastwood et al., 2012; Xu, 2016).

A specific attention pattern that needs to be addressed in college students is sustained attention. Sustained attention has been of interest in cognitive psychology for years. Specifically, sustained attention is defined as the ability to remain concentrated on repetitive tasks for extended periods of time (Manly, Galloway & Hawkins, 1999). These repetitive tasks are closely tied to the ability to perform well as a student in a university setting (Fiora et al., 2011). The cognitive processes associated with sustained attention are heavily related towards learning in the classroom and are essential towards self-regulation of academic tasks (Zimmerman, 2001).

Yoga based practice interventions may have the potential to help college students improve their sustained attention abilities. Past research on YBP and sustained attention have shown mixed results within adult populations (MacCoon et al., 2014; Schmalzl et al., 2018; Vineetha et al., 2018). Of even more importance is to understand which aspects of yoga influence sustained attention the most. Schmalzl et al. (2018) recently found a YBP intervention with an emphasized breathing component increases sustained attention as compared to a YBP intervention with an emphasis in movement components. However, one limitation of the Schmalzl et al. (2018) study is that it lacked a control group. The lack of a control group makes the extrapolation of inferences unclear.

Another aspect related to YBP is a mindfulness meditation component. Mindfulness involves paying attention to the current moment without judgement (Academic Mindfulness Interest Group, 2006). Mindfulness meditational practices have often been cited as having strong effects on sustained attention in past and recent years (Scmertz, Anderson & Robin, 2009; Valentine & Sweet, 1999). Seeing as mindfulness is often a component of YBP (Boccio, 2004), it is another necessary component on sustained attention.

The present study seeks to understand the relationship between specific components of YBP and mindfulness on sustained attention within college students. Additionally, because YBP and mindfulness are both related to conscientiousness, it is necessary to measure this personality trait when understanding the effects of YBP and mindfulness (Thompson & Waltz, 2007). College students serve as the population of interest because of their need of sustained attention to be academically successful in a university setting. This ambiguity in YBP components, such as movement or breath, and mindfulness leads to the disability in properly dissecting what is the most beneficial to sustained attention outcomes.

Method

*Participants*

Participants from Colorado State University (CSU) were recruited for this study. Eligible participants were required to be over the age of 18, never participated in YBP or mindfulness mediation, have no chronic health conditions, and currently be enrolled full time at CSU. Participants were invited to sign up for the study via a Psychology 100 recruitment page, campus flyers and announcements in classrooms. A $20.00 compensation was provided to college students that participated in the entirety of the study. All participants gave informed consent to participate in this research study.

Eligible participants were considered eligible had the opportunity to participate in one of three main interventions: 1.) An 8-week movement based YBP intervention, 2.) an 8-week breath focused intervention, 3.) or a waitlisted control group intervention. Additionally, each of these interventions were split into two groups to include a lesson on mindfulness lesson or no lessons. Therefore, a total of six groups were created with one group serving as a true control group (no yoga practice and no mindfulness training). Participants had been informed not to participate in any other forms of YBP or mindfulness across the 8-week period.

*Materials*

*Yoga Based Practices.* All but the control group were assigned to attend class sessions once a week for 8 weeks. Classes were one hour long. All intervention classes were assigned at noon each day across each day of the week.

*Yoga Based Practice/Mindfulness Instructor.* One trained yoga and mindfulness instructor was assigned to teach the five conditions that included YBP and/or mindfulness meditation practices to prevent differences in instructor lessons. The instructor utilized breathing or movement-based exercises dependent on the condition. Additionally, they provided a 30-minute mindfulness lesson at the end of the lesson for the conditions that included the mindfulness lessons. Participants in the no YBP but mindfulness lesson were given the same mindfulness lesson as all other mindfulness groups but neither of the YBP interventions. The true control group received no interaction with the YBP/Mindfulness instructor. All intervention groups received lessons at the same location on the CSU campus.

*Sustained Attention.* Sustained attention was measured using the Response Inhibition Task (RIT; MacLean et al., 2010). The RIT is a sustained attention task that requires individuals to discriminate lengths of visually presented lines; these visually presented lines are known as the “target”. The target is visually represented for less than a second on the screen and participants are told to left click the computer mouse when they see the target. The task is an 30 minutes in length and measures the percent correct individuals correctly left click when the line is visually presented. Additionally, participants get a lower score for false clicks, meaning the participant clicks the mouse when no target was visually presented. Participants with higher scores are perceived to have better sustained attention. All participants were instructed to place their head one-foot away from the computer to any effects associated with closeness to the screen. Additionally, participants were required to wear corrective lenses to ensure they had the best visibility to see the targets.

*Conscientiousness.* To assess participants’ levels of conscientiousness, we used a measure from the International Personality Item Pool (Goldberg, 1999). This measure is based on Goldberg’s (1992) study of the markers of the Big Five personality characteristics. It consists of 10 statements (e.g., “I… am always prepared.”) and participants indicate the degree to which each statement escribes them on a scale from 1 = “not at all true of me” to 7 = “very true of me.” According to previous research, the scale has good internal consistency reliability (α = .79) and shows acceptable convergence with other measures (Goldberg, 1999).

*Procedures*

Prior to the start of the intervention component of the study, participants were asked to complete a questionnaire relating to participant demographics and a personality measure. After participants completed the questionnaire they were asked to participate in the RIT mentioned in the *Materials* section as a baseline measure.

Participants were then randomly assigned to one of the six conditions. After random assignment the participants were given informational sheets containing the time and location of their sessions. Additionally, they were informed that we would be requesting they come back after the 8-week intervention. Control participants only received information on the post-test procedure.

At the end of the 8-week intervention all participants were asked to return to the testing center to retake the RIT. The difference between the two scores then calculated to indicate improvement or impediment in scores. A positive value indicates improvement in RIT score while a negative value indicates an impediment; a score of zero represents no change between the pretest and posttest.

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