EFFECTS OF A BRIEF YOGA INTERVENTION ON
TEST ANXIETY IN FIFTH GRADE STUDENTS

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EFFECTS OF A BRIEF YOGA INTERVENTION ON TEST ANXIETY IN FIFTH GRADE STUDENTS

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ABSTRACT

EFFECTS OF A BRIEF YOGA INTERVENTION ON TEST ANXIETY IN FIFTH GRADE STUDENTS

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With the increase of high-stakes testing in the schools, research-based interventions to address test anxiety are needed. This study investigates the effectiveness of a brief yoga intervention on perceived feelings of test anxiety in fifth grade students. This study involves three participants engaging in a brief yoga intervention. Three matched (by anxiety level) control students were compared to the intervention group in order to ensure that decreased anxiety was not due to a placebo effect. It was hypothesized that the intervention would lower test anxiety in participants after engagement in the yoga intervention. Effect size of the individual scores indicated the yoga intervention had a large effect of decreasing test anxiety. The control group also decreased test anxiety, but at an inconsistent rate. Group effect sizes indicated lowered levels of test anxiety in both intervention and control groups. The findings indicate the yoga intervention was associated with consistent decreased anxiety levels in all three yoga participants. Further research into the effects of yoga on test anxiety is needed to verify the results of this study.
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Chapter I
Literature Review

Test anxiety is an overwhelming problem for many students. Symptoms of test anxiety diminish test performance, lower self-confidence, increase negative self-talk, and can cause physiological disturbances (Hembree, 1988; Onyeizugbo, 2010; Zeidner, 1998). While other interventions exist for decreasing symptoms of test anxiety (e.g. studies skills training, systematic desensitization, relaxation therapy, etc.), yoga interventions have rarely been examined. This literature review will be divided into two major topics: test anxiety and yoga. The first section will discuss the theories, prevalence, symptoms, and consequences of test anxiety, as well as interventions to address test anxiety. The second section of this literature review will give a brief overview of yoga, as well as evidence supporting the benefits of yoga. In the final section, a rationale for this study will be presented.

The purpose of this study is to determine whether a brief yoga intervention is an effective classroom treatment for test anxiety. It is hypothesized that students who engage in the brief yoga intervention will exhibit decreased test anxiety, when compared to their baseline as well as when compared to students who do not engage in the intervention.

Test Anxiety

Test anxiety, sometimes referred to as examination anxiety, is defined as an “unpleasant state characterized by feelings of tension and apprehension, worrisome
thoughts and the activation of the autonomic nervous system when the individual faces evaluative achievement-demanding situations” (Spielberger, 1972, as cited in Ergene, 2003, p.314). Test anxiety manifests in a variety of forms. Some people exhibit physiological symptoms, such as nausea, dry mouth, sweaty palms, increased heart rate, and shallow/rapid breathing (Lowe et al, 2008; Zeidner, 1998); others suffer more from cognitive symptoms including (but not limited to) feelings of helplessness, fear, worry, racing thoughts, and negative self-talk (Supon, 2004; Zeidner, 1998). Sometimes students may score low on a test, not because they do not know the material, rather due to the symptoms of their test anxiety. According to the American Test Anxiety Association (2010), the prevalence of severe test anxiety is evident in approximately 16-20% of high school students. These students suffer from lower test performance, as well as struggle with understanding instructions and other performance anxieties (ATAA, 2010)

Test anxiety may carry some effects that last longer than the test-situation itself. Test anxiety may account for students receiving lower test scores (Hancock, 2001; Hembree, 1988; Morris & Liebert, 1970; Swanson & Howell, 1996; Zeidner, 2008). As a result of these lowered scores, student self-esteem may be negatively impacted by internal feelings of shame and incompetence (Rothman, 2004). With the increased importance of high-stakes testing, it is imperative to investigate methods of easing feelings of test anxiety.

Much of the research investigating test anxiety was conducted between the years 1965 and 1990. Although this research may still be valid, some of the information may be suspect due to the lapse in time. Contemporary research on test anxiety is primarily in the form of theses and dissertations with college students as participants.
It should also be noted that most research on cognitions related to test anxiety are based on quantitative self-report from the participant (Putwain, 2008). The benefits of self-reporting include the ability to measure the inner thoughts of the participant, as well as private behaviors. Comparative research on the accuracy of self-reporting indicates that self-reporting has accurately been used with a wide variety of groups, including young children (Luby, Belden, Sullivan, & Spitnagel, 2007), as well as elderly people (Kinsler, Cunningham, Mohanty, & Wong, 2008). Although self-report is a common data-gathering technique, there are limitations with self-reporting measures, including limited understanding of the items, rater bias (answering how they think they should), and limited understanding of the measure (Baldwin, 1999; Hartley & MacLean, 2006). Physiological symptoms are not typically measured by self-reports; instead, the researcher collects samples or takes measurements of bodily changes.

Behavioral and cognitive treatments help alleviate symptoms of test anxiety (Ergene, 2003; Hembree, 1988). Having strategies to combat the deleterious effects of test anxiety may not only raise student test scores, but also combat the negative cognitions associated with anxiety provoking testing situations. Training students who suffer from test anxiety to recognize and alleviate their symptoms may increase test scores and decrease the negative side-effects of test anxiety.

**Theories of test anxiety.** When researching the topic of test anxiety, school psychologists must also consider theories of general anxiety due to the relation between theories of general anxiety and test anxiety. Test anxiety is “a specific category of anxiety observed in evaluative situations” (Friedman & Bendas-Jacob, 1997, p. 1035). In fact, Weems and colleagues (2010) found a link between people who suffered from
generalized anxiety and those who showed symptoms of test anxiety. The results of this study indicated that students who suffer test anxiety were more likely to suffer from symptoms of other anxiety disorders (e.g. Generalized Anxiety Disorder, Social Phobia, Panic Disorder, and Separation Anxiety) than the non-test anxious group (Weems et al, 2010).

Spielberger (1972) distinguished between two different forms of general anxiety: trait and state. The trait-state theory of anxiety is continued to be supported by contemporary researchers (Elliot & McGregor, 1999; Ergene, 2003; Sena, Lowe, & Lee, 2007; Zeidner, 2008). Trait theory maintains that anxiety is a trait, or a predisposition a person holds for heightened feelings of anxiety. The trait aspect of anxiety could be thought of as a personality characteristic. State anxiety is brought about by a specific event or antecedent that triggers particular anxious behaviors in a person (e.g. a person with agoraphobia who sweats when looking out the window of a high-rise building).

Similarly, there are two different types of test anxiety, state test anxiety and trait test anxiety. State test anxiety is anxiety people feel during the test (the test being the antecedent), whereas trait test anxiety is the person’s predisposition to the symptoms of test anxiety (Elliot & McGregor, 1999). Factors that determine the severity of reaction are variable in each person and are measured by frequency, duration, and intensity (Elliot & McGregor, 1999). Trait theory suggests that one person may have the predisposition for intense feelings of test anxiety (the trait), whereas another person may have learned to react to tests with anxiety and preceding a test, he or she will have the state of having anxious feelings.
The symptoms of test anxiety may interfere with the student’s ability to recall previously learned material (Hembree, 1988). This is also referred to as cognitive obstruction (Swanson & Howell, 1996). Swanson and Howell (1996) suggested that students learn material when it is originally presented, but when tested on that material, symptoms of test anxiety may hinder their ability to recall the information. People have different reactions to test anxiety. Mild anxiety may result in higher scores while extreme test anxiety is likely to lower scores (Swanson & Howell, 1996).

Another theory of test anxiety pertains to test-takers’ comfort with their knowledge of the material under evaluation (Hembree, 1988). If a person is not comfortable with his knowledge of the material, then he may start to exhibit the symptoms of test anxiety. These anxious feelings are derived from students’ worries of being unprepared or that he will not do well on the test. This theory suggests that test anxiety may be a learned behavior, as opposed to a trait behavior. In this scenario, a student has learned by prior experiences that if he has not prepared adequately for an exam, then a low test score will be attained. This raises the student’s level of anxiety, thereby enhancing feelings of test-related anxiety.

Current theories suggest a social component to test anxiety. Within the social component of test anxiety, many of the symptoms may be triggered by the environment. For instance, research in the field indicates that feelings of social humiliation may intensify a general feeling of test anxiety (Friedman & Bendes-Jacob, 1997; Lowe et al, 2008). Fear of social derogation may be a cause for test anxiety. Students may feel that they will be bullied or ridiculed by other students or their teacher for lowered scores.
Certain cultural expectations, such as negative attributions to failure and the importance of success in education often lead to higher levels of test anxiety (Stankov, 2010).

Another component of the social aspect of test anxiety is the family. Achievement-oriented families may influence a student’s level of test anxiety. Some students may feel test anxiety due to parental pressure to achieve. Consider family-oriented cultures such as those found in Asia, the social component of test anxiety pertains to the family structure and feelings stemming from students not wanting to shame their families (Bodas & Ollendick, 2005).

Although test anxiety is typically thought of as harmful, research suggests that some students thrive under this anxiety (Martin & Marsh, 2003). These students use their anxiety as a mechanism to promote goals and achievement, rather than become debilitated by the stress. Martin and Marsh (2003) point out that although these students use this anxiety to their advantage, they can be pushed too far, potentially leading to emotional and academic turmoil.

**Prevalence of test anxiety.** During his 1988 meta-analysis of 562 studies on test anxiety, Hembree found many trends in the data. Although this research was conducted over 20 years ago, this study is one of the more highly quoted studies in the field of test anxiety research, and there has not been another meta-analysis of test anxiety of this magnitude since. In his study, Hembree found the number of average-ability students with test anxiety was higher, when compared to students considered to have above- or below-average academic ability. Gender analysis indicates females have shown higher levels of test anxiety than males. Another interesting trend from this study is that test anxiety increased though primary school, leveling off in the fifth grade. This rate
remained constant for high school, and then dropped again in college. Another trend is that many students show more symptoms of test anxiety when they feel they are in a highly evaluative environment (Hancock, 2001). These feelings of evaluation may be influenced by the teacher as well as other students.

**Symptoms of test anxiety.** The term test anxiety encompasses many symptoms, both cognitive and physiological. Leibert and Morris (1967) suggest symptoms of test anxiety can be separated into two major categories; emotionality and worry. A more modern approach refers to emotionality as *physiological hyperarousal* (Joiner et al, 1999).

As the name suggests, the “worry” category pertains to cognitive feelings of dread or apprehension over the test and the students’ feelings of how well they perform on tests (Leibert & Morris, 1967). Preoccupations with failure and a general lack of confidence in one’s own ability also fall into this category (Onyeizugbo, 2010; Zeidner, 1998). Feelings of worry have been negatively correlated with test scores (Morris & Liebert, 1970). Another cognitive aspect of test anxiety is a fear of failure. This is an overwhelming fear a person holds about failing a class or test. These feelings of worry and anxiety can lead to cognitive obstruction, which may lower test scores (Swanson & Howell, 1996).

Physiological hyperarousal pertains to the body’s reaction to heightened anxiety, as a result of a triggering of the sympathetic nervous system. The sympathetic nervous system governs the fight-or-flight response during which the body prepares for danger (either by fighting or running away). In the case of test anxiety, the sympathetic nervous system is triggered by the perceived threat of the test. The typical physical symptoms of
test anxiety are sweaty palms, increased heart rate, and shallow/rapid breathing (Lowe et al., 2008). In some cases, effects such as increased heart rate are present despite a lack of self-reported anxious feelings (Zaripov & Barinova, 2006).

During physiological hyperarousal, the body also produces an excess of certain hormones. Heightened production of the hormone cortisol has been linked to children who suffer from anxiety disorders (Kallen et al., 2008). Heighted cortisol levels have also been linked to test anxiety in college students (Conneely & Hughes, 2010). In an earlier study, researchers found on days during which there was a test, second grade children were found to have heightened levels of cortisol (Tennes & Kreye, 1985).

Sometimes referred to as the stress hormone, cortisol is a steroid produced in the body when the sympathetic nervous system is triggered by a stressful event. Cortisol is released by the adrenal gland during periods of stress to modulate blood pressure and glucose levels (preparing the body for a stressor). During times of perceived stress, it is common to find a person’s cortisol level heightened.

There are many barriers to overcome when a student struggles with test anxiety. Not only do the physiological symptoms (e.g. physiological hyperarousal) need to be addressed, but also the psychological symptoms (e.g. worry). There are many interventions to help alleviate these detrimental symptoms.

**Interventions for test anxiety.** Many schools are moving toward more of a Response to Intervention (RTI) three-tiered approach to academic and behavioral interventions. In this model, interventions are incorporated for students based on the need of the individual student. Interventions can be provided universally or whole class (tier-1), in small group or more intensive (tier-2) or individually or quite intense (tier-3).
In the RTI model, students are grouped into tiers based on their need. Just as in any other behavioral intervention, test anxiety interventions can be used in the three-tiered model, in which the student’s needed intensity dictates which level of test anxiety intervention is necessary. Teaching professionals and other staff should have test anxiety interventions at their disposal.

There are many effective interventions to help alleviate the symptoms of test anxiety depending on theoretical orientation. The major theoretical categories of interventions previously investigated have been behavioral, cognitive, skill-focused (study skills training), and combinations of these (Neuderth, Jabs, & Schmidtke, 2009). The most widely-used interventions come from behavioral methods, including systematic desensitization, modeling, hypnosis, anxiety management training, and relaxation therapy (Ergene, 2003; Hembree, 1988), as well as cognitive behavioral strategies such as positive self-talk, and breaking down the test into smaller components (Dundas, Wormnes, & Hauge, 2009). These techniques range from relatively un-invasive (e.g., relaxation training) to invasive (e.g., hypnosis).

When working with children and adolescents, one key theme is that the intervention should be as minimally invasive as possible, based on the circumstances of each child. Although some students need significant interventions to cope with their test anxiety, a majority of students may need a less intense intervention. Some of the less invasive interventions may be given at the class-wide level (tier-1), as well as in a small group (tier-2) or individual (tier-3) setting.

An area of test anxiety intervention that is minimally invasive is relaxation therapy. Relaxation treatments have been found to be moderately effective in reducing
test anxiety in students (Ergene, 2003; Johnson, Larson, Conn, Estes, & Ghiellini, 2009). These interventions train students to replace their anxious behaviors with relaxation techniques in order to assuage their symptoms of anxiety. Interventions that fall into this category include: guided meditation; deep breathing exercises tailored to lessen symptoms of anxiety; muscle relaxation, during which students tense and relax their muscles; and visualization, during which students are guided through visualizing and imagining peaceful scenes (Ergene, 2003; Johnson et al. 2009). Another potential intervention that falls into this category is yoga.

**Yoga**

Yoga is part of an Indian religion dating back thousands of years. Yoga stems from the Hindu sacred texts, the *Vedas*. The word yoga can be translated to mean many things, including “union” or “to yoke,” referring to the act of harnessing attention (Feuerstein, 2001). The main focus of traditional yoga is to gain insight into oneself and the world.

There are many disciplines of yoga. In America, yoga is commonly thought of as a form of exercise and flexibility training. According to a 2002 survey, 1% of the US population had used yoga in the 12 months prior to the survey (Birdee et al., 2008). This survey also revealed that the mean age of yoga users was 39, and they were more likely to be Caucasian females.

The school of yoga many Americans are familiar with is *hatha* yoga. This is the more active, physical form of yoga, dealing more with the body and posing. There are many aspects to hatha yoga, but for brevity, the focus of this paper will stay with the physical aspects of hatha yoga, the *asana* (posing) and *pranayama* (breathing). In the
traditional hatha yoga whole body events are the major focus, during which the yogi is perfecting his or her own body, while still internally striving for enlightenment (Feuerstein, 2001). In the West, we look at yoga as a form of exercise, to strengthen our bodies. This does not mean all American yoga classes have discounted the spiritual aspect, rather the focus of many yoga classes remains in the proper poses and breathing methods.

Recently more people have been exposed to yoga due to video games. A current trend in games has brought different forms of exercise into the video gaming world. One of the most popular of these excergames is Wii Fit Plus, published by Nintendo. This game incorporates motion sensitive equipment to track the player’s progress through multiple fitness-related scenarios. Yoga is one of the core components of this game. During these yoga sessions, the player is guided through different poses by a virtual trainer, who gives the player feedback on the accuracy of his/her posing. During yoga sessions the player stands on a weight-sensitive balance board that tracks his/her movements and weight distribution. Preliminary studies have found that the Wii balance board system is not as accurate as professional equipment used to measure balance and motor abilities, but is useful for general screening purposes (Geronimi, Pouydebat, & Gorce, 2009; Gras, Hummer, & Hine, 2009).

Posing is one of the hallmarks of contemporary American yoga. The different poses, or asana, are designed to strengthen different muscles as well as foster flexibility in those areas. In traditional yoga, people can master asana when they can maintain the pose with no mental effort, meaning the body is working without any effort from the mind, allowing the mind to concentrate on meditation (Coward, 2002).
Accompanying the poses is the breathing method, or pranayama. This is a form of trained breathing meant to open the lungs, relax the body, and clear the mind. The pranayama can be engaged alone, or in conjunction with the asana. There are many forms of pranayama, each with different focuses, similar to the asana.

The focus of hatha yoga is to manipulate the body in order to gain strength, control, and an understanding of the body. Over the years many studies have investigated the potential benefits of yoga practice such as better sleep quality (Vera et al., 2009), improvement in depression and anxiety (Gavin & McBrearty, 2006; Javnbakht, Kenari, & Ghasemi, 2009; Pilkington, Kirkwood, Rampes, & Richardson, 2005) and even reduce the ravages of cancer (Banerjee et al., 2007). Since yoga is both a mental and physical discipline, research has been conducted into both physiological and psychological aspects of this practice.

**Benefits of yoga.** Studies have recorded differing physical benefits for those who practiced yoga (Gavin & McBrearty, 2006). Yoga is used as a form of exercise, or as a relaxation technique. In their study of complementary and alternative medicines Long, Huntley, and Ernst (2001) found doctors had suggested yoga therapy in cases of headache/migraine, back pain, insomnia, cardiovascular problems, menstrual/premenstrual tension, arthritis/rheumatism, multiple sclerosis, and anxiety/stress. In a survey of American yoga users, many used yoga practice to treat a health condition, the most prevalent being musculoskeletal conditions, mental health conditions, and asthma (Birdee et al., 2008).

A study of pranayama suggests a neuropsychological model may modulate certain aspects of the parasympathetic nervous system (Brown & Gerbarg, 2005; Brown &
Gerbarg, 2009). This theory postulates the notion that pranayama may actually train the parasympathetic nervous system when and how to respond. Other research indicates oxygen consumption and breathing patterns may differ with each form of yoga practice (Telles, Reddy, & Nagendra, 2000).

Many studies support yoga’s benefits beyond introspection and meditation. Engagement in yoga has been shown to reduce feelings of stress and anxiety in cancer patients during radiation treatments, and even reduced the amount of DNA damage in these patients (Banerjee et al. 2007). Vera and colleagues (2009) found people who practice yoga on a regular basis have higher subjective sleep quality, based on a standardized sleep assessment, than people who do not practice yoga.

Engagement in yoga has also been shown to improve mental disorders, such as depression and anxiety (Gavin & McBrearty, 2006; Javnbakht, Kenari, & Ghasemi, 2009; Pilkington, Kirkwood, Rampes, & Richardson, 2005). In their 2007 study, Streeter and colleagues, found a positive correlation between asana yoga practice and gamma-Aminobutyric acid (GABA) levels in the brain. GABA levels play a role in depression, anxiety, and epilepsy. By raising GABA levels in the brain, this study found the effects of disorders involving low levels of GABA were diminished. Another chemical linked with stress and anxiety is cortisol. As previously discussed, cortisol is a stress hormone secreted when the sympathetic nervous system is activated. Hatha yoga sessions have been shown to lower the secretion of cortisol, as well as perceived feelings of stress over time (West, Otte, Geher, Johnson, & Mohr, 2004).
Much of the evidence supporting the use of yoga interventions for mental disorders is in the initial stage, partially because yoga is categorized as an alternative treatment. This label sometimes attaches a stigma to the treatment. Much evidence supports the use of yoga to alleviate some of the symptoms associated with anxiety disorders, but many people still do not consider yoga to be a justifiable intervention. Since it is considered an alternative treatment, some people do not view it as a viable option for treatment or as a supplement to their current treatment regime. Although yoga started as a form of religion, many Americans do not follow yoga as a religion. Instead they consider it a way to hone the body and mind, or a way to relax and rejuvenate.

**Yoga and Test Anxiety**

Relaxation training has been shown to be an effective intervention for test anxiety (Ergene, 2003; Hembree, 1988; Johnson, 2009; Neurderth, Jabs, & Schmidtke, 2008). Because yoga can be used as a way to clear the mind and relax the body, the use of a yoga intervention for the treatment of test anxiety is a logical alternative. Research already supports the use of yoga therapy for the treatment of anxiety disorders (Banerjee et al. 2007; Javnbakht, Kenari, & Ghasemi, 2009; Pilkington, Kirkwood, Rampes, & Richardson, 2005). Since test anxiety is a sub-category of anxiety, yoga-based interventions for anxiety should be investigated for their efficacy.

Much of the yoga research focuses on steady participation in yoga, typically between one month and one year. Many people engage in a yoga regimen multiple times a week, with some people engaging in yoga daily. There is poverty of research on brief yoga interventions, as well as a lack of examination of the reasoning behind the lack of
research in brief yoga interventions. This gap in the research may call for more research into the efficacy of short-term yoga interventions.

Since there is a lack of research into the effects of yoga on test anxiety, further evidence is needed to support the use of yoga as a viable intervention for test anxiety. The benefits of a brief yoga intervention may reduce the worry and physiological hyperarousal brought on by test taking or evaluative events. The present study investigates the impact of a brief yoga intervention on student’s feelings of test anxiety.
Chapter II

Method

The goal of this study was to investigate whether a brief yoga intervention minimized negative feelings associated with test anxiety. If the results of this study indicated the brief yoga intervention lowered perceived feelings of test anxiety, teachers could utilize a yoga intervention with their students before a test, thereby potentially alleviating some of the symptoms of test anxiety and increasing academic performance. The study investigated the efficacy of a brief yogic breathing and posing intervention on perceived feelings of test anxiety for elementary students.

Participants

The participants for this study included six fifth grade students. The participants were selected based on their scores on the State-Trait Anxiety Inventory for Children Trait version (STAIC-T) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1973). The entire class completed the inventory and target students were selected based on their scores. The students were selected from one teaching team from Spinning Hills Middle School, located in Mad River Local Schools in Riverside Ohio. Because the participants were minors parental informed consent was obtained via the permission form (Appendix A). Biological/biographical data collected included gender, race, and age. All data-sensitive material (e.g. permission forms, and any data with the participant’s name) collected during this study were secured in a locked file drawer in the primary
researchers’ residence and reporting of the results remained anonymous. At the end of the study all sensitive forms were destroyed via shredder.

The teaching team consisted of two teachers and an intervention specialist, with the students divided into two classes. One class contained 22 students, while the other class included 19 students. Fifth grade students were selected due to research supporting fifth grade as the highest period of test anxiety in a student’s academic life.

The target students were selected based on their scores on the STAIC-T (see Table 1). The mean score on the STAIC-T for both classes combined was 33.4. The target group of six students consisted of two male and four female students aged 10 and 11 (mean age = 10.67 years). The target group demographics consisted of 83.3% Caucasian and 16.7% African American. As a whole, 66.7% of the target group was economically disadvantaged. All students selected for the target group returned parent permission to participate in the study.

Table 1: target student scores on the STAIC-T screening measure

<table>
<thead>
<tr>
<th>Student</th>
<th>Score on STAIC-T</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>56</td>
</tr>
<tr>
<td>CA</td>
<td>48</td>
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<tr>
<td>IB</td>
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<td>CB</td>
<td>47</td>
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<td>IC</td>
<td>40</td>
</tr>
<tr>
<td>CC</td>
<td>43</td>
</tr>
</tbody>
</table>
Instrument

Two complimentary instruments were used in this study. The STAIC-T was used as a screener to assist with the student selection process. This inventory measures the student’s trait anxiety, or their susceptibility to anxiety. This assessment was selected because it is used as a predictor of state anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1973) The format of the STAIC-T is a 20 question self-rating scale that pertains to the student’s feelings in general. The STAIC-T was given to both classes, in a whole-group setting with standardized instructions read by the classroom teacher.

A modified version of the STAIC-S was used for monitoring the baseline and intervention data. The STAIC-S measures how the student is feeling at that moment. Like the STAIC-T, the STAIC-S has three optional selections for each item. The student selects which they are feeling at that moment for each item. The full version of this inventory is 20 questions, but due to time constraints, a 10-item version of the STAIC-S was given to the target students each test. The items on the STAIC-S are positively (i.e. I feel…very cheerful…cheerful…not cheerful) or negatively (i.e. I feel…very terrified….terrified…not terrified) worded in equal amounts (ten of each). The modified instrument contained five positively worded items and five negatively worded items. Prior to the first data collection point, each student was trained on how to complete the STAIC-S, ensuring each student understood the wording and procedure.

Both forms of the STAIC were normed using fourth, fifth, and sixth grade students. Another factor considered was the matched format of the two versions of the STAIC. The authors suggest the use of the STAIC-T inventory for screening purposes when investigating anxiety-related interventions (Spielberger, Gorsuch, Lushene, Vagg,
& Jacobs, 1973). As discussed in the literature review, test anxiety has roots in both state and trait anxiety, therefore both measures are meant to be sensitive enough to accurately measure student anxiety.

**Research Design**

This study was a quasi-experimental mixed methods design with a multiple baseline-single case design as well as matched control grouping. Three dyads of two students were created based upon the student’s scores on the STAIC-T screening. Students were matched by their scores and were placed into treatment groups.

**Procedure**

The screening process consisted of the classroom teacher administering the STAIC-T to all students during their math class time. Once those scores were collected, six target students were selected based on their high anxiety scores. Of the six selected students, three were selected to participate in the intervention, while the other three students were selected as part of the control group. Since the design of the study incorporated a staggered intervention initiation, the control students were matched, based on their screening scores, for the initiation of the control exercise. Baseline data were collected for a minimum of three instances prior to the beginning of the intervention phase for the students selected to participate in the intervention. The yoga intervention was conducted by the primary investigator. In all instances, the participants completed their self-rating immediately following the intervention, but preceding their test. The control students who did not receive the intervention were removed from class to engage in the Wii Fit Plus Soccer Heading balance game, and then completed the progress monitoring tool immediately preceding the test.
Three students engaged in the yoga intervention, while three students engaged in a control activity and completed the questionnaire but did not receive the yoga intervention. The three yoga intervention students started the intervention phase at a different point in the study. A minimum baseline of three data points was collected for each student who participated in the intervention. Three baseline data points were collected for Student IA, who then participated in the intervention for seven instances. Student IB completed five baseline data points and five intervention points. Student IC had seven baseline points and three intervention points. The dependent variable was perceived feelings of test anxiety, which was measured by a State-Trait Anxiety Inventory for Children State version (STAIC-S) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1973).

The independent variable of this study was the brief yoga intervention. The intervention consisted of one pranayama (deep breathing) exercise and two asana (poses). In order to standardize the intervention, a Wii Fit Plus video game was incorporated into the intervention. The Wii Fit Plus system is pre-recorded, so the instructions were standardized for all participants. The Wii Fit Plus also incorporates the use of the Wii balance board. This board allowed the participants to gain feedback on the accuracy of their posing, ensuring the students posed correctly, thereby minimizing the risk of injury due to improper posing.

The Wii Fit Plus yoga system has many poses to select from. The criteria for pose selection included a minimal risk of physical injury and whether the pose was conducive to the classroom setting (meaning standing poses). The first chosen yoga pose was the half-moon pose, which requires the student to raise his/her arms over his/her head and
stretch slightly to either side. This pose stretches the arms, back and stomach muscles. The second selected pose was the warrior pose, which involved the student standing with his/her legs apart and bending one leg while maintaining weight on both legs. This pose stretches the hip flexors and thigh muscles. Both of these poses are minimally invasive and are not deep stretching that may cause muscle damage.

The yoga intervention was brief (approximately six minutes), in order to ensure the students had sufficient time to complete their test. The intervention was conducted with the students individually, immediately preceding one of their normally scheduled math tests. A math test was defined as any math assessment involving 10 or more questions. Prior to the initial intervention phase testing day, the students engaged in training for the yoga intervention, so they were comfortable with the poses and breathing methods. In order to address reliability and integrity of the intervention, the Wii Fit Plus was incorporated into the intervention. Since the Wii Fit Plus has pre-programmed instructions and time-frames, all interventions were similar, across time frames as well as participants.

The STAIC-S was given to the intervention target students immediately preceding their test, but after they had engaged in the intervention. This questionnaire was completed in the classroom and was passed out by the classroom teacher with the assessment. In order to address the potential of placebo effects, a matched group of students was also pulled out of class and used the Wii Fit Plus video game, but instead of doing yoga poses these students played the Soccer Heading balance game. This game required the students to stand on the balance board and shift their weight. The students played the Soccer Heading game for approximately six minutes, in order to match the
amount of time their intervention-counterparts were engaged in yoga. The control students also completed the STAIC-S in the classroom at the same time as the test. Their data was compared to the students who engage in the yoga intervention to ensure that any decrease in perceived feelings of test anxiety was due to the intervention, not the fact that the students received individualized attention with a novel activity.

In order to ensure the data was collected with integrity, the primary investigator and the classroom teacher completed an intervention integrity checklist (see Appendix B). This checklist was completed each data-collection day by the classroom teacher and the primary investigator.

The null hypothesis was that a moderate or small effect size would be found when the baseline was compared to the intervention phase. The alternative hypothesis was that for the intervention group, the intervention would produce a large effect size for all students who engaged in the brief yoga intervention, when the baseline phase was compared to the intervention phase. A secondary alternative hypothesis stated that when the intervention group and control group were compared, the effect size of intervention group would be greater than the effect size of the control group.
Chapter III
Results

Data Analysis

In this study, each student’s baseline and intervention scores were compared by calculating an effect size for the intervention/control activity. The effect size of each group as a whole was also compared. Because the intervention phase had a staggered initiation, each control student was matched to an intervention student whose score on the STAIC-T was similar. When an intervention student began the intervention phase, his/her control counterpart also began to be pulled from class for the Wii Fit Plus activity. A $d$-index was calculated for each student, comparing the baseline to the intervention/control phase. A $d$-index was also calculated between each matched pair of students. Another $d$-index was calculated for each of the groups and then the group effect sizes were compared.

The data were analyzed by calculating effect size with a $d$-index and PND measure, as well as a visual analysis of the data. The $d$-index is used to determine the effect size, or impact, of an intervention (Hunley & McNamara, 2010). The $d$-index determined how effective the yoga intervention was in lowering perceived feelings of test anxiety in fifth grade students. When determining the effectiveness of the intervention, a larger effect size indicates the intervention had a larger effect on the target behavior/skill. (i.e. a $d$-index of .8 would be considered an effective intervention). Statistical significance was determined if the $d$-index was equal to or greater than 0.8. PND is the
percentage of data points that do not overlap, suggesting the impact of the intervention. A PND of 70% or greater is typically used to determine an effective intervention (Hunley & McNamara, 2010). Significance was determined if the $d$-index was equal to or greater than 0.8 and the PND was 70% or greater.

In order to account for variability in the scores, another effect size measurement, the ESvar, was used to verify the whole group results. An ESvar score is used when determining the magnitude of change when there is variability among the scores, as opposed to the change in level that a $d$-index provides (Hunley & McNamara, 2009). An ESvar score was calculated for each group. An ESvar score of 0.5 or greater was considered to be significant.

Goal Attainment Scaling (GAS) was also used to determine whether each student made appropriate progress over the intervention phase. The GAS was calculated by subtracting the average intervention score from the average baseline score. The GAS criteria can be found in Table 2. Data were analyzed within subjects (i.e. baseline and

<table>
<thead>
<tr>
<th>GAS Score</th>
<th>Difference of scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2</td>
<td>≥15</td>
</tr>
<tr>
<td>-1</td>
<td>≥4 ≤14</td>
</tr>
<tr>
<td>0</td>
<td>Between +3 and -3</td>
</tr>
<tr>
<td>+1</td>
<td>Between -4 and -14</td>
</tr>
<tr>
<td>+2</td>
<td>≤-15</td>
</tr>
</tbody>
</table>

*Table 2: Goal Attainment Scaling (GAS) criteria*
intervention phases compared), as well as between each matched pair and each treatment
group as a whole.

**Visual analysis**

A visual analysis of the graphed data was conducted for each participant in the
yoga group (see Figure 1). A visual analysis of Student IA’s data showed a decrease in
test anxiety during the intervention phase, although there is variability in the scores.
Visual analysis of Student IB’s data indicated the scores on the STAIC-S were lower
during the intervention phase when compared to baseline. Visual analysis of Student IC’s
scores indicated a steady decline in scores during the baseline phase, with the

*Figure 1*: Representation of intervention group data
scores remaining low during the intervention phase.

A visual analysis of the control group’s data was also conducted (see Figure 2). Visual analysis of Student CA showed a decrease in STAIC-S scores after the initiation of the control activity. Visual analysis of Student CB indicated a heightened initial baseline score with a significant decrease in scores during the subsequent nine data points, regardless of involvement in the control activity. This indicates that Student CB did not experience a heightened sense of anxiety after the screening and initial data point. Visual analysis of Student CC’s data indicates lowered STAIC-S scores during the baseline phase that continued into the control phase.

*Figure 2: Representation of control group data*
**Statistical results**

The effect size of the yoga intervention was determined by a $d$-index. A $d$-index was calculated for each student. Another $d$-index was calculated comparing the data of the whole intervention group to the whole control group. A $d$-index was also calculated between matched participants. A PND was obtained for the individual students to investigate the impact of the intervention/control activity. A PND could not be calculated for the groups, since each member of the group initiated treatment at a different point in the intervention. An ESvar was calculated for the groups, to account for variability in the whole group scores. Table 3 shows the $d$-index effect sizes, PND, and GAS of all participants in the study.

<table>
<thead>
<tr>
<th>Student</th>
<th>Treatment</th>
<th>$d$-index</th>
<th>PND</th>
<th>GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>Intervention</td>
<td>-1.55</td>
<td>80%</td>
<td>+1</td>
</tr>
<tr>
<td>CA</td>
<td>Control</td>
<td>-1.71</td>
<td>100%</td>
<td>+1</td>
</tr>
<tr>
<td>IB</td>
<td>Intervention</td>
<td>-1.51</td>
<td>70%</td>
<td>+1</td>
</tr>
<tr>
<td>CB</td>
<td>Control</td>
<td>-0.73</td>
<td>10%</td>
<td>+1</td>
</tr>
<tr>
<td>IC</td>
<td>Intervention</td>
<td>-0.82</td>
<td>40%</td>
<td>+1</td>
</tr>
<tr>
<td>CC</td>
<td>Control</td>
<td>-0.49</td>
<td>20%</td>
<td>0</td>
</tr>
</tbody>
</table>

The individual within-participant analysis for the intervention group indicated a large effect size for all yoga intervention participants. These scores indicate that the brief yoga intervention had a large decreasing effect on test anxiety for all three students.
The individual within-participant analysis for the control group indicated varying results. The $d$-index score for Student CA was -1.71, indicating a large effect size. The $d$-index score for Student CB was -0.73, indicating a moderate effect size. The $d$-index score for Student CC was -0.32, indicating a minimal effect size.

The scores of the whole intervention group were compared by calculating a $d$-index for the entire treatment group. The whole intervention group treatment $d$-index of 1.07 indicates a large effect size for the whole group (see Table 4). The mean baseline score for the group was 20.2, while the mean intervention score for the group was 14.46 (SD= 5.34). The scores of the whole control group were also compared (see Table 4). The whole control group $d$-index of -1.01 indicates a large effect size for the whole group. The mean baseline score was 17 and the mean score for the intervention phase was 11.47 (SD= 5.50).

Due to variability in the data points, a whole group change in magnitude effect size for variable data (ESvar) was also calculated (see Table 4). The intervention group showed a large ESvar effect size (ESvar=1.06). The control group ESvar also indicated a large effect size (ESvar = 2.83).

After visual analysis and calculation of the $d$-index for Student IA, a variability effect size was also calculated. The STAIC-S scores for Student IA showed much variability. In order to verify the effect size, an ESvar was also calculated. The ESvar indicated that the yoga intervention had a large effect on Student IA’s feelings of test anxiety (ESvar=0.71), consistent with the large effect size calculated by the $d$-index.

A $d$-index was also calculated between matched participants who started the intervention/control phases at the same time (see Table 5). This measure compared the
Table 4: Effect size by treatment group

<table>
<thead>
<tr>
<th>Group</th>
<th>d-index</th>
<th>ESvar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>-1.07</td>
<td>1.06</td>
</tr>
<tr>
<td>Control</td>
<td>-1.01</td>
<td>2.83</td>
</tr>
</tbody>
</table>

intervention phase of the yoga participant to the control phase of the control student of each pair. When compared, the effect size between Student IA and CA indicates the intervention had a large effect size on test anxiety (d-index=1.29). When Student IB and CB were compared, the effect size was also large, indicating the intervention was effective at reducing test anxiety (d-index= 1.29). Comparison between Student IC and CC indicated a small effect size, indicating the intervention was not as effective at reducing test anxiety with this pair (d-index=-0.32).

Table 5: Effect size between matched pairs

<table>
<thead>
<tr>
<th>Matched Pair</th>
<th>d-index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student IA/CA</td>
<td>1.29</td>
</tr>
<tr>
<td>Student IB/CB</td>
<td>1.29</td>
</tr>
<tr>
<td>Student IC/CC</td>
<td>-0.32</td>
</tr>
</tbody>
</table>

The PND varied greatly for each student (see Table 3). The PND for Student IA was 80%, indicating that the intervention was moderately successful at reducing test anxiety for Student IA. The PND for Student IB was 70%, indicating the intervention
was moderately successful for the student. The PND for student IC was 40%, indicating the intervention was ineffective for student IC.

The PND for student CA was 100% indicating that the control activity was very successful at reducing test anxiety for Student CA. The PND for student CB was 10%, indicating the control activity was ineffective at reducing test anxiety for Student CB. The PND for Student CC was 20% indicating the control activity was ineffective for reducing test anxiety for student CC.

It should be noted that the intervention was conducted with 100% integrity. This was documented by the intervention integrity checklists completed by the classroom teacher and the primary investigator. Since the intervention was conducted with full integrity, it can be assumed the results of this study are valid.
Chapter IV
Discussion

The purpose of this study was to determine the effectiveness of a brief yoga intervention for reducing test anxiety in students. This study investigated not only the effectiveness of yoga for test anxiety, but also whether a brief yoga intervention was effective. Most research involving yoga requires consistent practice of yoga. Regular yoga practice may not be conducive to the classroom, due to time, space, and liability constraints. The first hypothesis stated that the intervention would produce a large effect size in all students who engaged in the brief yoga intervention. This hypothesis was supported.

In order to determine the effectiveness of the intervention, effect size ($d$-index) and PND were calculated for each student, comparing baseline data to intervention data. The PND scores were varied and may not be a true indication of the impact of the intervention. The PND pertains to the percentage of data points that do not overlap. When using PND, caution should be used, since PND does not take actual scores into account, the measure may not be an accurate representation of the outcome of the data. Another potential reason for the difference in PND results and $d$-index results may be due to the variability in the scores.

When the intervention group was compared, both within the subjects and across groups, the effect size, as measured by the $d$-index was negative and large, indicating the
brief yoga intervention had a large decreasing impact on the test anxiety of the students. The individual scores of the control group varied in effect size. When the group variability effect size (ESvar) was calculated, the intervention group as a whole consistently had a large effect size. The variability effect size statistic indicated that the control exercise had a large impact on the student’s test anxiety. The control group as a whole elicited a large effect size, indicating that the control group also significantly lowered feelings of test anxiety during the study.

The intervention/control phases of each pair were also compared by a $d$-index. Two of the three pairs indicated the intervention had a large effect on feelings of test anxiety. This indicates that the brief yoga intervention consistently lowered perceived feelings of test anxiety.

Although the control group as a whole reported lowered feelings of test anxiety, the control scores showed great variability. Comparing individual effect sizes indicates inconsistent results. Student CA showed a significant effect size, while Student CB and Student CC did not respond to the control activity with a significant level of impact. In comparison, all students who engaged in yoga responded to the intervention with a large effect size. This indicates that the brief yoga intervention produced more consistent results of alleviating test anxiety.

In order to combat a placebo effect, the control group also engaged in a Wii Fit Plus activity. This allowed the group to investigate whether any decreases in test anxiety were due to the yoga intervention or due to extra attention and participating in a “fun” activity immediately preceding a test.
The yoga intervention produced a large decreasing effect on feelings of test anxiety in students who engaged in the intervention. The second hypothesis stated that when the two groups were compared as a whole, the effect size of the intervention group would be larger than the effect size of the control group. This hypothesis was not supported. When compared, the whole-group effect sizes, as measured by both the $d$-index were similar. Although this hypothesis was not supported, the evidence from this study indicates that a brief yoga intervention consistently decreased test anxiety at a significant level, whereas the control activity produced inconsistent results.

In order to investigate the efficacy of the yoga intervention, students who engaged in the brief yoga intervention were matched to control students who did not perform yoga, rather engaged in the Soccer Heading Wii Fit Plus balance game. The scores of these control students were compared to their intervention counterparts. As a whole, the control group exhibited lowered levels of test anxiety, indicating a placebo effect. This placebo effect may be attributed to the engagement of the students in a “fun” activity. Since a popular video game system was incorporated into the study, the overall feeling of the intervention/control activity was fun. Previous research indicates that positive emotional states and humor decrease test anxiety (Berk & Nanda, 2006; Nelson & Knight, 2010; Ringeisen & Buchwald, 2010). The students who engaged in the control activity were observed to laugh and smile and these students genuinely seemed to have fun during the activity. The intervention students treated the yoga intervention seriously and focused on the yoga tasks, but each student commented about the Wii and the novelty of engaging in such an activity in school. Both groups (intervention and control) were
overheard by their teachers to gloat to uninvolved students about playing video games at school.

**Limitations**

Because this study was a case study format, there are limitations with participant selection. The participants were selected based on two qualifications; scores on the STAIC-T and parental permission. Since the participants may not be representative of the population of elementary students, the results of this study may not be generalizable to the population as a whole. Two of the participants scored higher on the screening assessment than later measures indicated (Screening scores: CB = 47; CC=43). Teachers reported that these two individuals had inconsistencies in the homes, therefore on some days the students felt more anxiety than on other days. The STAIC may not have been a sensitive enough assessment to differentiate between true test anxiety and general anxiety.

Another limitation of this study was the formatting of the tests. Due to time constraints, the tests were not uniform in question number or complexity. Although the team defined a test as any math assessment 10 or more questions, the students seemed to be less anxious during shorter assessments. When the students were aware of a major test, they reported increased test anxiety. Any further study should standardize the types of tests (e.g. only chapter tests). This endeavor would be time consuming and may in fact last an entire school year, but may yield different results.

Another limitation of the study was the common limitations of self-report scales, as discussed previously in the literature review including limited understanding of the items and rater bias. In order to ensure the participants understood the items, each
student participated in a training session to ensure the student understood the modified STAIC-S. During this training session, the investigator and student read and discussed each item, with the opportunity to ask any questions.

In order to address any placebo effects, each control student was matched to a student in the intervention group who scored similarly on the screening measure. Since the effect sizes of the intervention and control groups were similar, the data indicates that a placebo effect may have indeed impacted the data. It could not be determined whether the control decrease in scores on the test anxiety scale was due to the Wii Fit Plus activity, or whether it was due to the positive regard and individualized attention given by the assessor.

**Suggestions for future research**

Since there is no prior research linking the areas of test anxiety and yoga, the present study is a preliminary investigation into the impact of a brief yoga intervention on test anxiety. The results of this study indicate that engaging in yoga consistently lowers test anxiety, but replication of the results is warranted in order to verify the results. As mentioned previously, a replication of the study should use similarly formatted tests, in order to standardize the data. Another option for further research may be to include a third group of participants who only complete the STAIC-S without engaging in any intervention or activity, in order to rule out the complexity of the assessment.

Further investigation into the area of yoga and test anxiety is needed to determine if there is truly a consistent effect. In order to better investigate yoga’s effect on test anxiety, further studies should look at student engagement in yoga on a short-term and
long-term basis, as led by a licensed yoga instructor. As previously mentioned, the tests should also be uniform in question number and complexity.

Another area to be investigated is the impact of “fun” student-driven activities on test anxiety. During the present study, the intervention was conducted by a person who was not a yoga trainer; therefore the Wii Fit Plus was used to standardize the intervention and to minimize the physical risks associated with yoga. Although the focus of this study was to determine the efficacy of a short-term yoga intervention, when the Wii Fit Plus video game was incorporated, the students focused more on the video game aspect and less on yoga. Activities that elicit positive feelings and incorporate student interests should also be investigated further as potential interventions for alleviating feelings of test anxiety.

Conclusion

At first glance of the group scores as a whole, the intervention data seems inconclusive, since a comparison of both group effect sizes indicates a large effect size. Further analysis of the individual scores indicates that the intervention had a large impact on all students who engaged in yoga, while the effect sizes of the control students were inconsistent. Only one of the students who engaged in the control activity responded with a significant decrease in the level of test anxiety. This student’s scores significantly impacted the overall effect size of the control group. When matched participants were compared, two of the three groups indicated the brief yoga intervention had a large effect in reducing test anxiety. Overall, the findings of this study indicate that the brief yoga intervention consistently lowered student test anxiety at a significant level.

Although the overall results of this study indicate a more consistent decrease in
test anxiety after engagement in yoga, it should be noted that the students in the control group did respond to the control activity with some diminished test anxiety. It could not be ascertained whether this effect was coincidental, or whether the students responded to the control activity.

This study acted as a preliminary study into the efficacy of a brief yoga intervention. Most of the literature for yoga interventions pertains to consistent yoga practice. This study investigated whether engaging in a yoga intervention only during high anxiety situations would be beneficial. Since the brief yoga intervention yielded a consistently large impact on test anxiety, the findings of this study indicate that the length of yoga practice may not impact the efficacy of a yoga intervention.

The findings of this study indicated that engagement in a brief yoga intervention preceding a test consistently lowers test anxiety. Although this study indicates a more consistent effect, the study should be replicated, in order to verify the findings. The present study may serve as a preliminary study for further research into the areas of yoga in the schools, as well as research into interventions increasing positive feelings and involving student interests, such as video games.
References


*Clinical Child and Family Psychology Review, 8*(1), 65-88. doi: 10.1007/s10567-005-2342-x


Appendix A. Parent Consent Form

Parental Consent for Student Participation in Research

• **Effects of a Brief Yoga Intervention on Test Anxiety in Fifth Grade Students**: Your child is being asked to participate in a research study conducted by Jessica Harrison from the School Psychology program of the Department of Counselor Education from the University of Dayton. Your child’s participation in this study is voluntary. Please read the information below, and ask questions about anything you do not understand, before deciding whether or not to participate in this study.

• **PURPOSE OF THE STUDY**

  This study is investigating whether a brief yoga intervention given before a test lowers feelings of test anxiety in fifth grade students.

• **PROCEDURES**

  If you volunteer your child to participate in this study, your child may be asked to participate in a brief yoga intervention that will include deep breathing and light stretching. You child will be asked to complete a short questionnaire before a regularly scheduled math test. This will occur in a one-on-one setting. The intervention will use the Wii Fit Plus yoga system to help the student with the yoga poses. The student will engage in a deep breathing exercise, as well as the half moon and the warrior yoga poses. The half-moon pose consists of the student raising his/her arms over his/her head and stretching slightly to either side. This pose stretches the arms, back and stomach muscles. The warrior pose will also be used, which involves the student standing with his/her legs apart and stretching his/her thigh muscles. Students will complete a short questionnaire about any feelings of test anxiety. Your child will be out of the classroom for about 10-15 minutes. This will not affect the amount of time your child will have to complete the test. Your child may engage in the intervention before 10 math tests.

  At the end of the study, you may choose to receive a brief overview of the results, including your child’s results. The results of the other participants will be anonymous, but will be compared to your child’s data. If you would like a copy of the findings of this study, please indicate on the permission form. At any time you may request to receive a summary at the end of the study.

• **POTENTIAL RISKS AND DISCOMFORTS**

  Because the intervention includes light muscle stretching, there is a slight risk of physical injury. These poses were selected for their ease and minimal risk. In order to minimize
potential physical risks, the intervention will use a Wii Fit Plus system. This system uses a Balance Board which has sensors that monitor and track the user’s progress through the poses. The on-screen yoga instructor will give the student feedback on whether s/he is posing correctly, and suggestions on how to improve the pose (if needed).

**• ANTICIPATED BENEFITS TO PARTICIPANTS**

If you allow your child to participate in this research project, he/she will gain basic breathing and stretching techniques that may lower feelings of test anxiety. If your child benefits from these exercises, he/she may use them to lower anxiety in the future.

**• PAYMENT FOR PARTICIPATION**

Participants will not be reimbursed for participation in this study.

**• IN CASE OF RESEARCH RELATED ADVERSE EFFECTS**

If your child experiences any kind of discomfort as a result of his/her participation in this study, you may contact Jessica Harrison (937-295-6635) or Dr. Sawyer Hunley (937-229-3624).

**• CONFIDENTIALITY**

When the results of this study are published or discussed in conferences, no identifying information will be reported. In the final write-up, all names and identifying information will be omitted. Any reports to other parents or staff will be confidential and will not contain any information that identifies your child.

**• PARTICIPATION AND WITHDRAWAL**

Your participation in this research is voluntary. If you choose not to allow your child to participate, that will not affect your child’s education or relationship with his/her teacher or school staff or other services to which you are otherwise entitled. If you decide to allow your child to participate, you may withdraw your consent and stop participation at any time without penalty. The investigator may withdraw your child from participating if she finds it necessary. If your child is removed from the study, the investigator will inform you by phone.

**• NEW FINDINGS**

During the course of the study, you will be informed of any new research findings (either good or bad), such as changes in the risks or benefits resulting from participation in the research or new alternatives to participation. If new information is provided to you, your consent to continue participating will be required and you will be contacted to regain your consent.
**IDENTIFICATION OF INVESTIGATORS**

If you have any questions about this research, please contact one of the investigators listed below.

Jessica Harrison  
Graduate Student  
University of Dayton  
(937)259-6635  
jessi.harrison@madriverschools.org

Dr. Sawyer Hunley  
School Psychology Director  
University of Dayton  
(937)229-3624  
sawyer.hunley@notes.udayton.edu

**RIGHTS OF RESEARCH PARTICIPANTS**

If you have questions regarding your child’s rights as a research participant, you may contact the University of Dayton Institutional Review Board (IRB) Chair, Mary Connolly, PhD, (937) 229-3493, Mary.Connolly@notes.udayton.edu, Kettering Laboratories Room 542, 300 College Park Dr., Dayton, OH 45469-0104

**SIGNATURE OF RESEARCH PARTICIPANT (or legal guardian)**

I have read the information provided above. I have been given an opportunity to ask questions and all of my questions have been answered to my satisfaction. I have been given a copy of this form.

Name of Student (please print) ____________________________

Address _______________________________________________________________

____Yes, I would like a copy of the results of this study

Name of parent/guardian (please print) ____________________________

Phone number _______________  email address __________________________

Signature of parent/guardian ____________________________  Date ____________
Appendix B: Intervention Integrity Checklist

Investigator

☐ Greet Student
☐ Ask about their math test
☐ Start Wii Fit Yoga Routine/Soccer Heading activity
☐ When completed, send student back to class
☐ Repeat with each student (as determined by intervention schedule)

Teacher

☐ Hand out STAIC-S with test (to all participating students)
☐ Remind student to complete before he/she starts test
☐ Collect with test
☐ Return to primary investigator