1-1-2014

Yoga And Breathing And Relaxation Techniques Used During The School Day And Their Effects On School-Aged Children

Erica Marie Thomas
Wayne State University,

YOGA AND BREATHING AND RELAXATION TECHNIQUES USED DURING THE SCHOOL DAY AND THEIR EFFECTS ON SCHOOL-AGED CHILDREN

by

ERICA M. THOMAS

THESIS

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

MASTER OF EDUCATION

2014

MAJOR: COMMUNITY HEALTH

EDUCATION

Approved By:

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Dr. Erin Centeio (Co-Advisor) Date

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Dr. Noel Kulik (Co-Advisor) Date

ACKNOWLEDGEMENTS

I give special thanks to Jennifer Cory and the staff at Hoover Elementary for their open doors and patience during the data collection process. The students at Hoover were very cooperative and willing to participate. I thank them for letting me into their classroom and daily lives.

The success of this project was made possible by the encouragement, assistance and support of many individuals. I first want to thank my co-advisors, Dr. Erin Centeio and Dr. Noel Kulik. Without their diligent guidance, I would not have been able to complete this project. Erin, you have served many roles: mentor, professor, boss, and I am proud now to say "friend", too. Noel, your knowledge and guidance in theory, and providing another perspective have proven indispensable. The faculty and staff in the Department of Kinesiology, Health and Sport Studies offered their time and expertise to either help with the study, teach me the research process, or just be a sounding board.

I want to thank my family who has been helpful to me in so many ways, from making meals, providing childcare, and just being there for me. Their pride in me keeps me going and helps me remember how I got to this place in life. I will be forever grateful for all the times they gave and ever expected anything in return.

Lastly, I want to thank my husband, Grant, and son, Max. They have given up many hours with me in order for me to devote time to writing. They have been patient and loving through this process. Thank you for supporting me while I fulfill my dreams and achieve my goals. You help me maintain balance by centering me and reminding me of what is really important in life. I would not be able to complete this process without your commitment to me, and to my education. Through ups and downs, forks in the road,

and curves ahead, you two are my constants. You have never asked for more than I could give. I will never forget your selflessness and understanding. I love you both.

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CHAPTER 1

INTRODUCTION

Background

Given the rising need to address obesity, stress in children and low academic achievement, coupled with the significant amount of time youth spend within school settings, schools have been identified by a range of federal, regional, and local health authorities as ideal locations to increase youth physical activity and healthy behaviors (CDC, 2010).

Low-income youth are disadvantaged in many areas, notably physical health and academics. According to Goodman et al (2003), low socioeconomic status youth are at risk for negative health consequences because of the numerous barriers to health-promoting behaviors, such as physical activity (Goodman, et al 2003). Physical activity is linked with academic achievement (CDC 2010). Goodman's article showed that SES has a broad and an important influence on health across the population.

Yoga can be considered as part of the fulfillment of the 60 minutes of daily activity recommended by the U.S. Centers for Disease Control (CDC, 2010). Increasing movement during the school day will be an added benefit of Yoga Calm.

Studies look at how improving "mindfulness" can affect children. Improving mindfulness can include a variety of methods, such as yoga, breathing techniques, relaxation response techniques, and sensorimotor awareness activities. There are also variations and different levels of each of these techniques. Researchers are finding similar effects on psychosocial well-being, self-regulatory skills, self-esteem, behavior and areas of cognition as a result of these different, yet related methods (Gard, et al. 2012) (Galantino, Galbavy, & Quinn, 2004).

Because of stress levels and low academic achievement related to low-income status, yoga and related relaxation techniques seem to be a multi-faceted approach: relieve stress,

decrease aggression and anger, increase physical activity, awareness and self-esteem; thereby improving attendance, academic achievement and behavior (Bentley, 1980).

Purpose

The purpose of this project was twofold. First, it sought to add to the current evidence base documenting the effectiveness of yoga and mindfulness training in low SES elementary schools. This study looked specifically at the effects of incorporating yoga and relaxation techniques into the school day, and into the classroom, sometimes as a result of students' behavioral cues. The study also looked at the direct result on classroom behavior, as a whole and with individual "problem" students. The study looked at the impact of the program on attention and concentration, as seen in test scores and classroom behavior observations.

Second, this study seeks to better understand yoga programming for youth within the school setting, in order to optimize health outcomes and provide an evidence base necessary to garner more funding in the area of yoga and mindfulness training within the school setting.

The following research questions guided this study:

- What is the impact of Yoga Calm® on the stress levels of elementary students in an urban, low SES area?
- What is the impact of Yoga Calm® on the behavior in the classroom of these children?
- What is the impact of Yoga Calm® on the academic achievement of these children?
- What is the impact of Yoga Calm® on the use of these techniques outside of school?
- What is the impact of Yoga Calm® on the aggression levels of these children, specifically fighting, bullying and anger?

Potential confounding factors accounted for in the study are self-efficacy toward physical activity and fitness level, and a disparity between the intervention group and the control before

the intervention is implemented.

Hypotheses

The following hypotheses were tested in this study:

- The stress and aggression levels of children in the intervention classroom will decrease significantly.
- The academic achievement levels of children in the intervention classroom will increase, and in comparison to the comparison classroom, will increase significantly.
- The behavior of children in the intervention classroom will improve, or will be better controlled than the behavior of children in the comparison classroom.
- Children in the intervention classroom will increase their participation and knowledge in yoga.

Study Context

This study took place in the Green (pseudonyms used throughout) school district, at Smith Elementary. Green's graduation rate was 71.5% in 2011. Only 17% of Smith elementary third graders met the MEAP standards in 2012, similar to the four previous years. The school is located in an urban, low-income area of a large metropolitan area. Smith Elementary's free and reduced lunch participation is at 75% (Michigan Department of Education, 2012).

Several assumptions were made in order to complete the study. For the purpose of this project, Yoga Calm® was implemented in two third grade classrooms at Smith Elementary, one with a certified Yoga Calm® teacher, and one that acted as a control (comparison), for the duration of the treatment, over a period of 10 weeks. One classroom was labeled Group 1, and received the intervention during the fall semester, while the other group was labeled Group 2 and received the intervention during the spring semester. Although Group 2 will receive the intervention during the 2nd semester; they acted as a comparison group during the first semester

of the year. During the fall semester Group 2 did not receive the Yoga Calm intervention but took the same pre/post surveys and tests as Group 1. Group 2 will not be assessed in the spring at the end of their intervention for purposes of this thesis; therefore the following design was used:

Untreated Control Group Design with Dependent Pretest and Posttest Samples:

NR O_1 X_1 O_2

NR O_1 O_2

Authenticity of the Yoga Calm® certification has been verified. A true random sample of children cannot be obtained, as the intervention classroom has already been established; children have already been placed into a classroom that has a Yoga Calm® certified teacher. The comparison classroom is not a true control, because it has also been established; children have been placed into a classroom with a teacher that is not Yoga Calm® certified.

The Yoga Calm® certified teacher, who was also the regular classroom teacher, led the intervention classroom. She conducted a 20 min. session of yoga and mindfulness activities in the music room twice per week. This included breath work, physical yoga, and a guided relaxation. The other three days during the week, consisted of short segments of Yoga Calm® scattered throughout the day. For example, after writing workshop students completed a short yoga flow that included poses such as mountain, upward mountain, crescent moon, and forward roll (repeated twice). After lunch, students may have done belly breaths and volcano breaths before starting on their next scheduled subject during the day, most often it was math. After math, students were asked by the teacher to do seated guided relaxation at their desk.

Definitions

For purposes of clarity and consistency, the following terms are defined here, and used throughout the thesis. These terms were retrieved from Gillen, J. (2007). It is important to note they are defined here because of their differences. Although one may relate to, be a cause of, or

be correlated with another, they have distinct differences.

Yoga- both a Hindu system of philosophy aiming at the mystical union of the self with the Supreme Being in a state of complete awareness and tranquility through certain physical and mental exercises and any method by which such awareness and tranquility are attained.

Physical Yoga- a system of exercises practiced as part of this discipline to promote control of the body and mind.

Relaxation-making the body less strained or tense, reduce restrictions and intensity.

Mindfulness-a way of paying attention that is intentional, trained on the present moment, and maintained with an attitude of non-judgment.

Meditation-deliberate training of attention to cultivate this state of mindfulness.

Stillness-ability to quiet the mind and body; to be self-aware; to develop sensitivity, self-control and self-regulation.

Listening-ability to tune in to what the heart, mind and body have to say.

Grounding-a strong sense of balance and other sensory-motor functions, and to develop a sense of competence, physical safety, and security.

Strength-physical, mental, and emotional strength

(Gillen, J., 2007)

Table 1.1

Conceptual and Operational Definitions

	Persons	Setting	Treatment
Conceptually	Third graders in southwest Detroit	Urban, elementary school	Yoga Calm®
Operationally	Smith Elementary; 42 students	Hazel Park, Michigan; during schools hours 8 am-3:05 pm	10 week intervention: 5 days per week in the classroom, 2 days outside of the classroom

Independent variables for this study:

- Twenty seven children in a third grade classroom at Smith taught by a certified Yoga Calm® teacher, receiving Yoga Calm® as an intervention.
- Fifteen children in a third grade classroom at Smith, acting as a control, not receiving the Yoga Calm® intervention.

Table 1.2

Dependent Variables/Observations

Conceptually	Operationally
Reading Achievement	DIBEL Reading Comp Score
Behavior	SWISS Records, Observations
Yoga Calm Knowledge	Survey
Yoga Behavioral Charact.	6 Questions via survey
Attendance	Attendance Records
Fitness Level	15 meter timed PACER test
Stress Levels	Valid and reliable scale via survey
Aggression	Valid and reliable scale via survey
Oral Fluency	DIBEL Oral Fluency score
Math Achievement	DIBEL Math Score

Social Cognitive Theory

This study used the Social Cognitive Theory as a framework. The Social Cognitive Theory states that behavior, personal factors, and environmental factors interact with each other, and changing one changes them all (Hayden, 2014). The personal factors looked at in this study were stress and anger. Behavior was operationalized as fighting, bullying, observed behavior, and documented incidents of discipline. The school environment consisted of either having Yoga Calm® in the classroom or not.

Social Cognitive Theory posits that behavior is not simply the result of the environment and the person, just as the environment is not simply the result of behavior and the person. The thought in this study is that students' behavior and personality will be affected by whether they have the yoga intervention in their classroom (environment). Also, their behavior and personality may affect whether they like or accept the yoga. The environment can be a model for behavior. Also, having yoga in their school environment will cause them to use yoga (and related techniques) outside of school, or on their own. But also, according to Social Cognitive Theory, as the students change, they could also affect the learning environment and the overall environment of the classroom (or school) as a whole.

Statement of the Problem

Although many studies have looked at meditation programs, or physical yoga by itself, few programs have looked at the effects of yoga and mindfulness activities within the elementary classroom setting. Additionally, previous interventions have not centered around structured programs, made for the classroom setting that include a broad range of focuses that center around yoga and mindfulness training. This intervention uses a program called Yoga Calm® as the basis of its intervention. The book "Yoga Calm for Children" by Gillen (2007) states the following:

> Yoga Calm® engages heart, mind and body through its unique blend of physical yoga, social skills games, mindfulness activities, and counseling techniques. It helps kids develop emotional intelligence, communication skills, trust and empathy. It nurtures teamwork and leadership. (p 17).

Yoga Calm® contains breath work, yoga-based activities, social/emotional activities, guided relaxations, and emotional guidance. The four goals of Yoga Calm are stillness, listening, grounding and strength.

Other studies, that are not as complex as Yoga Calm®, show that after school programs or yoga classes have an effect on students (Broderick, 2009; Peck, 2005), but there is little research that examine yoga and relaxation techniques into the classroom, as part of traditional educational curriculum. Few studies have been done focusing on the effect of a complete yoga curriculum on the behavior, cognition, and academic achievement of students in elementary school. Even sparser, is the literature that is related to disadvantaged students (who are low SES) who have been exposed to yoga, and whether this type of program can help them specifically. Furthermore, few studies have effectively used a control group as a comparison to a group receiving a yoga/mindfulness intervention. Some studies used children in PE as the comparison group (Noggle,et al., 2012; Hagins, et al., 2013).

CHAPTER 2

LITERATURE REVIEW

Youth Health Status

Childhood obesity has been a focus of public health concern over the last 20 years. As of 2012, approximately 17% (or 12.5 million) of children and adolescents aged 2-19 years were obese (CDC, 2012). Although the number of obese has leveled off in recent years, with more than 2/3 of children being overweight and/or obese, the health of our children continues to be a major public health concern (Ogden, Carroll, Kit, & Flegal 2012). The main factors that impact obesity are inactivity and poor diet. Obesity can cause many health problems from diabetes to heart disease. Obese adolescents and children are more likely to become obese adults (CDC, 2012).

Another rising public health concern is stress in children. School-aged children report many sources of stress including: homework, peer pressure, being teased, and receiving poor grades (Ryan-Wenger, Sharrer, & Campbell, 2005); standardized testing (Skybo & Buck, 2007); and perceived parental pressure and isolation (Luthar, 2003). In urban, low-income youth, additional stress can come from frequent moves and transitions, conflict among family members, exposure to violence and lack of resources (Wadsworth et al., 2008). High levels of stress can have negative health outcomes. Stress can impact the immune system; heart rate; blood pressure, and other physiologic systems in the body. Stress can also negatively impact mental health, concentration, and sleep, as much as other physical implications (Ross & Thomas, 2010). And more importantly, in the school setting, several sources of stress, responses to stress, and methods of coping affect academic achievement (Bently, 1980).

Urban Youth

Overweight and obesity rates are higher in low-income youth compared to higher income youth (CDC, 2012). Low-income youth are disadvantaged in many areas, notably physical health and academics. One article (Goodman, Slap, & Hang, 2003) states that SES has a broad and an important influence on health across the population. Goodman's (2003) study states the following:

> Overall, lower household income and lower parental education each were associated with approximately one third of depression and obesity in the sample. Almost two thirds of adolescents live in homes without a college-educated parent, and almost half live in households with incomes 2.5 times below the federal poverty level (p. 1846).

Socioeconomic status accounts for a large proportion of stress-related disease (namely depression) within the whole population. The uncertainty of living conditions, anxiety of parents living below the poverty level, reduced access to resources, and harsh and inconsistent parenting produce high levels of stress (Goodman et al., 2003).

According to Goodman et. al. (2003), low socioeconomic status youth are at risk for negative health consequences because of the numerous barriers to health-promoting behaviors, such as physical activity (Goodman et al., 2003).

Importance of Physical Activity

Physical activity is becoming more important than before due to the obesity rates (CDC, 2013). Physical activity is just one way to help combat obesity and also reduce stress. Current recommendations state that children and adolescents should be physically active for 60 minutes every day. Most of these 60 minutes should contain moderate- or vigorous intensity aerobic physical activity, and should include vigorous-intensity physical activity at least 3 days a week. As part of their 60 or more minutes of daily physical activity, children and adolescents should

also participate in muscle-strengthening activities, like climbing, at least 3 days a week and bone-strengthening activities, like jumping, at least 3 days a week (USDA, 2014).

In addition to the numerous health benefits of being physically active, physical activity also has many other benefits for children, including improved cognition (Hillman, Castelli, & Buck, 2005), and increased academic achievement (Ortega, Ruiz, Castillo, & Sjostrom, 2008), which can lead to better performance in school (Castelli, Hillman, Buck, & Erwin, 2007). A growing body of evidence also suggests a relationship between vigorous and moderate- intensity physical activity and the structure and functioning of the brain. Children who are more active show greater attention, have faster cognitive processing speed, and perform better on standardized academic tests than children who are less active (IOM, 2013). Other benefits of physical activity include improved physical fitness, self-esteem and mood, and decreased depression and anxiety (Ortega et al., 2008). Physical activity has also been linked to a reduction in stress or an increase in stress resistance of the body (Fleshner, 2005). In another study, psychosocial quality of life was improved as a result of physical exercise, particularly in urban and over-weight students (Hartmann, Zahner, Puhse, Puder, & Kriemler, 2010).

Physical activity is very important to all children and adolescents, however, not all children and adolescents have safe and affordable places to live a physically active lifestyle. According to Goodman et al. (2003), low socioeconomic status youth are at risk for negative health consequences because of the numerous barriers to health-promoting behaviors, such as physical activity (Goodman et al., 2003). The importance of physical activity during the school day is particularly pertinent with low-income youth, as their access to physical activity is limited outside of school. There are vast inner-city barriers to physical activity outside of school, such as: neighborhood safety, lack of access & green space, and family financial limitations (Romero, 2005). Molnar, et al. (2002) found that neighborhood disorder and lack of safety predict reduced

physical activity among urban children.

Schools as Intervention Sites

Given the rising need to address obesity, stress, and low academic achievement in children, coupled with the significant amount of time youth spend within school settings, schools have been identified by a range of federal, regional, and local health authorities as ideal locations to increase youth physical activity and healthy behaviors (CDC, 2010). The school day, typically 8-9 hours long, traditionally provides a sedentary setting away from home. Adding physical activity during the school day can reduce the sedentary nature of classrooms. Over 95% of youth are enrolled in schools, thus making a large captive audience (CDC, 2010).

Because children spend so much of their time in schools, schools play a critical role in improving the dietary and physical activity behaviors of children and adolescents (IOM, 2013). Schools can create environments supportive of students' efforts to eat healthy and be active by implementing policies and practices that support healthy eating and regular physical activity and by providing opportunities for students to learn about and practice these behaviors.

In the 2013 *Physical Activity Guidelines Midcourse Report: Strategies to Increase Physical Activity Among Youth,* schools were identified as the setting that had the most evidence for promoting and improving youth physical activity, and the evidence was strongest for multi-component programs. Additionally, schools are a key setting because the promotion of physical activity has long been a fundamental component of schools (CDC, 2011). The Institute of Medicine agrees with this, per their report brief released in 2013: "Schools—backed up by district policies and supported by administrators and parents— should provide access to at least 60 minutes per day of vigorous or moderate-intensity physical activity, more than half of which should be accomplished during regular school hours." (IOM, 2013). The Carnegie Task Force on Education back in 1989 wrote in its landmark report "School systems are not responsible for

meeting every need of their students. But when the need directly affects learning, the school must meet the challenge" (in Adelman & Taylor, 2006, p296). More recently, the CDC, in collaboration with American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD), developed a step-by-step guide for schools and school districts to develop, implement, and evaluate comprehensive school physical activity programs. This guide suggested that schools could promote physical activity through Comprehensive School Physical Activity Programs (CSPAPs) including recess, classroom-based physical activity, intramural physical activity clubs, interscholastic sports, and physical education.

One component of the CSPAP is physical activity during the school day. The CDC suggests providing ample opportunities for all students to engage in physical activity outside of physical education class. Opportunities for physical activity (PA) may include: recess, physical activity breaks (breaks from academic content), and classroom-based physical activity (integrated into the classroom setting). The CDC (2011) reported on studies regarding the positive impact of classroom physical activity. Nine studies explored physical activity that occurred in classrooms apart from physical education classes and recess. In general, these studies explored short physical activity breaks (5–20 minutes) or ways to introduce physical activity into learning activities that were either designed to promote learning through physical activity or provide students with a pure physical activity break. These studies examined how the introduction of brief physical activities in a classroom setting affected cognitive skills (aptitude, attention, memory) and attitudes (mood); academic behaviors (on-task behavior, concentration); and academic achievement (standardized test scores, reading literacy scores, or math fluency scores). Eight of the nine studies found positive associations between classroom-based physical activity and indicators of cognitive skills and attitudes, academic behavior, and academic achievement; none of the studies found negative associations (Raspberry et al., 2011).

Another component of CSPAP are short physical activity breaks and/or "recess" during the day. They have also been proven beneficial in numerous studies. It has been suggested that people function better with a change of pace (Ellis, 1984), and that spacing the delivery of new information improves memory recall (Dempster, 1988). In one study, children became more on task and less fidgety when they had recess, compared with days they did not have recess (Jarrett et al., 1998). The CDC reported on eight recess studies that explored the relationship between academic performance and recess during the school day in elementary schools. Six studies tested an intervention to examine how recess impacts indicators of academic performance; the other two studies explored the relationships between recess and school adjustment or classroom behavior. Time spent in recess appears to have a positive relationship with, or no relationship with, children's attention, concentration, and/or on-task classroom behavior. All eight studies found one or more positive associations between recess and indicators of cognitive skills, attitudes, and academic behavior; none of the studies found negative associations (Raspberry et al., 2011).

Benefits of Yoga/Yoga as Physical Activity

One way to integrate physical activity into the school setting is through Yoga. Yoga can help to address the two major health problems facing children today: obesity and stress. Yoga can be considered as part of the fulfillment of the 60 minutes of daily physical activity recommended by the U.S. Centers for Disease Control, particularly as a bone and muscle strengthening activity. It can also be used to relax and calm, thereby reducing stress. Studies show that Yoga reduces stress, from adolescents to adults (Sharma, 2014).

Yoga can consist of stillness, holding a posture for a period of time, or a sequence of moves put together into a "flow" of movement. Yoga can also be meditation or relaxation techniques, also described as mindfulness techniques. Improving mindfulness can include a

variety of methods, such as yoga, breathing techniques, relaxation response techniques, and sensorimotor awareness activities. There are also variations and different levels of each of these techniques. Yoga can be used to stretch by holding one pose or posture.

Yoga has been identified as beneficial in many aspects of life, in addition to relieving stress. Yoga has been shown to improve flexibility and increase strength among both adults and children (Telles, Singh, Bhardwaj, Kumar, & Balkrishna, 2013). One study that showed positive effects of a yoga-based intervention on perceived stress suggested these types of programs might be of value in cultivating subjective well being in young adults (Gard et al., 2012). Studies also support the idea that Yoga techniques may improve physical and mental health through physiologic measures (Ross & Thomas, 2010). Yoga decreases levels of salivary control, blood glucose, and epinephrine levels. Yoga significantly decreases heart rate and blood pressure. Most importantly, yoga reverses the negative impact of stress in the immune system, and regulates our bodies' response to stress. A meta-analysis of 17 yoga interventions revealed that yoga appears to be a promising modality for stress management (Sharma, 2014). Twelve of the studies demonstrated positive changes in psychological or physiological outcomes related to stress. The benefits of yoga have mostly been documented for adults, but an emerging field of study is the benefit of yoga and related mindfulness techniques on children.

Benefits of Yoga in Children

The benefits and positive effects of yoga are not just applicable to adults, but also to children. For years researchers have cited the benefits, but only recently have yoga studies increased in the literature. Galantino, Galbavy, & Quinn (2004) conducted a review of the literature to see the physiological affects of yoga on children. They found cardiopulmonary, neuromuscular, and musculoskeletal effects of yoga on children. They found evidence regarding the effects of yoga as an intervention for quality of life (QOL) and physical outcomes in

children. Quality of life was self-reported and defined as a "subjective evaluation of both positive and negative aspects of life (Galantino et al., 2004).

Only a few studies look at how improving "mindfulness" can affect children. Researchers are finding similar effects on psychosocial well-being, self-regulatory skills, self-esteem, behavior and areas of cognition as a result of these different, yet related methods (Broderick & Metz, 2009; Napoli et al., 2005).

As stated earlier, low-income status is associated with increased stress levels and low academic achievement. Yoga and related relaxation techniques may be a multi-faceted approach that can be used to relieve stress, decrease aggression and anger, increase physical activity, self awareness and self-esteem which in turn may improve attendance, academic achievement and behavior (Bentley, 1980).

Yoga can also easily be done with little space and little equipment. Teaching children yoga and breathing techniques gives them the tools to be physically active and reduce stress in the safety of their own home, with no extra costs or supervision needed.

Yoga in Schools

Given the positive benefits of yoga, and the need for more physical activity during the school day, yoga is one promising approach to increasing physical activity in the classroom, and can have secondary benefits that reduce stress and increase academic achievement among students. Yoga can be used in the school day to provide physical activity breaks and recess. It can also be used in response to behavior, and to calm or energize. Of the research done on yoga interventions in schools, they all yield some positive results. About 10 different studies have been done on the use of yoga with children in schools. They vary on how yoga was incorporated during the school day, and also the type of yoga and/or mindfulness techniques.

Some yoga interventions are implemented as an after-school program, or in addition to traditional school curriculum. One study looked at the effects of yoga training on 48 fifth graders (Stuech & Gloeckner, 2003). Each session was divided into three parts: relaxation, yoga exercises and a final "game", encouraging social contact. The researchers collected data at pre and post time frames. The intervention was 15 sessions of 60 minutes each, held after school. Stuech and Gloeckner (2003) found that the program "increased emotional balance and reduced fears, feelings of helplessness and aggression" (p. 371).

Other interventions take place during the school day but outside of the children's classroom. For example, one study that was implemented showed the effect relaxation techniques have on academic achievement. Cardiologist Herbert Benson (2000) found that students who were exposed to a relaxation curriculum earned higher marks in GPA, work habits and cooperation, than students who did not, and maintained this improvement for at least two years. (p. 156).

Other yoga interventions that have been researched are added within traditional physical education or health classrooms. A study conducted by Noggle and colleagues (2012) compared a group of students that received the yoga intervention against a group that received Physical Education (PE) as normal. This was a 10-week intervention, meeting 2-3 times per week, during normal PE times, for 30 minutes. The program included yoga poses, breathing exercises, relation, and meditation. A small, unequal sample size limited the results of the study. However, total mood disturbance and negative affect (self concept and negative emotions) improved in the students who received the yoga intervention (Noggle, Steiner, Minami, & Khalsa, 2012). Another study implemented mindfulness classes during lunch periods and study halls as a pilot study (Broderick & Metz, 2009). This same program was then used during health classes for high school seniors. The BREATHE program tailored mindfulness-based approaches to the

developmental needs of adolescents. The program contained six themed lessons: body awareness, understanding and working with thoughts, integrating awareness of thoughts, feelings and bodily sensations, reducing harmful self-judgments, and integrating mindfulness awareness into daily life. Qualitative feedback indicated a high degree of program satisfaction, and statistically larger gains in emotion regulation skills including emotional awareness, access to regulation strategies, and emotional clarity (Metz, et al., 2013).

Other school interventions have shown positive affects in "time on task" in children after deep breathing, physical postures and relaxation exercises (Peck et al., 2005), improved emotion regulation and well-being and increased focus and attention after mindfulness training (Broderick, 2009; Napoli, 2005), and increases in self esteem and greater internal locus of control after relaxation-response curriculum (Benson, 1994).

Through a review of literature, two programs that specifically focus on integrating Yoga into the classroom were found. One program, Yoga Ed©, is a curriculum that consists of breathing, poses, visualization and games used during the school day. Yoga Ed© has been shown to have benefits on children's behaviors and stress levels, but an official study was not conducted until this one. Yoga Ed© is described as "yoga instruction" and in the Slovacek (2003) study, it was done separately from the student's classroom. Certified yoga instructors taught these classes. This study that evaluated Yoga Ed© had a strong sample size with 310 participants, grades 3 through 8. The researchers collected data at 3 time points; pre, mid and post intervention, over a 9 month school year. Elementary students received instruction 60 minutes per week. Slovacek (2003) found that "yoga participation not only helped students improve their attitudes towards themselves, but their behavior also improved, as seen in the vastly lower rate of discipline referrals" (p .2).

School yoga interventions vary in length, dose, type of yoga, who teaches the yoga, and whether it is in the classroom or not. While all of these studies show at least some small result or benefit of yoga, most of them are not incorporated throughout the school day. This study tries to find out if a classroom intervention would yield the most benefit to children.

Yoga Calm®

Another program that focuses on integrating Yoga into classroom time is referred to as Yoga Calm. The focus of Yoga Calm® is to increase physical activity during the day, teach students activities they can do at home (with little space and no equipment), and introduce stress relieving and calming techniques. The program is meant to be used at specific times, such as for a calming effect after lunch and recess, before tests; as an energizer after long periods of instruction or sitting; and also in response to student behavior such as restlessness and lethargy. The program utilizes all of the benefits of both yoga on children and physical activity during the school day. The Yoga Calm® program was designed for use throughout the school day, and in conjunction with the teacher's own methodologies for classroom management. It is designed for use by the classroom teacher, not a yoga instructor. It should be incorporated into the school day, in response to behavior, before a test or important event, to energize students, or to calm students down. This program can be used to meet CSPAP guidelines for implementing physical activity during the school day. Just one aspect of Yoga Calm® is short bouts of movement, doing only one or a few yoga moves together. These short bouts can be used as physical activity breaks. Another component of Yoga Calm® are 25-minute "lessons" which incorporate breathing techniques, yoga flow and a relaxation phase. These lessons can be used as additional physical activity breaks throughout the day or sometimes incorporated as an indoor recess period during the school day.

Contribution to Current Literature

There is only one known study about the Yoga Calm® program specifically, and it was not published in a peer-reviewed journal. As a result, that study will not appear in this thesis.

While studies show that after school programs or yoga classes have a positive effect on students (Broderick, 2009; Peck, 2005), there is little research about bringing yoga and relaxation techniques into the classroom, as part of traditional educational curriculum. Only one other program, Yoga Ed©, brings yoga into the classroom, as part of the school day, but in the study, it was taught by certified yoga instructors, not by teachers, and not in the classroom. Additionally, previous interventions have not centered around structured programs, made for the classroom setting that include a broad range of focuses that center around yoga and mindfulness training. This intervention uses a program called Yoga Calm® as the basis of its intervention. The book "Yoga Calm for Children" by Gillen (2007) states the following:

> Yoga Calm® engages heart, mind and body through its unique blend of physical yoga, social skills games, mindfulness activities, and counseling techniques. It helps kids develop emotional intelligence, communication skills, trust and empathy. It nurtures teamwork and leadership. (p 17).

Yoga Calm® contains breath work, yoga-based activities, social/emotional activities, guided relaxations, and emotional guidance. The four goals of Yoga Calm® are stillness, listening, grounding and strength.

There are few yoga studies that examine low-income youth and whether this type of program can help them specifically. Some studies such as (Hagins et al., 2013) and (Noggle et al., 2012) used children in physical education as the comparison group. As a result, the intervention group was not receiving physical education in addition to the yoga. Because yoga is

a form of physical activity, comparing a yoga group to a physical activity group, such as physical education class, is problematic.

This study is unique because it adds the element of focusing on students who live in an urban area. According to the classroom teachers, these particular students have high stress levels, and have little parental support at home for academics or physical activity. Many of these students have anxiety related to attending school, whether it is separation anxiety from their parents, as a result of stress at home, or a general apprehension to school.

Most literature about the benefits of yoga relates to adults. Of the literature that relates positive benefits of yoga to children, very little brings interventions to schools. And of the interventions in schools, they normally take the place of other classes, activities, and learning experiences. This study focuses on a complete yoga program that contains multiple components, such as breathing and relaxation techniques, yoga poses, and team building. None of these interfere with the school day, or take the place of other learning opportunities. The purpose of this study is to change the environment of children at school, by adding a yoga intervention. The purpose then is to determine the effects this intervention would have on the stress levels, (classroom) behavior, and academic achievement of this group of third graders. As a result of changing the school environment, the PI would like to investigate if participation in yoga or yoga related activities (breathing and relaxation techniques) increases outside of school.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

This study used an untreated control group design with dependent pretest and posttest samples". The X refers to the Yoga Calm intervention (Shadish & Cook, 2002).

$$\begin{array}{llll} NR & O_1 & X & O_2 \\ \hline NR & O_1 & & O_2 \end{array}$$

The design is non-randomized because the students were drawn from a purposive sample. A mixed methods approach was used to capitalize on the strengths of both quantitative and qualitative data. This methodology can increase the validity of the findings by looking at the effects of Yoga Calm® in different ways. Quantitative data will show whether change occurred over time, while the qualitative data helps to understand what happened and why.

The PI went into this study with a general bias toward the implementation of a yoga-based program. The PI has experienced personal benefits from the use of yoga, which inspired this research project. In order to reduce bias during data collection, the PI used valid and reliable scales, surveys, observation forms, and interview guides, as well as tried to keep an open and unbiased mind and attitude toward the program and students.

Participants

The sample represented by this research project consists of 47 third grade students at Smith Elementary in an urban area in the midwestern part of the United States. The percentage of students eligible for free and reduced lunch at Smith Elementary (pseudonym used) is 78.1%. Students were not randomly selected for the research study as a class cohort design was used, but were randomly placed into the third grade classroom cohort by lottery. Twenty-seven students at Smith Elementary received the Yoga Calm® certified teacher as their classroom teacher, and

twenty received a non-Yoga Calm® certified classroom teacher. The classroom with a non-Yoga Calm® certified teacher acted as the non-treatment comparison group in the study. The sampling plan included convenience sampling, which is "a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher" (Laerd Dissertations, 2012). The Principal Investigator sought out a certified Yoga Calm® teacher, in order to conduct the study to determine the interventions effect on stress, behavior and aggression of this classroom yoga program on children.

Because the study aims to understand specific outcomes of the Yoga Calm® program, children in a classroom with a Yoga Calm® certified teacher were recruited.

The following are independent variables for this study:

- Twenty seven children in a third grade classroom at Smith Elementary taught by a certified Yoga Calm teacher, receiving Yoga Calm® as an intervention.
- Twenty two children in a third grade classroom at Smith Elementary, acting as a comparison group, not receiving the Yoga Calm® intervention.

The intervention classroom started with 22 students, but after the study began, five students transferred in from the comparison classroom, for a final total of 27 students. The comparison classroom started with 22 third graders and after the five transferred and one student moved, the final number of students in the comparison classroom was 16 students.

Table 3.1

Dependent Variables For This Study

Construct/Dependent Variables	Measure	Level
Reading Achievement	DIBEL Reading Score	Ratio
Behavior	SWIS Records	Ratio
Yoga Calm Knowledge	Survey	Nominal
Prior Yoga participation	Self report on survey	Nominal
Fitness Level	15 meter timed PACER test	Ratio
Stress Levels	Valid and reliable scale via survey	Ordinal
Aggression	Valid and reliable scale via survey	Ordinal
Math Achievement	DIBEL Math Score	Ratio

The following research questions will be answered at the conclusion of this study:

- What is the impact of Yoga Calm® on the stress levels of elementary students in an urban, low SES area?
- What is the impact of Yoga Calm® on the behavior in the classroom of these children?
- What is the impact of Yoga Calm® on the academic achievement of these children?
- What is the impact of Yoga Calm® on the use of these techniques outside of school?
- What is the impact of Yoga Calm® on the aggression levels of these children, specifically fighting, bullying and anger?

Hypotheses

The PI hypothesizes that the stress and aggression levels of the children in the intervention classroom will decrease. Also, it was hypothesized that children will increase their use of and participation in yoga. The children in the intervention classroom will have significantly higher academic achievement compared to the comparison classroom.

Measures

Quantitative. Several instruments were used to collect data for the study. One is a survey using two valid and reliable scales (Stress in Children and the Modified Aggression Scale) with six other behavioral questions added by the researcher. (Appendix A). Three academic achievement tests were administered (DIBEL Reading Comprehension, AIMS Web Math Computation, and DIBEL Oral Fluency) as well as a cardiorespiratory fitness test (PACER).

Stress in children. The stress level of children was measured using the "stress in children" scale by Osika, Friberg & Wahrborg (2007). This scale consists of 21 items and is used to assess stress in children according to a self-rating. Twelve of the items are reverse coded, then a total score is obtained by adding all 21 scores together. A high score suggests higher levels of perceived stress. A few examples of questions are, "I like going to school", "I feel calm", and "I fall asleep easily at night" (Osika et al., 2007). The four-point scale ranged from "never" to "very often". A previous study with 181 children ages 9-12 showed a Cronbach's alpha of .79 for the complete test score. In the current study, the Cronbach's alpha for this scale for "pre" measures was .750, and for "post" measures was .741.

Modified aggression scale. The aggression of children was measured using the modified aggression scale. This scale measures fighting, bullying, anger and cooperative care. The cooperative care subscale was not used in this research study, therefore the final scale in this study contains 14 total items: 5 in "fighting", 4 in "bullying", and 5 in "anger". Scoring and

analysis point values are assigned as follows: No opportunity = 1, Never = 1, 1 or 2 times = 2, 3 or 4 times = 3, and 5 or more times = 4. The "fighting" subscale is calculated by reverse coding Item 5 and summing across all five items. Examples of questions are, "I hit back when someone hit me first", and "I pushed, slapped, shoved, or kicked other students". A total of 20 points is possible and a high score indicates more aggression or fighting. The other two subscales are calculated similarly, by summing across all responses. The "bullying" subscale has a total of 16 points; and the "anger" subscale has a total of 20 points. Examples of bullying questions are "I teased other students" and " I threatened to hit or hurt another student". Examples of anger questions are "I frequently get angry" and "I got into a physical fight because I was angry". High scores indicate more bullying behavior, and more anger (Bosworth et al., 1999). In a study with 558 middle school students, the Cronbach's alpha for bullying was .83 and for anger was .70 (Bosworth et al., 1999). In this study, the Cronbach's alpha for "pre" measures for fighting, bullying, and anger are .668, .705, .634 respectively. The Cronbach's alpha for "post" measures for fighting, bullying, and anger are .514, .485, .638 respectively.

Behavioral characteristics. The following six questions were added to the survey in order to understand yoga participation at home and school, yoga enjoyment, and confidence and skill related to yoga: "I have participated in yoga at some time in my life before today" (yes/no answer), "In the last 3 days how many times did you participate in yoga at school", In the last 3 days how many times did you participate in yoga at home", "I enjoy participating in yoga", "I feel confident about performing yoga poses", "I think I have the skills needed to perform yoga". The additional questions were modeled after similar questions that have been validated with students in other physical activity settings.

Academic achievement. Three academic achievement tests were administered to students: DIBEL Reading Comprehension, AIMS Web Math Computation, and DIBEL Oral Fluency.

***AIMS web math computation*.** This test measures academic achievement in math, and is specific to third graders. Students are given 8 minutes to complete as many math problems as possible. The test consists of single and double-digit addition and subtraction problems. The number correct is their math score. Each correct answer has a different weight, and is assigned a "1", "2", or "3". An incorrect answer gets a "0", and a non-answer gets nothing. According to Thurber (2002), "correlations to performance on global state tests range from 0.5-0.9 for math computation, while discriminant analyses reveal that Curriculum Based Measurement math probes predict performance on state math standards with 87% accuracy" (p. 520).

DIBELS reading comprehension. This test measures academic achievement in reading comprehension, and is specific to third graders. Students were given 2 minutes to complete one reading test. The students took a total of three reading probes. Each probe is a story. Students must choose one word (out of three choices) that accurately completes the sentence. For example, "Bobby was born over (golfers/one/less) hundred years ago". The student would circle the word "one" in order to accurately complete the sentence. According to Fuchs (1988) "reliability shows a single probe ranges from r=0.79 - 0.92, while the mean of 3 probes ranges from r= 0.92 - 0.97" (p. 5).

DIBELS oral fluency. The DIBELS Oral Reading Fluency (ORF) test measures academic achievement in reading oral fluency. The DIBELS ORF is a standardized, individually administered test of accuracy and fluency with connected text. The passages are calibrated for each grade level. Student performance is measured by having students read a passage aloud for one minute. Words omitted, substituted, and hesitations of more than three seconds are scored as

errors. Words self-corrected within three seconds are scored as accurate. The number of correct words per minute is the oral reading fluency score. The classroom teachers gave this test in September and January, as part of district requirements. A number score was given to the PI for each student. According to Jenkins (2003), "Reading Curriculum-Based Measurement compared with global reading skills have coefficients of agreement from 0.63 to 0.90, with most exceeding 0.80" (p. 725), and according to Howe (2002), "recent meta-analysis of 29 studies demonstrated an overall agreement of 0.69" (p. 5). A series of studies has confirmed the technical adequacy of CBM reading. Test-retest reliabilities for elementary students ranged from .92 to .97; alternate form reliability of different reading passages drawn from the same level ranged from .89 to .94 (Tindal, Marston & Deno, 1983). Criterion-related validity from eight separate studies in the 1980's reported coefficients ranging from .52 to .91 (Good & Jefferson, 1998).

PACER fitness test. This test measures students' level of physical fitness. Students were informed of how the test was performed in their classroom setting. Once in the gymnasium, the PI demonstrated the test. The PI started a CD, which guided students through the fitness test. Students ran 25-meter laps and got two chances to not reach the line before the beep. After their second miss, their test was over. The CD indicated laps with a "beep". Cones in the gymnasium delineated laps. Total laps completed were recorded and entered into SPSS. This variable will be used as a control for academic achievement, as fitness level is correlated with academic achievement (Castelli et al., 2007).

Qualitative. Three types of quantitative data collection were used: observations, interviews and artifact collection. They were all used, in conjunction with quantitative data, to triangulate themes.

Behavior observation protocol. Behavior was documented using observation forms, filled out by both the teachers and Principal Investigator (PI) (Appendix B). The PI observed

each classroom twice, for half of a school day. The PI took notes on overall classroom behavior, and on individual student's behavior. Each teacher also took notes on individual student's behavior at three time points during the intervention: September (pre), end of October (mid), and December (post). Examples of items noted are, "talking when should be quiet", "remains on task", "sits still", and "follows directions". Although the behavioral observation protocol is not a valid and reliable instrument, it was chosen because it capture children's in school behavior and is commonly used in the school setting. Given that it was not being used for statistical purposes the researcher chose to include it and conduct a qualitative document analysis with it as part of the triangulation of data.

SWIS forms. Various staff at the school (e.g. teachers, lunch aides, classroom aides) document "minor" and "major" problem behaviors in students during the school day. Examples of "minor" problem behaviors are "inappropriate language" or "disruption". Examples of "major" problem behaviors are "fighting/assault" and "insubordination". These forms document disciplinary action taken at school, and were obtained for each student in third grade from the existing school database. This form is a district wide form that is used to track discipline issues and therefore was included for qualitative analysis.

Student interviews. The PI conducted twenty-six semi-structured interviews with the students from the intervention group, at the conclusion of the research study. Twelve student interviews were conducted on November 21, 2013, and thirteen student interviews were conducted on November 22, 2013. The PI used a script to perform all of the interviews. The PI changed follow up questions and adapted the interview according to the student's answers. Two sample questions are, "what did you like most about having yoga in your classroom?", and "do you use the breathing techniques that you learned in class, outside of school?"All interviews were transcribed and coded for themes. The average length of the interviews was 6 minutes 11

seconds, with the longest at 9 minutes 11 seconds and the shortest at 2 minutes 41 seconds. At least seven of the children were very quiet, and/ or hard to get answers from. All student interviews were conducted during school hours, and in the hallway outside of the classroom. The PI conducted interviews with one child at a time and the interviews were recorded to ensure accuracy. The interview guide is attached and was followed for every student (Appendix C).

Teacher interview. A semi-structured interview with the intervention classroom teacher was recorded at the conclusion of the intervention, in December. The interview was 40 minutes long. Two sample questions were, "why did you introduce yoga into your classroom?", and "What changes have you noticed as a result of introducing yoga into the classroom?" The interview revealed observations by the classroom teacher that triangulated student interviews and PI classroom observations.

Procedures

The PI entered the classroom during school hours and obtained oral assent from the students for data collection in September. Letters were sent home in September and parental consent was obtained for all third grade students. For ethical reasons, the comparison group received Yoga Calm® in their classroom during the second semester of the school year, after the intervention period was complete.

Upon receiving IRB consent, the Principal Investigator (PI) and research assistants collected data for this research; administered the surveys, achievement tests, PACER test, interviews, and conducted observations. The only exception was the DIBEL Oral Fluency test, which was administered by the classroom teachers. The "pre" data was collected in September; with the intervention lasting for 10 weeks, and the post data collected in December.

The same data was collected for both the comparison and treatment groups, on respective days. The tests were conducted in the classroom, in the hallway outside of the classroom, and in the gymnasium (PACER test). An extensive research protocol was strictly followed for all tests.

The surveys were administered in a group format in each of the classrooms. At each administration, the researcher and classroom teacher was present. Although the items were appropriate to the reading level of the students, the researcher read the items and the response choices aloud while the classroom teacher walked around the room to monitor students and provide individual assistance. Surveys took approximately 40 minutes to complete.

The two academic achievement tests administered by the researcher were given on the same day, in a group format in classrooms. The researcher explained that the tests would not affect their grade in the classroom and that their teacher and parents would not have access to their scores. Students had to keep their eyes on their own papers, and any aides in the classroom that might be of assistance were covered or removed. Students were given a set period of time, depending on which test was given; the PI kept this time with a stopwatch for accuracy. When "time" was called, all students put their pencils down and hands up. The researcher was not present when the teachers administered the DIBELS ORF exams, however the teachers followed all protocol for the examination. The test was given to all students over the course of a week, with all students individually tested.

The PI observed each classroom four times for half of a school day (n=8). The PI took notes on overall classroom behavior, and on individual student's behavior. The PI sat in the back of the room, and students were used to her presence. In order to reduce bias, the same observation form was used for each child. In the intervention room, individual children were looked at and overall classroom behavior. In the comparison classroom, overall behavior was observed.

Each teacher also took notes on individual student's behavior at three time points during the intervention: September (pre), end of October (mid), and December (post). The observations recorded were anything the teacher noticed during the school day, while teaching. Teachers logged the observations after school hours. Teachers were not logging behavior as it was happening.

Within this study, there are several plausible threats to internal validity. To measure and correct for covariates, the pre-test measures will be used as a covariate. Because of the multiple statistical tests and small sample size, there might not be adequate power to detect a difference between groups. Power will be an issue for this study as the sample size was small. Accurately comparing effect size may be a problem to other research, as a literature review did not reveal what was previously used in similar research. In order to avoid violations of statistical assumptions: The researcher ensured that powerful statistical tests were used, considering the sample size. In order to avoid unreliability of measures, the measurement methods are valid and reliable and have been used multiple times in other research. The treatment strength is high as Yoga Calm® is an established, organized and structured school program, designed especially for children. The classroom teacher received extensive training in Yoga Calm®, and is methodical in her delivery of the treatment. The treatment was consistent and all students adhered to the treatment, as it was used during the school day, as a daily occurrence (Shadish, et al. 2002).

Data Analysis

Quantitative. All original survey responses and test scores were entered into an Excel spreadsheet. All of the measures including the scaled variables, academic tests, and the PACER tests were scored. Demographic information and observed behavioral data was categorized and coded, and entered into Excel as a number. A number, in a separate column, labeled "ID", identifies the students. From Excel, items were imported into IBM SPSS, Version 22. The data

were screened to make sure all assumptions for normality and homogeneity of variances were met before conducting the analysis. The values were labeled and ranges and numbers were verified for accuracy. The 40 third graders were screened for missing values on 7 initial continuous variables (Stress, Aggression (Fight, Anger), DIBEL oral, math computation, reading comprehension, and behavioral characteristics). The missing values that were discovered were imputed with the mean substitution procedure. The variables were checked for both univariate and multivariate outliers. Descriptive statistics were run in SPSS on all variables and all students in the population, to check the normality and linearity of the distributions.

The "bully" variable was omitted after normality and linearity could not be achieved.

Five separate T-tests were performed for both the intervention and comparison group, to compare pre and post measures between the groups, and within the groups. An independent t-test was run to compare the pre levels of stress, academic achievement, aggression, and the six behavioral characteristics between the intervention and comparison group at baseline. An independent t-test was run to compare the post levels of stress, academic achievement, aggression and the six behavioral characteristics between the intervention and comparison group. An independent t-test was run to compare the difference between the pre and post levels of stress, academic achievement, aggression and the six behavioral characteristics between the intervention and comparison group. A paired samples t-test was run to compare the pre and post levels of stress, academic achievement, aggression and six behavioral characteristics within the intervention group. A paired samples t-test was run to compare the pre and post levels of stress, academic achievement, aggression and six behavioral characteristics within the comparison group.

Qualitative. In order to conduct a competent mixed-methods study, several qualitative strategies were used to provide evidence of trustworthiness: data-source triangulation, peer

debriefing, participant checks, and dependability (Thomas et al., 2011). Bias was addressed earlier in this chapter. Data-source triangulation between all sources of qualitative and quantitative data was completed to compare alternatives and expose any inconsistencies. The peer debriefing was done by having an experienced qualitative researcher examine the transcripts and coding sheets. A participant check was conducted by the teacher to examine the transcripts of her interview to ensure it was consistent with her experience.

The observations in the classrooms, made by the PI, were tracked using the same observation sheet each time. The observations were categorized by types of behavior. Overall behavior was analyzed by date. Individual student observations were grouped together, and then sorted by date.

The observations made by the teachers were separated by date, then student. The observations were separated by category, and then analyzed by student and date.

The SWIS artifactss were separated by student and analyzed for patterns. Only 6 SWIS forms were completed for children in the intervention group over the 10-week period.

Student interviews were transcribed verbatim from the recording and coded for themes in an Excel spreadsheet. First, the PI organized every answer under the respective question in order to find themes. Coding was redefined and united until 3 main themes emerged, with one subtheme. Once the themes were discovered, the PI tallied responses for every student in order to find percentages.

The teacher interview was transcribed verbatim from the recording and coded for themes in an Excel spreadsheet. The transcribed interview was given back to the teacher for her to change or add anything. She kept the transcript as it was given to her.

Once all of the individual data sources were analyzed the researcher and team analyzed the data across all sources to determine common themes and patterns. The patterns and themes were then used to express the overall qualitative themes for this study.

Summary

Third graders receiving a Yoga Calm intervention in their classroom were compared to third graders that do not receive the intervention. Academic achievement and psychosocial data were collected. Data were cleaned and t-tests run to compare the means of various scale measures of each group, both at pre and post measures. The results were analyzed for significance, in order to accept or reject the null hypothesis. Qualitative data was collected and analyzed to confirm or deny themes and constructs of Social Cognitive Theory.

CHAPTER 4

RESULTS/ANALYSIS

The purpose of this study was to: 1) understand the effects Yoga Calm® on stress levels, (classroom) behavior, and academic achievement among one group of urban third grader students, and 2) determine if participation in yoga or yoga related activities (breathing and relaxation techniques) increased both in and outside of school as a result of the intervention. The intervention classroom received Yoga Calm® in their classroom for 10 weeks. Every Monday and Wednesday, the students received approximately 25 minutes of a yoga flow, with a guided relaxation at the end, totaling 500 minutes over the 10-week intervention. These sessions occurred in the afternoon from approximately 1:40 pm until 2:05 pm. Additionally, the students received short "yoga breaks" virtually every school day, before and after lunch, before a test, and/or in response to fidgety, tired, loud, or bored behavior. The breaks consisted of yoga poses and relaxation and breathing techniques. The teacher kept a log of when she performed these mini yoga breaks, with a total of 36 breaks being recorded, totaling approximately 218 minutes. The intervention group received a total of 718 minutes or approximately 12 hours of Yoga Calm® over the 10-week period. The comparison group, located in the same school, did not receive any yoga or breathing techniques during the 10-week period of time, however they received Yoga Calm® as a delayed intervention during the second semester of the school year.

Quantitative Results

Response rate. As of September 2014, there were 22 students in the intervention classroom and 21 students in the comparison classroom. In October 2014, 5 students from the comparison classroom were placed into the intervention classroom, leaving the intervention classroom with 27 students. The comparison classroom then only had 16 third grade students remaining, and 10-second graders were also placed into the classroom (2nd grader students were

not included in this study). There were a total of three students who did not complete the study from pre-post and were excluded from the dataset. Therefore, the total number of participants for this study included 25 for the intervention group, and 15 for the comparison group (n = 40).

Data cleaning and screening. All original survey answers and test scores were coded and entered into an Excel spreadsheet. From Excel, items were imported into IBM SPSS, Version 22. The values were labeled and ranges and numbers were verified for accuracy. The data were screened for missing values, univariate outliers, multivariate outliers, and statistical assumptions. The data on the 40 third graders were screened for missing values on 7 initial continuous variables [Stress, Aggression (Fighting, Bullying, and Anger), DIBEL oral, math computation, reading comprehension]. The few missing values per variable that were discovered were imputed with the mean substitution procedure. Among the pre data, the percentage of imputed data for both the anger and bullying variables was 4%, and 12% for the stress variable. Also, 2% of the post data for the stress variable was imputed. The Bullying variable was omitted after normality and linearity could not be achieved.

Descriptive statistics. Descriptive statistics were run in SPSS on all variables and all students in the sample. See tables 4.1 and 4.2 for the mean, standard deviation, and cronbach's alpha (if applicable) for each variable used in the analysis. Effect size was calculated for paired or within group measures using Moins and DeShon (2002) equation 8. Effect sizes were calculated for independent or between group measures using Cohen (1988).

Table 4.1

Intervention Group Descriptive Statistics

Variable	Mean	Std. Deviation	Cronbach's Alpha
Behavior Characteristics			
POST_YogaPart	1	0.00	_

PRE_YogaPart	1.36	0.49	_
POST_Last3DaysSchool	2.72	1.17	_
PRE_Last3DaysSchool	1	0.5	_
POST_Last3DaysHome	2.52	1.22	_
PRE_Last3DaysHome	1.79	1.11	_
POST_Enjoy_Yoga	3.88	1.61	_
PRE_Enjoy_Yoga	4.08	1.07	_
POST_Confidence_Yoga	3.92	1.38	_
PRE_Confidence_Yoga	3.88	1.36	_
POST_YogaSkills	3.48	1.50	_
PRE_YogaSkills	3.71	1.42	_
POST_YogaPart	1	0.00	_
Scales			
POST_Stress	47.88	9.42	0.74
PRE_Stress	49.76	9.94	0.75
POST_Fight	8.32	2.90	0.51
PRE_Fight	8.64	2.57	0.67
POST_Anger	8.59	2.40	0.64
PRE_Anger	7.50	2.41	0.63
Academic Achievement			
POST_DIBEL Oral	82.92	30.22	_
PRE_DIBEL Oral	63.33	28.42	_
POST_MathComp	35.84	15.67	_
PRE_MathComp	23.64	10.00	_
POST_Reading	9.40	6.23	_
PRE_Reading	10.00	7.86	_

Table 4.2

Comparison Group Descriptive Statistics

Variable	Mean	Std. Deviation	Cronbach's Alpha
Behavior Characteristics			
POST_YogaPart	1.13	0.34	_
PRE_YogaPart	1.25	0.44	_
POST_Last3DaysSchool	1.5	1.09	_
PRE_Last3DaysSchool	1.19	0.75	_
POST_Last3DaysHome	1.94	1.43	_
PRE_Last3DaysHome	1.94	1.34	_
POST_Enjoy_Yoga	3.94	1.18	_
PRE_Enjoy_Yoga	4.31	0.94	_
POST_Confidence_Yoga	3.69	1.35	_
PRE_Confidence_Yoga	4.27	0.77	_
POST_YogaSkills	3.44	1.50	_
PRE_YogaSkills	4.06	1.23	_
POST_YogaPart	1.13	0.34	_
Scales			
POST_Stress	46.33	8.54	0.74
PRE_Stress	46.13	6.65	0.75
POST_Fight	8.56	3.34	0.51
PRE_Fight	7.43	3.05	0.67
POST_Anger	6.64	1.59	0.64
PRE_Anger	7.35	1.90	0.63
Academic Achievement			
POST_DIBEL Oral	99.40	36.71	_
PRE_DIBEL Oral	86.20	37.01	_
POST_MathComp	33.37	15.59	_
PRE_MathComp	21.00	10.80	_

POST_Reading	14.06	6.08	_
PRE_Reading	12.84	6.04	_

As seen in Table 4.3, in the intervention group at pre test, reading comprehension and DIBEL Oral were significantly correlated. Table 4.4 shows that at post-test, anger was significantly correlated to stress, and reading was significantly correlated with DIBEL Oral. Table 4.5 shows that in the comparison group at pre test, anger and fighting, and DIBEL and math, reading and math, reading and DIBEL are significantly correlated. As seen in Table 4.6, at post test, reading and anger are also significantly correlated.

Table 4.3

Correlations for Intervention at Pre Test

	1	2	3	4	5	6
1. Stress	_					
2. Fight	.10	_				
3. Anger	.42*	.24	_			
4. Math_Comp	-.21	.21	.01	_		
5. DIBEL Oral	-.33	-.13	-.19	.17	_	
6. Reading	-.21	-.15	-.04	.28	.85**	_

Note. * p<0.05, ** p<.01

Table 4.4

Correlations for Intervention at Post Test

	1	2	3	4	5	6
1. Stress	_					
2. Fight	.38	_				
3. Anger	.55**	.39	_			

4. Math_Comp	-.11	-.00	-.11	_		
5. DIBEL Oral	-.31	-.37	-.36	.38	_	
6. Reading	-.30	-.24	-.24	. 64**	.72**	_

Note. * p<0.05, ** p<.01

Table 4.5

Correlations for Comparison Group at Pre Test

	1	2	3	4	5	6
1. Stress	_					
2. Fight	.25	_				
3. Anger	.31	.87**	_			
4. Math_Comp	.02	.16	-.00	_		
5. DIBEL Oral	-.19	.34	.14	.62**	_	
6. Reading	.05	.35	.24	.51*	.79**	_

Note. * p<0.05, ** p<.01

Table 4.6

Correlations for Comparison Group at Post Test

	1	2	3	4	5	6
1. Stress	_					
2. Fight	.27	_				
3. Anger	.40	.65**	_			
4. Math_Comp	.05	-.27	-.29	_		
5. DIBEL Oral	-.44	-.02	-.41	.47	_	
6. Reading	-.34	-.30	-.53*	. 64**	.90**	_

Note. * p<0.05, ** p<.01

Analysis

Behavior variables. A series of paired sample t-tests and frequencies were run to determine if questions related to yoga behavior changed over the 10-week period in both the intervention and comparison groups. In addition to other scales, several questions were asked to gain knowledge from the children about their own yoga behavior. Students were asked if they have ever participated in yoga. Twenty-eight, or 68% of the children from both classes responded "yes" on the pre survey, and thirty nine, or 95%, answered "yes" on the post survey. Some children in the comparison group had exposure to yoga during the previous school year, as yoga was offered as an after school program on a weekly basis.

A series of paired and independent t-tests were run to determine if children increased the amount of yoga done at school, as a result of the intervention. The question, "In the last 3 days, how many times did you participate in yoga at school?" was used; the answers ranged from 0 to 3 times. First, Pre-Last3DaysSchool Intervention group was compared to Pre-Last3DaysSchool Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences ($p=.34$; see Table 4.7). Then Post-Last3DaysSchool Intervention was compared to Pre-Last3DaysSchool Intervention group, in order to determine if yoga in school increased in the intervention group. Results showed that yoga in school increased significantly ($p<.01$; see Table 4.8). Then, Post-Last3DaysSchool Comparison group was compared to Pre-Last3DaysSchool Comparison group in order to determine if the comparison group remained the same. Results showed that children in the comparison group answered they had participated in yoga in the last 3 days on the post survey, but the change was not significant ($p=.38$; see Table 4.9). It is not known why children in the comparison group would answer they had participated at school, as they had no opportunity to participate in yoga during the 10 week intervention. Then, Post-Last3DaysSchool Intervention Group was compared to Post-

Last3DaysSchool Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed a much larger change in the intervention group, and this change was significant ($p<.01$; see Table 4.10). Finally, the change from Pre-Last3DaysSchool to Post-Last3DaysSchool Intervention Group was compared to the change from Pre-Last3DaysSchool to Post-Last3DaysSchool Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. The effect of Yoga Calm® on participation of yoga in school as measured by one self-report question indicated that yoga increased in the intervention group and decreased in the comparison group, and that this difference was significant ($p<.01$; see Table 4.11).

A series of paired and independent t-tests were run to determine if children increased the amount of yoga done outside of school, as a result of the intervention. The question, "In the last 3 days, how many times did you participate in yoga at home or outside of school?" was used; the answers ranged from 0 to 3 times. First, Pre-Last3DaysHome Intervention group was compared to Pre-Last3DaysHome Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences ($p=.70$; see Table 4.7). Then Post-Last3DaysHome Intervention was compared to Pre-Last3DaysHome Intervention group, in order to determine if yoga outside of school increased in the intervention group. Results showed that yoga outside of school increased significantly ($p<.01$; see Table 4.8). Then, Post-Last3DaysHome Comparison group was compared to Pre-Last3DaysHome Comparison group in order to determine if the comparison group remained the same. Results showed that participation in yoga outside of school did not change, and so was not significant ($p=1$; see Table 4.9). Then, Post-Last3DaysHome Intervention Group was compared to Post-Last3DaysHome Comparison group to see if there were significant differences between the two groups after the intervention. Results showed a much larger change in the intervention group than in the comparison group, but

this change was not significant (p=.17; see Table 4.10). Finally, the change from Pre-Last3DaysHome to Post-Last3DaysHome Intervention Group was compared to the change from Pre-Last3DaysHome to Post- Last3DaysHome Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. The effect of Yoga Calm® on participation of yoga outside of school as measured by one self-report question indicated that yoga outside of school increased in the intervention group and decreased in the comparison group, but that this difference was not significant (p=.15; see Table 4.11).

A series of paired and independent t-tests were run to determine if children increased their enjoyment of yoga over the 10-week period. A statement, "I enjoy participating in yoga" was used; with a scale ranging from strongly disagree to strongly agree. First, Pre-Enjoy_Yoga Intervention group was compared to Pre-Enjoy_Yoga Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences (p=.48 see Table 4.7). Then Post-Enjoy_Yoga Intervention was compared to Pre-Enjoy_Yoga Intervention group, in order to determine if yoga enjoyment increased in the intervention group. Results showed that yoga enjoyment actually decreased, but the change was not significant (p=.60; see Table 4.8). Then, Post-Enjoy_Yoga Comparison group was compared to Pre-Enjoy_Yoga Comparison group in order to determine if the comparison group remained the same. Results showed that enjoyment decreased in this group also, but this change was not significant (p=.13; see Table 4.9). Then, Post-Enjoy_Yoga Intervention Group was compared to Post-Enjoy_Yoga Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed only a small, and non-significant change between the two groups (p=.90; see Table 4.10). Finally, the change from Pre-Enjoy_Yoga to Post-Enjoy_Yoga Intervention Group was compared to the change from Pre-Enjoy_Yoga to Post-Enjoy_Yoga Comparison group, in order to compare the changes that occurred in the intervention group to the

comparison group. The affect of Yoga Calm on the enjoyment of yoga as measured by one self-report question indicated no significant change between the intervention and comparison group (p=. 73; see Table 4.11).

A series of paired and independent t-tests were run to determine if children's exposure to yoga increased their confidence about performing yoga. A question, "I feel confident about performing yoga poses" was used; with a scale ranging from strongly disagree to strongly agree. First, Pre-Confidence_Yoga Intervention group was compared to Pre-Confidence_Yoga Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences (p=.30; see Table 4.7). Then Post-Confidence_Yoga Intervention was compared to Pre-Confidence_Yoga Intervention group, in order to determine if yoga confidence increased in the intervention group. Results showed that yoga confidence increased only slightly, but the change was not significant (p=.92; see Table 4.8). Then, Post-Confidence_Yoga Comparison group was compared to Pre-Confidence_Yoga Comparison group in order to determine if the comparison group remained the same. Results showed that confidence decreased in this group, but this change was not significant (p=.08; see Table 4.9). Then, Post- Confidence_Yoga Intervention Group was compared to Post-Confidence_Yoga Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed only a small, and non-significant change between the two groups (p=. 59; see Table 4.10). Finally, the change from Pre-Confidence_Yoga to Post-Confidence_Yoga Intervention Group was compared to the change from Pre-Confidence_Yoga to Post-Confidence_Yoga Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. The effect of Yoga Calm® on children's confidence of yoga as measured by one self-report question indicated no significant change

between the intervention and comparison group, but that the intervention group was more confident (p=.28; see Table 4.11).

A series of paired and independent t-tests were run to determine if children that were exposed to Yoga Calm increased their self-efficacy toward yoga over the 10-week period. A question, "I think I have the skills needed to perform yoga" was used; with a scale ranging from strongly disagree to strongly agree. First, Pre-YogaSkills Intervention group was compared to Pre-YogaSkills Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences (p=.42; see Table 4.7). Then Post-YogaSkills Intervention was compared to Pre-YogaSkills Intervention group, in order to determine if self-efficacy toward yoga increased in the intervention group. Results showed that self-efficacy actually decreased slightly, but the change was not significant (p=.58; see Table 4.8). Then, Post-YogaSkills Comparison group was compared to Pre- YogaSkills Comparison group in order to determine if the comparison group remained the same. Results showed that self-efficacy decreased significantly in this group (p<.05; see Table 4.9). Then, Post-YogaSkills Intervention Group was compared to Post-YogaSkills Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed only a small, and non-significant change between the two groups (p=. 93; see Table 4.10). Finally, the change from Pre-YogaSkills to Post-YogaSkills Intervention Group was compared to the change from Pre-YogaSkills to Post-YogaSkills Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. The effect of Yoga Calm® on children's self-efficacy towards yoga as measured by one self-report question indicated no significant change between the intervention and comparison group, but that the intervention group was slightly more self-efficacious (p=. 48; see Table 4.11).

Yoga participation in general, and both at home and at school increased significantly in the intervention group. The post scores in the intervention group significantly increased compared to the comparison group in overall yoga participation and participation in school. The change from post to pre scores in yoga participation at school significantly increased in the intervention group compared to the comparison classroom. The perceived yoga skill level in the comparison group significantly increased from post to pre.

Stress. A series of paired and independent t-tests were run to determine if children that were exposed to the Yoga Calm® intervention reduced their stress over the 10-week period. A 21-item stress scale for children was used. First, Pre-Stress Intervention group was compared to Pre-Stress Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences (p=.21; see Table 4.7). Then Post-Stress Intervention was compared to Pre-Stress Intervention group, in order to determine if stress decreased in the intervention group. Results showed that stress decreased, but was not significant (p=.36; see Table 4.8). Then, Post-Stress Comparison group was compared to Pre-Stress Comparison group in order to determine if the comparison group remained the same. Results showed that the stress level increased, but again was not significant (p=.92; see Table 4.9). Then, Post-Stress Intervention Group was compared to Post -Stress Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed no significant differences (p=.85; see Table 4.10). Finally, the change from Pre-Stress to Post Stress Intervention Group was compared to the change from Pre-Stress to Post-Stress Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. Results showed (p=.50; see Table 4.11). The effect of Yoga Calm® on stress as measured by the 21-item stress scale indicated that stress was reduced in the intervention group,

but not in the comparison group, but the difference was not significant. In summary, none of the changes related to stress scores were significant.

Aggression. A series of paired and independent t-tests were run to determine if the children that were exposed to the Yoga Calm® intervention were less aggressive after the 10-week period. Both a fighting and an anger scale was used to measure aggression.

Fighting. How much a child engages in fighting was measured by a 5-item fighting scale. First, Pre-Fight Intervention group was compared to Pre-Fight Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences (p=.19; see Table 4.7). Then Post-Fight Intervention was compared to Pre-Fight Intervention group, in order to determine if fighting decreased in the intervention group. Results showed that fighting decreased, but the result was not significant (p=.55; see Table 4.8). Then, Post-Fight Comparison group was compared to Pre-Fight Comparison group in order to determine if the comparison group remained the same. Results showed that fighting increased, but again was not significant (p=.35; see Table 4.9). Then, Post-Fight Intervention Group was compared to Post-Fight Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed no significant differences (p=.98; see Table 4.10). Finally, the change from Pre-Fight to Post-Fight Intervention Group was compared to the change from Pre-Fight to Post-Fight Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. The effect of Yoga Calm® on fighting as measured by the 5-item fighting scale indicated that fighting decreased in the intervention group and increased in the comparison group, but these findings were not significant (p=.22; see Table 4.11).

Anger. The 5-item anger scale measured a self-report of child anger. First, Pre-Anger Intervention group was compared to Pre-Anger Comparison group to determine if there were any

significant differences at baseline. Results revealed no significant differences (p=.91; see Table 4.7). Then Post-Anger Intervention was compared to Pre-Anger Intervention group, in order to determine if anger decreased in the intervention group. Results showed that anger increased, and was trending toward significant (p=.07; see Table 4.8). Then, Post-Anger Comparison group was compared to Pre-Anger Comparison group in order to determine if the comparison group remained the same. Results showed that the anger decreased, but was not significant (p=.14; see Table 4.9). Then, Post-Anger Intervention Group was compared to Post-Anger Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed the differences trending toward significant (p=.06; see Table 4.10). Finally, the change from Pre-Anger to Post-Anger Intervention Group was compared to the change from Pre-Anger to Post-Anger Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. The effect of Yoga Calm® on anger as measured by the 5-item anger scale indicated that anger increased in the intervention group and decreased in the comparison group, and that this difference was significant (p<.05; see Table 4.11).

In summary, there were no significant differences in changes with the fighting scale. The difference in anger scores between the intervention and comparison group from post to pre was significant. Changes in anger scores for the intervention group were trending toward significant.

Academic achievement. A series of paired and independent t-tests were run to determine if the children in the Yoga Calm® intervention group had higher achievement gains over the 10-week intervention period than the children in the comparison group. A DIBEL oral fluency score, math computation score, and a reading comprehension score were used to measure academic achievement.

DIBEL oral fluency. Academic achievement was measured by the DIBEL oral fluency test. First, Pre-DIBEL Oral Intervention group was compared to Pre-DIBEL Oral Comparison group to determine if there were any significant differences at baseline. Results showed a significant difference between the two groups ($p<.05$; see Table 4.7). Then Post-DIBEL Oral Intervention was compared to Pre-DIBEL Oral Intervention group, in order to determine if scores increased in the intervention group. Results showed that scores increased, and the change was significant ($p<.01$; see Table 4.8). Then, Post- DIBEL Oral Comparison group was compared to Pre-DIBEL Oral Comparison group in order to determine if the comparison group remained the same. Results showed that the scores increased, and that the change was significant ($p<.01$; see Table 4.9). Then, Post-DIBEL Oral Intervention Group was compared to Post-DIBEL Oral Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed no significant differences ($p=.13$; see Table 4.10). Finally, the change from Pre-DIBEL Oral to Post-DIBEL Oral Intervention Group was compared to the change from Pre-DIBEL Oral to Post-DIBEL Oral Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. Results showed a significant difference between the two groups ($p=.05$ see Table 4.11). The intervention group improved significantly more than the comparison group in DIBEL Oral fluency.

AIMSWeb math computation. Academic achievement was also measured using the AIMS Web Math Computation test.. First, Pre-MathComp Intervention group was compared to Pre-MathComp Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences ($p=.42$; see Table 4.7). Then Post-MathComp Intervention was compared to Pre-MathComp Intervention group, in order to determine if scores increased in the intervention group. Results showed that scores increased, and that the change was significant ($p<.01$; see Table 4.8). Then, Post-MathComp Comparison group was compared

to Pre-MathComp Comparison group in order to determine if the comparison group remained the same. Results showed that the scores increased, and that the change was significant ($p<.01$; see Table 4.9). Then, Post-MathComp Intervention Group was compared to Post-MathComp Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed no significant differences ($p=.62$; see Table 4.10). Finally, the change from Pre-MathComp to Post-MathComp Intervention Group was compared to the change from Pre-MathComp to Post-MathComp Comparison group, in order to compare the changes that occurred in the intervention group to the comparison group. Results showed no significant differences in the change, between groups ($p=.95$; see Table 4.11).

DIBEL reading comprehension. Finally, Academic Achievement was measured by taking an average of 3, 2–minute reading comprehension probes. First, Pre-Reading Intervention group was compared to Pre- Reading Comparison group to determine if there were any significant differences at baseline. Results showed no significant differences ($p=.22$; see Table 4.7). Then, Post-Reading Intervention was compared to Pre-Reading Intervention group, in order to determine if scores increased in the intervention group. Results showed that scores decreased, but that the change was not significant ($p=.54$; see Table 4.8). Then, Post- Reading Comparison group was compared to Pre-Reading Comparison group in order to determine if the comparison group remained the same. Results showed that the scores increased, and that this change was significant ($p<.01$; see Table 4.9). Then, Post-Reading Intervention Group was compared to Post-Reading Comparison group to determine if there were significant differences between the two groups after the intervention. Results showed scores were higher at post in the comparison group, and there was a significant difference between the groups for post scores ($p<.05$; see Table 4.10). Finally, the change from Pre-Reading to Post-Reading Intervention Group was compared to the change from Pre-Reading to Post-Reading Comparison group, in order to compare the changes

that occurred in the intervention group to the comparison group. Results showed the change in the intervention group was larger than the change in the comparison group, but that the change was not significant (p=.23; see Table 4.11).

Both groups saw a significant improvement in math, reading and DIBEL Oral fluency scores, but the difference between the intervention and comparison group was only significant for the DIBEL Oral fluency test. Further analysis was not run due to the small sample size and non-significant findings of the above t-tests.

Table 4.7

Independent T Test Comparing Pre Intervention Group to Pre Comparison Group

	t value	df	sig	Mean diff	ES
Yoga Behavior Characteristics					
PRE_YogaPart	.72	39	.47	.11	
PRE_Last3DaysSchool	-.96	39	.34	-.18	
PRE_Last3DaysHome	-.37	39	.70	-.14	
PRE_Enjoy_Yoga	-.70	39	.48	-.23	
PRE_Confidence_Yoga	-1.03	39	.30	-.38	
PRE_YogaSkills	-.81	39	.42	-.35	
Scales					
PRE_Stress	1.25	38	.21	3.62	0.43
PRE_Fight	1.30	37	.19	1.17	0.42
PRE_Anger	.10	35	.91	.07	0.03
Academic Achievement					
PRE_DIBEL Oral	-2.21	39	.03	-22.63	-0.69
PRE_MathComp	.79	39	.42	2.64	0.25
PRE_Reading	-1.23	39	.22	-2.84	-0.4

Table 4.8

Paired Samples t Test Comparing Pre to Post in Intervention Group

	t value	df	sig	Mean diff	ES
Yoga Behavior Characteristics					
POST- PRE_YogaPart	-3.67	24	0.00	-0.36	
POST-PRE_Last3DaysSchool	7.33	24	0.00	1.72	
POST-PRE_Last3DaysHome	2.53	24	0.01	0.72	
POST-PRE_Enjoy_Yoga	-0.52	24	0.60	-0.2	
POST-PRE_Confidence_Yoga	0.09	24	0.92	0.04	
POST-PRE_YogaSkills	-0.55	24	0.58	-0.22	
Scales					
POST-PRE_Stress	-.92	24	.36	-1.88	-0.18
POST-PRE_Fight	-.60	21	.55	-.31	-0.12
POST-PRE_Anger	1.85	21	.07	1.09	0.39
Academic Achievement					
PRE_DIBEL Oral	8.75	23	.00	19.58	1.81
PRE_MathComp	6.50	24	.00	12.20	1.59
PRE_Reading	-.61	24	.54	-.60	-0.13

Table 4.9

Paired Samples t Test Comparing Pre to Post in Comparison Group

	t value	df	sig	Mean diff	ES
Yoga Behavior Characteristics					
POST- PRE_YogaPart	-1.46	15	0.16	-0.12	
POST-PRE_Last3DaysSchool	0.89	15	0.38	0.31	
POST-PRE_Last3DaysHome	0	15	1	0	
POST-PRE_Enjoy_Yoga	-1.56	15	0.13	-0.37	
POST-PRE_Confidence_Yoga	-1.86	15	0.08	-0.57	
POST-PRE_YogaSkills	-2.29	15	0.03	-0.62	
Scales					
POST-PRE_Stress	.09	14	.92	.20	0.02
POST-PRE_Fight	.96	15	.35	1.12	0.24
POST-PRE_Anger	-1.54	13	.14	-.71	-0.40
Academic Achievement					
PRE_DIBEL Oral	6.49	14	.00	13.20	2.26
PRE_MathComp	5.92	15	.00	12.37	1.77
PRE_Reading	1.08	15	.29	1.21	0.27

Table 4.10

Independent t Test Comparing Post Intervention Group to Post Comparison Group

	t value	df	sig	Mean diff	ES
Yoga Behavior Characteristics					
POST_YogaPart	-1.84	39	.07	-.12	
POST_Last3DaysSchool	3.33	39	.00	1.22	
POST_Last3DaysHome	1.38	39	.17	.58	
POST_Enjoy_Yoga	-.12	39	.90	-.05	
POST_Confidence_Yoga	.53	39	.59	.23	

POST_YogaSkills	.08	39	.93	.04	
Scales					
POST_Stress	.19	39	.85	.56	0.06
POST_Fight	.02	38	.98	.02	-0.01
POST_Anger	1.89	38	.06	1.56	0.6
Academic Achievement					
POST_DIBEL Oral	-1.52	37	.13	-16.48	-0.49
POST_MathComp	.49	39	.62	2.46	-.13
POST_Reading	-2.35	39	.02	-4.66	0.15

Table 4.11

Independent T Test Comparing Change from Post to Pre Between Intervention and Comparison

	t value	df	sig	Mean diff	ES
Yoga Behavior Characteristics					
Change_YogaPart	-1.67	39	0.10	-0.23	
Change_Last3DaysSchool	3.47	39	0.00	1.40	
Change_Last3DaysHome	1.46	39	0.15	0.72	
Change_Enjoy_Yoga	0.33	39	0.73	0.17	
Change_Confidence_Yoga	1.09	39	0.28	0.61	
Change_YogaSkills	0.70	39	0.48	0.39	
Scales					
Change_Stress	-.67	38	.50	-2.08	-0.23
Change_Fight	-1.23	36	.22	-1.44	-0.4
Change_Anger	2.18	34	.03	1.80	0.8
Academic Achievement					
Change_DIBEL Oral	1.95	37	.05	6.38	0.67
Change_MathComp	-.06	39	.95	-.17	-0.01
Change_Reading	-1.20	39	.23	-1.81	-0.38

Qualitative Analysis

Qualitative data was collected from several sources, including observations of the students by both the PI and by the teacher, interviews with the intervention students, SWIS forms, and an interview between the PI and intervention classroom teacher. Each of these data sources were analyzed individually and coded in order to find themes. After collectively analyzing all of the data sources, quantitative data were used to triangulate the themes that emerged. Qualitative analysis revealed three main themes that included teacher and student perceptions: 1) Increase use and enjoyment of yoga techniques (i.e. using breathing techniques to calm down), 2) Behavioral changes both in/out of school (i.e. students and teachers felt students were able to concentrate better in the classroom), and 3) Impact on personal factors (increase knowledge about yoga, better able to handle perceived stress, and sense of calmness).

Increased yoga techniques outside of school. Adding Yoga Calm into the daily routine changed the intervention classroom environment. The PI observed Yoga Calm being used in the classroom, the teacher kept a log of how often she used Yoga Calm, and the student interviews confirmed consistent use of Yoga Calm. As a result of this change in environment, several other things changed for the children. Learning Yoga Calm in the classroom enabled students to use Yoga Calm techniques outside of school, on their own. When asked if they participate in "Yoga" outside of school, 72% of the students responded yes (and elaborated about when, with whom, and how often). Kylie said, "I do Warrior 2, volcano and belly breaths at home." At home I do "belly breaths and mountain pose and warrior and warrior 2. I do stretching." Yoga Calm has started to change the student's home environment, as told by Carly in this story:

> Sometimes my mom has to make my baby brother a bottle or something and I will sit on my bottom and I will do stuff, like the funny poses for him, and he will start laughing. Like he thinks the eagle is funny when you sit on your perch. He thinks because when I

go up and let it go I make the volcano sounds so he thinks volcano breaths are funny, too (Carly Interview, 2014).

When specifically asked about using the breathing techniques they learned, 84% of the students said they used breathing techniques (unprompted by their teacher), and described at least one time they used them. Ashton says he uses the breathing "before bed and when I am mad. I do the belly breaths so I can calm down." And Amy says, I use them before I go to bed to make me calm-I do some belly breaths." Of the four children that did not discuss using breathing techniques outside of school, three of them discussed using the breathing techniques and liking them, and feeling more calm after using them, but did not say specifically that they use them on their own, outside of class.

The teacher interview supported this theme. She reported that several students were telling her they were doing yoga at home, and also requesting more yoga during the school day. "Students would spontaneously get up and do a yoga pose. It's like they were understanding when they should use it and why". She also saw children using the belly breaths during the day. When doing belly breaths, children are taught to put one hand on their belly and one hand on their chest. She reported seeing students doing this (unprompted by her), toward the end of the 10-week intervention.

As reported earlier in the quantitative analysis, students answered questions about their yoga behavior. The theme of changing their home environment as a result of Yoga Calm was supported by two of these questions. More students answered yes to doing yoga at home or outside of school at post data collection. Students increased the amount they had done yoga in the past 3 days at home, from pre to post.

Self-regulation. A sub theme of adding yoga Calm to their environment, is children using Yoga Calm specifically when angry or for purposes of calming down or dealing with stress:

More than half (56%) of the children said they now specifically use breathing techniques learned in the classroom for purposes of dealing with anger or for calming them, outside of school. Jalen said, "My anger comes out when I am at home, especially when I am wrestling. And something just pops out and I can't comparison so I use the breaths now. I learned how to keep him in. But when I used to wrestle he always use to come out and I couldn't put him back in." And Renee said this of dealing with her brother at home, "I wanted to play with him and his friend and he wouldn't let me. So I got mad at him. So I took belly breaths and I asked him one more time *nicely,* cause I asked him meanly the last time. And then he said yeah." Another student, Joel, said "Sometimes I am just like when is the day going to be over? I want to be home, and yoga, even one thing we do in yoga, it helps me with my anger. It's just something about yoga." Of the children that did not mention anger specifically as a reason to use the breathing, they talked about breathing as a "break", before bed to relax, to get calm, and to relax.

It was hypothesized that yoga and related techniques would decrease the aggression of children in the intervention group. Quantitative and qualitative results were mixed and mostly weak with respect to aggressive behavior, but were stronger with respect to anger specifically (a subset of aggression). Most of the children did not think they were "aggressive", so they did not think Yoga Calm helped with "aggression" per se. Only 6 of the children said that yoga calm helped them with "aggressive" behavior. Amy says, "Whenever I was mad at my sister and I felt like I was going to yell at her she told me to go in my room and do belly breaths, so I did and I felt better." Jaime says, "I use the breaths when I get in fights with my brother. Like I am just really mad so I go to my room and do belly breaths." Aaron says, "Like when my brother kept on punching me. I used the belly breath so I wouldn't punch him back." But when asked how they use Yoga Calm, one student replied, "One day my friend was being mean to me and I got mad and I almost said mean stuff until I did arm swings and then I calmed down."

Behavioral changes. The overall behavior changed for many of the students in the intervention classroom. Many things like concentration, focus, attention, being fidgety and antsy improved, as reported in the student interviews, teacher interview, and research observations. The PI, the classroom teacher, and the students themselves noted the changes. Changes in focus, attention, and being "fidgety" were common responses. Seventy six percent of the students interviewed said they have changed their behavior at school or home as a result of the Yoga Calm program. Andrew says, "I have been raising my hand a lot and answering questions right". Some students, like Stewart, see overall behavior changes, "A few months ago I was doing really bad in class (messing around with my friends) and when we started doing yoga it changed me. So now I am sitting down when she tells me." Other students, like Joel, see short term, immediate changes right after using yoga calm techniques. "When I get back from lunch and I am just really hyper, I just sit down in my seat and do belly breaths. It helps me work better. And pay attention in class." Other students are able to use yoga calm techniques in response to certain behaviors: "One day I was frustrated (in class) so I got up and I did the tree. And I closed my eyes and I took deep breaths in and out. It made me feel better because then I calmed down and I got to do my work because I felt better." Some students use it to change their behavior, "Yesterday when I was at school I couldn't do math so I did some belly breaths to make me calm."

The PI observed the classroom on five different occasions over the course of the 10-week intervention. The overall classroom behavior improved as Joanne incorporated Yoga Calm into her classroom and as part of her classroom management. She used Yoga Calm techniques in response to fidgety and lethargic behavior. As a result, most students were able to get on task and remain on task for about 45 minutes. Her classroom was able to quietly read, work on the same assignment, and focus on a speaker for long periods of time. There were 3-4 of the same students

who regularly could not stay on task, would get up from their seats, disrupt other students, or not do what they were told. These 3-4 children improved only slightly over the 10-week period. The Yoga Calm did not seem to benefit them. The classroom teacher discussed these same students in her interview, saying they were unaffected by the yoga techniques.

Joanne saw many changes in her students individually, but most noticeably saw changes in the entire group, overall. “Yoga in my classroom creates a sense of community. They are more of a unified group. Something about yoga brings the students together, almost like team building”. Joanne saw changes in children that were once fidgety and antsy, but learned to calm down. Children, who would walk around or not do what they were told, were now on task and staying in their seats. One student that stood out to Joanne was Jake. “He was impulsive, talked out of turn. Now he is a model student with a great attitude. He made the greatest improvement. He regularly uses yoga poses and breathing throughout the day, unprompted”.

Academic achievement. A variable of particular interest in this study was academic achievement. A sub-theme of behavior in the classroom was very little change in academic achievement. The quantitative results showed a vast improvement in academic achievement, in both the comparison and intervention groups but the intervention group did not improve significantly more than the comparison group. Therefore, researchers might conclude that academic achievement increased no more than you would expect normally for a third grade student over a ten week period.

Joanne saw only a few changes with academic achievement, and mostly in students who were doing well before the intervention. “Grades improved, but I think the intervention was too short to tell. I saw major changes in children in March, 6 months after I began the yoga intervention.” She thinks these changes in grades and what the children can produce happen as a result of the focus and attention improvements.

Also, only five of the children said that they have seen an improvement in their grades as a result of learning yoga techniques. Patrick says, "I have been getting higher grades. Math, science, and writing." However, it is hard to decipher if this perceived notion of performing better in school carries through into actual performance.

Personal factors. Many personal factors changed for the students as a result of yoga calm in their classroom, such as less stress, being more calm, reported happiness, and yoga knowledge (e.g. how and when to use it). Eighty four percent of the children interviewed said they have changed personally since having Yoga Calm in their classroom. Joel says, "I have been a little bit calmer. I have been letting stuff get by me a little bit, too. Plus it helps me take my mind off stuff."

While most students said that Yoga makes them more "calm", 8 students mentioned that Yoga energizes them or gives them more energy. Annie says, "We get to do it so we can get energized and calm." Other changes noted were feeling healthier, stronger, and more flexible. Amanda says, "It really calms me down a lot and it helps me relax and it helps me feel like I am building strength."

The classroom teacher has also noticed that students have changed. Her observations supported the theme of personal factors changing. She thinks they know more about Yoga Calm. They use it on their own in the classroom. They ask for yoga, claiming "I am tired, can we do yoga to get energy?" They have learned what yoga can be used for and the various techniques, like poses and breathing. She sees students do poses and uses belly breaths spontaneously in class. She noticed that children that were the most stressed and anxious had released their anxiety and no longer showed signs of stress. "He started to show fewer signs of stress and was able to put more effort in". As far as individual changes, she noticed that Yoga Calm has the greatest impact in the classroom on children that have anxiety. She had a few students who had anxiety

issues (separation anxiety and high stress) that changed over the course of the intervention. She saw a "transformation with one student in particular, Max. "His anxiety is non-existent. He is smiling, takes on challenges, his parents no longer have to walk him to the classroom, and his attendance has improved". Max was regularly tardy, would cry in class, and had a hard time entering the classroom before the intervention.

Stress. The stress level of students in the intervention classroom decreased, while the stress level of children in the comparison classroom increased. However, this increase was not significant when paralleled to the comparison group. Most students were silent when asked about "stress", and only a few mentioned using yoga calm when stressed. It appeared that students did not know what stress meant, or they did not feel like they had "stress" in their lives. They could go on to describe what might be deemed "stressful" events, but could not voluntarily name a "stressful" event, or admit to being "stressed" about anything.

CHAPTER 5

DISCUSSION

The purpose of this study was to determine the relationship between yoga in the classroom, and children's behavior, stress and academic achievement. In addition, as a result of learning these mindfulness techniques (yoga, breathing, and relaxation), a secondary purpose was to determine if children began to practice yoga outside of the school setting.

This study was rigorous, given available resources. The use of a comparison group and pre testing increased the internal validity of the study. A pretest was selected because it determine any pre group differences at baseline. This can decrease selection bias, regression, instrumentation, history, and maturation (Shadish, et al, 2002). Exposure to the first round of pre-tests (which test cognition and academic achievement) can affect scores on the post-tests. Using similar to, but not exactly the same cognition tests addressed this. There were no known threats to construct validity. Children in the control classroom were not aware of the intervention children were getting in another classroom.This study used a mixed methodological design and valid and reliable instruments to gather data.

The Social Cognitive Theory, focusing on the central idea of reciprocal determinism, strengthened the study by providing a theoretical framework. The concept of reciprocal determinism is the "dynamic interplay among personal factors, the environment, and behavior" (Hayden, 2014). Social Cognitive Theory posits that behavior is not simply the result of the environment and the person, just as the environment is not simply the result of behavior and the person. The thought in this study is that students' behavior and personality would be affected by whether they had the yoga intervention in their classroom (environment). Also, their behavior and personality may affect whether they like or accept the yoga. The yoga environment can act as a model for behavior. Also, having yoga in their school environment will cause them to use

yoga (and related techniques) outside of school, or on their own. But also, according to Social Cognitive Theory, as the students change their behavior and attitude, they could in turn affect the learning environment and the overall environment of the classroom (or school) as a whole. People with the same social environment often develop a sense of social solidarity; they often tend to trust and help one another, and to congregate in social groups. They will often think in similar styles and patterns even when their conclusions differ. This groupthink helps to promote community and help the teacher with classroom management.

Stress

It was hypothesized that the stress levels of students in the intervention group would decrease. The study results revealed that the stress mean score decreased among those in the intervention group, and increased in the comparison group. Although the change was not statistically significant the researcher believes the change in stress is trending towards significance and the lack of significance could have been due to a small sample size. The decrease in stress is consistent with literature that yoga decreases perceived stress levels both in adults and children (Telles et al., 2013).

Interviews with the children indicated that many were unclear what “stresses” they may have in their lives. They seemed either unclear on the definition of stress, or did not relate events in their lives as a “stressor”. However, the students were able to describe what might be deemed by others as stressful situations, and that they were using mindfulness techniques, learned through Yoga Calm, in response to them. For example, before a public speaking event (Special Person’s Day), students used breathing techniques to “calm down”, or before a test students would perform belly breaths or a tree pose to help them focus. Observations by the teacher indicated that stress levels, in particular anxiety, of the students decreased within two weeks of starting yoga calm. Students who had school or separation anxiety were "noticeably more calm,

then able to focus in class, which translated to better grades (achievement)". This is also in comparison to students she had in past years, before she was using yoga and breathing techniques in her classroom. Sharer and Ryan-Wenger (2002) found that current instruments measuring stress in children only captured 36-55% of the children's self-reported cognitive/emotional symptoms, and 0-33% of physiologic symptoms. It is possible that the instrument used in this study was not accurately capturing the stress levels of these students.

The use of breathing and relaxation techniques has potential to have profound effects on the stress levels of children. Changing the classroom environment to include yoga and breathing and relaxation techniques could decrease stress levels or the perceived stress levels of children in the classroom. In turn, decreasing anxiety levels in children can further improve the classroom environment, by preventing chaos, decreasing noise volumes, and increasing time and the ability to focus.

Behavior

It was hypothesized that the behavior, specifically fighting, bullying and anger, of the intervention group would improve as a result of receiving the yoga intervention. The mean difference of the fighting variable was significant in the intervention group. The anger score actually increased in the intervention group, but it was not statistically significant. It is possible that the children became more aware of what anger meant to them and when they were experiencing it. Overall classroom behavior improved, as noticed by the PI and classroom teacher. Children were generally attentive, on-task, and less fidgety as the intervention progressed.

The interviews indicated that children noticed their behavior improving both at home and in the classroom. They noticed an improvement in control of their body and words, increased focus, and being more calm. They were using techniques they learned in the classroom to help

with aggression, in the form of fighting and anger, outside of school. Children were also using breathing techniques to avert otherwise stressful or "bad behavior" situations.

Observations made both by the principal investigator and the classroom teacher indicated that the classroom behavior did improve immediately in response to yoga and breathing techniques, and also over the long term, particularly in students with high anxiety. Students were better focused, calmer, and less fidgety. These observations helped to triangulate the data and prove the themes found in the interviews. However, also noted by both the PI and teacher, "high risk" students (those diagnosed with ADHD or showing similar symptoms), did not change very much at all. Many of them would not even participate in the yoga and relaxation techniques. They just could not engage in the activities.

Yoga and related techniques could have an impact the classroom behavior of children. If kept simple and used consistently, they can also influence the behavior of children outside of school. This is consistent with other studies that have focused on behavior of children. Physical activity has been shown to increase time on task and decrease fidgity behavior (Jarrett, 1998), and yoga specifically increases time on task (Peck, 2005) and improves behavior (Slovacek, 2003).

Academic Achievement

It was hypothesized that the academic achievement of the intervention group would increase, compared to the comparison group, even though very little research currently exists about the effects of yoga related interventions on academic achievement. It is expected that students will improve with time (as they age and mature), without any intervention. The thought is that yoga techniques will help children focus better, and thus improve their work product. The intervention group had scores markedly lower than the comparison group before the yoga intervention. Both groups did improve over the 10-week intervention. However, the change in

academic improvement was not significant between the intervention and comparison group. It is possible that 10 weeks is not long enough to see this type of change, particularly because of the large gap between the two groups at pre testing.

The interviews indicated that only a few children saw their grades or schoolwork improve after starting Yoga Calm. Teacher observations indicated that a few students who had severe separation anxiety before the yoga intervention, decreased their anxiety as a result of the yoga intervention, and thus improved their ability to pay better attention, which may have resulted in a better work product. The teacher noted that for the other students, it takes longer to see that improvement, like over the course of a school year. This result was not anticipated.

The use of yoga and related techniques does not necessarily impact the academic achievement of students. Yoga can improve personal factors and behavior, which may impact academic achievement. Because there are other factors that affect academic achievement (i.e. learning ability, academic attachment, mental health), it may be difficult to link yoga directly to an improvement in grades.

Environment and Yoga Behavioral Characteristics

Six questions added to the survey were meant to determine whether yoga participation increased, both at school and outside of school. The PI observed Yoga Calm® during the school day on several occasions. The teacher also supplied detailed notes and lesson plans on when the yoga calm was implemented and for how long. Children not only significantly increased their knowledge of yoga, but also learned when to use it and why. This was evident by the PI and teacher observations of children spontaneously using yoga unprompted, and also through the student interviews. They are using the techniques outside of school, for physical activity and stress relief benefits, to avert aggression and to focus or calm down. The classroom social environment also changed as a result of the intervention. The teacher noticed that children

became more "unified", and that she felt " a sense of community". The PI noticed children worked well together in teams, and as one unit.

This indicates that children learned the techniques either because they are easy to learn or easy to understand and apply to certain areas of their lives. All of the students indicated they enjoyed yoga in the classroom, which could also make it easier to learn and more likely to use on their own. Making yoga simple and applicable to life situations can increase the use of it outside of school; further impacting behavior and personal factors.

Behavior change typically happens in stages. The actual change does not happen right away, but rather the knowledge, sense and perception of the behavior is acquired or changed. The interviews with the children indicated that they learned yoga and breathing techniques, and that they liked it. Most of the children had incorporated it into their lives, but others had not. And of the children that have incorporated it, it may take months to see actual changes in cognition, academic achievement or personality. The intervention worked in that the children acquired new knowledge and began to see some changes in behavior and other personal aspects, like being more calm and relaxed. It may take more time to actually see longer-term changes, and in some cases, children may not respond to the yoga techniques. This finding is consistent with the Pandit & Shatish (2013) study, and their finding that yoga interventions yield the best results when longer in duration.

Personal Factors

Personal factors such as yoga knowledge, being calmer and less stressed were hypothesized to improve over the duration of the intervention. For the most part it seems as if it was unanimous among the children that yoga has a calming effect. Children were visibly calmer in the classroom, and reported they used yoga techniques learned in class in order to make themselves calm in various situations: when angry, in stressful situations, or when irritated or

annoyed. Yoga Calm is designed to energize and this specific setting may have seen greater benefits if it was used as a way to get children physically active during the school day and energized, rather than just for calming and focusing purposes. This is consistent with the literature that supports the use of yoga related techniques for regulating emotions (Stuech and Gloeckner, 2003), improving self-concept and negative emotions (Noggle et al., 2012), and improving overall QOL (Galantino et al., 2004).

The implications of yoga as a calming tool can be effective for both classroom management and for improving the children personally. A teacher can use effective calming techniques, while giving children tools they can use outside of school.

Recommendations for Future Research

Further research on yoga in the classroom should consider a longer intervention period. Pandit & Satish (2013) suggest that yoga works better when implemented over the long term. Using an entire school year and a larger sample size, with a pre test in September, a mid term check in January, and a posttest in May would increase the power of future studies. Also, a larger sample size would improve the generalizability of the study. Including multiple classrooms and classroom teachers using a yoga intervention, along with multiple control classrooms would be a more rigorous way to collect data.

As far as the research variables, it is imperative for future researchers to understand how students perceive personal factors such as stress and how they might define it in both the school and home setting. Completing understanding children's definitions of and conceptions of stress, what it is like to be calm, as well as what it means to pay attention and focus is also important, as it was unclear if children had a clear and similar understanding of this terminology. Another possible scale or survey questions may be about classroom rules regarding behavior, and what classroom behaviors are expected of them. Researchers could also focus on physiological

measures that affect academic achievement and other behaviors in the school setting, rather than self-report and observation alone. For example, they could measure how calm children feel and if this has a relationship with stress.

Recommendations for Practitioners

The use of Yoga Calm in classrooms can be beneficial for classroom management, used as form of indoor recess or a classroom physical activity break and in response to children's behavior and demeanor. Yoga can also be used during physical education classes to meet the CSPAP guidelines set forth by the CDC and SHAPE America. Yoga skills that can be taught throughout the school year can be introduced in the first few meetings of physical education. A program designed for use in the classroom should be introduced at the beginning of the school year, and used most school days, as part of a regular routine in order for students and teachers to see consistent and beneficial results. Specific yoga poses and techniques should be used in response to fidgety, lethargic, noisy, bored and disruptive behavior. Yoga moves should be strategically used before tests, long periods of reading and learning new material. Yoga should be used not only as a break for the students but also to gain energy. Most importantly, students should be informed of these particular reasons that the instructor is implementing a pose or technique at that time. Yoga can be given as "homework", or an instructor can set goals to ensure that children practice on their own. The one major thing lacking in this particular intervention was the explanation of why poses are used when they are. For instance, simply saying the following: "You all seem fidgety and talkative. Let's do tree pose for 1 minute each side to regain our focus" can really send the message home to lower level children who may not understand what is being done.

The most alluring part of adding yoga and breathing techniques into a school day is that it does not have to take away from core curriculum requirements. Yoga is simply added into the

lesson plans, and used as a form of classroom management. The time spent using the yoga is easily gained back by the focus and attention attained as a result of using the techniques.

Limitations

The results of this study are promising, but preliminary. Its limitations and unanswered questions open the door to further research of yoga related techniques in schools.

First, the sampling plan included convenience sampling, which is "a non-probability sampling technique where subjects are selected because of their convenient accessibility and proximity to the researcher" (Laerd Dissertations, 2012). The use of a Yoga Calm certified teacher, and a classroom setting, removed the possibility of a random sample. The non-randomization of participants within this study is a large limitation and threat to external validity, but could not be avoided as children are placed into classrooms by the administration of the school. This type of sampling allowed the researcher to have access to a very specific population receiving a specific yoga program. Although not a random sample, the third graders studied were randomly disseminated into the comparison and treatment group by the school, creating a "cohort design". Obviously, given the nature of the sampling procedures generalizability of the study is limited.

Second, small sample size was a limitation of this study as it affected the power of the analysis. Ideally, a sample size would be bigger, but the convenience sample of a classroom taught by a Yoga Calm certified teacher, limited the researchers ability to obtain a larger sample. Not many (if any) teachers in this geographic region are Yoga Calm certified, so it is pertinent to study one classroom rather than none at all. Another major limitation was the duration of the treatment, which was only 10 weeks. The limited resources of the Principal Investigator limited the size and duration of the study. In order to see more of the behavioral, personal and academic achievement changes, future research should span over the entire school year.

Third, the posttests were conducted in December, which is a particularly busy and distracting time in schools. This not only led to a short intervention time, but the tests were also conducted during a week of transition and assemblies, in which the students were not in their normal school routine. The teacher noted that this change in routine could have lead students to be distracted and that it might have produced post-test data that did not accurately reflect student abilities.

Fourth, the survey, which contained the stress and behavior scales, was tested and validated for readability at the third grade level. However, researchers might consider validating the scales in an urban population due to cultural differences and varying levels of reading abilities.

Lastly, given the design of the research study and at the request of the classroom teachers to complete pre-testing in a timely manner, the students were asked to complete a number of surveys and academic tests over the course of two days. In addition to the complexity of the surveys the students could have been bored, or uninterested after taking multiple tests. Future studies should consider the time of day in which children are tested, and how many tests are conducted at one time.

Conclusions

In conclusion, mindfulness activities such as yoga, breathing, and relaxation techniques had many benefits when used in this classroom during the school day. They can affect personal factors, such as decreasing stress levels and anger, and make children calmer. These techniques were used to improve focus and attention, and other factors that improved the chances of learning. Yoga was easily added as part of classroom management, and in response to or in anticipation of student's behavior. These techniques do not have to take up teaching time. They can be implemented right into the school day, and even save minutes by improving focus,

attention, and fidgety behavior. Yoga was used to energize, and is one way teachers can contribute to the 60 minutes of recommended physical activity per day. Yoga can be taught in PE and also used for indoor recess. In particular for urban youth, yoga is inexpensive, easy to learn, and can be done in the home with little space. Skills learned in the classroom can be used at home, which results in an even greater improvement in personal factors and behavior. Yoga is a great way to add physical activity to the classroom, which can improve behavior, stress levels and anger, which in turn can affect the learning levels of children in the classroom.

APPENDICES

A. Student Questionnaire #1

B. Behavior Observation Protocol

C. Student Interview Guide

STUDENT QUESTIONNAIRE #1

Name: _____ Teacher: _____

Grade: _____ Gender: Male Female

Race: _____Black or African American
_____White
_____Asian
_____Native Hawaiian or Pacific Islander
_____American Indian or Alaska Native
_____Other

Ethnicity: _____Hispanic or Latino
_____Not Hispanic or Latino
_____Other

Age: _____

1. I have participated in Yoga at some time in my life before today.	1 Yes	2 No		
2. I have participated in yoga at school.	1 Yes	2 No		
3. I have participated in yoga at home.	1 Yes	2 No		
4. In the last 3 days, how many times did you participate in Yoga at school?	0 times	1 time	2 times	3 times
5. In the last 3 days, how many times did you participate in Yoga at home or outside of school?	0 times	1 time	2 times	3 times
6. In the last MONTH, how many times did you participate in the Yoga afterschool program? (POST ONLY)	0 times	1 time	2 times	3 times

7. I have trouble concentrating at school	1 Never	2 Almost Never	3 Sometimes	4 Almost Always	5
8. I have trouble paying attention to my teachers	1 Never	2 Almost Never	3 Sometimes	4 Almost Always	5 Always
9. I enjoy participating in yoga	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
10. I feel confident about performing yoga poses	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
11. I think I have the skills needed to perform yoga	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
12. I am able to pay attention and sit still during class	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
13. I have an easy time taking tests	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
14. During Yoga Calm, I have learned breathing techniques (POST ONLY)	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
15. I have used the breathing techniques that I have learned in Yoga Calm (POST ONLY)	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
Read the following the statements. Then circle the number the best represents how often the statement occurs…					
16. I get angry	1 Never	2 Sometimes	3 Often	4 Very Often	
17. I get headaches	1 Never	2 Sometimes	3 Often	4 Very Often	

18. I like going to school	1 Never	2 Sometimes	3 Often	4 Very Often
19. I feel calm and happy	1 Never	2 Sometimes	3 Often	4 Very Often
20. I get stomach pains	1 Never	2 Sometimes	3 Often	4 Very Often
21. I feel lonely	1 Never	2 Sometimes	3 Often	4 Very Often
22. I get sad	1 Never	2 Sometimes	3 Often	4 Very Often
23. I like to be at school	1 Never	2 Sometimes	3 Often	4 Very Often
24. The other kids tease me	1 Never	2 Sometimes	3 Often	4 Very Often
25. I fall asleep easily at night	1 Never	2 Sometimes	3 Often	4 Very Often
26. I feel calm	1 Never	2 Sometimes	3 Often	4 Very Often
27. Things work out as I have planned	1 Never	2 Sometimes	3 Often	4 Very Often
28. I feel happy	1 Never	2 Sometimes	3 Often	4 Very Often
29. When I am happy I show it	1 Never	2 Sometimes	3 Often	4 Very Often
30. Sometimes I do not reach the goal I have planned for.	1 Never	2 Sometimes	3 Often	4 Very Often
31. When I have a hard time it helps being with my friends	1 Never	2 Sometimes	3 Often	4 Very Often
32. When I am sad I show it	1 Never	2 Sometimes	3 Often	4 Very Often
33. Sometimes I can't manage with the things I have to do	1 Never	2 Sometimes	3 Often	4 Very Often

34. When I have a hard time there is an adult to talk to	1 Never	2 Sometimes	3 Often	4 Very Often	
35. If anyone teases me I will protest	1 Never	2 Sometimes	3 Often	4 Very Often	
36. It is easy to concentrate during lessons at school	1 Never	2 Sometimes	3 Often	4 Very Often	
Please circle the number that represents your answer for the following questions					
37. I hit back when someone hit me first.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
38. I encouraged other students to fight.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
39. I pushed, shoved, slapped, or kicked other students.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
40. I got into a physical fight because I was angry.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
41. I walked away from a fight.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
42. I teased other students.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5

43. I said things about other students to make other students laugh (made fun of them).	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
44. I called other students names.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
45. I threatened to hit or hurt another student.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
46. I frequently get angry.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
47. I was angry most of the day.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
48. I got into a physical fight because I was angry.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
49. I was mean to someone when I was angry.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5
50. I took my anger out on an innocent person.	No Opportunity 1	Never 2	1 or 2 times 3	3 or 4 times 4	5 or more 5

51. I'm not very sure of myself.	False 1	Somewhat False 2	Not Sure 3	Somewhat True 4	True 5
52. I really don't like myself very much.	False 1	Somewhat False 2	Not Sure 3	Somewhat True 4	True 5
53. I sometimes feel so bad about myself that I wish I were somebody else.	False 1	Somewhat False 2	Not Sure 3	Somewhat True 4	True 5
54. I usually feel I'm the kind of person I want to be.	Never 1	Somewhat False 2	Not Sure 3	Somewhat True 4	True 5
55. I feel I can do things as well as other people can.	Never 1	Not Often 2	Sometimes 3	Often 4	True 5
56. I feel that I am a special or important person.	Never 1	Not Often 2	Sometimes 3	Often 4	True 5
57. I feel that I am really good at things I try to do.	Never 1	Not Often 2	Sometimes 3	Often 4	True 5
Below, please circle the BEST answer to each question.					
58. Which of these CANNOT help calm you down? a. Belly breaths b. Volcano breaths c. Tornado breaths d. Woodcutter					

59. What is the healthiest way to deal with anger?
    a. Yell
    b. Do nothing
    c. Do Woodcutter
    d. Fight

60. When engaging in belly breaths I should:
    a. Breathe through my mouth
    b. Hold my breath
    c. Breathe through my nose
    d. Breath rapidly

61. When engaging in volcano breaths I should:
    a. Breathe out of my nose
    b. Not hold my breath
    c. Breathe out of my mouth
    d. Breathe fast

62. Guided Relaxation is NOT a time for:
    a. Thinking about your day
    b. Studying for a test
    c. Using your imagination
    d. Sleeping

63. Which one is NOT part of healthy breathing?
    a. Breathe through mouth
    b. Breathe through nose
    c. Pausing
    d. Slowing the breath

64. Flexibility helps me _____.
    a. gain energy
    b. avoid injury to my body
    c. eat healthier foods
    d. breathe better

65. What do Tree Pose and Modified Dancer help me develop?
    a. Concentration
    b. Healthy breathing
    c. Strong arms
    d. An attitude

66. True or False. Yoga can help me control my anger.
    a. True
    b. False

67. True or False. During yoga you should always be quiet and serious.
    a. True
    b. False

68. True or False. Yoga can help me learn better.
    a. True
    b. False

BEHAVIOR OBSERVATION PROTOCOL

Child Name:_____
Group:_____
Teacher:_____

Behavior Skill	Never	Rarely	Most of the Time	Always
Arrives on time				
Brings necessary materials				
Completes Homework				
Respects Others' property				
Listens to peers				
Responds appropriately				
Keeps hands to self				
Refrains from abusive language				
Follows Directions				
Listens to teacher/staff				
Accepts responsibility				
Remains on task				
Allows others to remain on task				
Speaks out of turn				
Sits still				
Gets out of seat				

Speaks out of turn				
Gets into a fight				
Uses abusive language				
Is disciplined				
Acts out/angry				
Cries				
Yells				
Talking when should be quiet				

STUDENT INTERVIEW PROTOCOL

Hello! My name is _____ and I would like to learn about your thoughts and experiences with the Yoga Calm program. Are you willing to participate in this brief interview?

This is just a reminder that this interview is being conducted for program evaluation purposes. No one will know your responses and we will use a fake name.

1. What did you like most about having Yoga Calm in your classroom?

2. Is there anything you did not like about the Yoga Calm program?

3. What would you change about the program?

4. Is there anything that surprised you about the program?

5. Do you ever participate in yoga outside of the classroom?
    a. If yes, who do you participate with?
        i. Parents/Guardians?
        ii. Siblings?
        iii. Friends?
        iv. After school program
    b. How often do you participate in Yoga outside of school?
        i. Once a week?
        ii. Once a month?
        iii. Every day?

6. How does participating in yoga make you feel?
    a. Follow up questions when needed:
        i. What about it makes you feel good? Etc.

7. Have you ever used the breathing techniques that you have learned in Yoga Calm?
    a. Tell me about a time when you used the breathing techniques outside of yoga?
    b. Have you ever used the breathing techniques when you get angry?

8. Has yoga or the breathing helped you concentrate (or pay attention) in the classroom?
    a. How?

9. Do you ever feel stressed?
    a. When?
    b. What makes you stressed?
    c. What types of things do you do when you're stressed to help you cope with the stress (deal with it)?
    d. Do you ever use Yoga breathing to help you deal with it? Why or why not?

10. Aggression is when your anger comes out in words by yelling or being physical, like hitting. Has learning about Yoga helped you deal with aggression?

a. Have you used anything that you have learned in the program when you are angry or feeling frustrated with someone or something?

11. Since participating in the Yoga Calm program, do you see any changes in your personal classroom behavior (able to concentrate, better grades, focus)?

12. Have you changed in any other way since starting the program?

13. Now I am going to read you a series of statements and I want you to complete the sentence for me. For example, I am might say "Last night I ate ....." and you would finish the sentence with what you ate last night. Do you understand? Do you have any questions?
    a. I use yoga to help me...
    b. Belly breaths can help me to...
    c. The relaxation phase of yoga can help me...
    d. Doing yoga poses can help me...
    e. Yoga helps me learn better because...

14. How do you like yoga compared to
    a. Recess
    b. Gym class
    c. Sports
    d. Other physical activity

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ABSTRACT

YOGA AND BREATHING AND RELAXATION TECHNIQUES USED DURING THE SCHOOL DAY AND THEIR EFFECTS ON SCHOOL-AGED CHILDREN

by

ERICA M. THOMAS

May 2014

Advisors: Dr. Erin Centeio and Dr. Noel Kulik

Major: Community Health Education

Degree: Master of Education

Physical activity during the school day is becoming more important as the health of our children stays below optimal levels. Yoga has been shown to increase physical activity levels and decrease stress. This study, guided by the Social Cognitive Theory's idea of reciprocal determinism, sought to determine the effects of a Yoga Calm® certified classroom teacher incorporating yoga poses, breathing and relaxation techniques and games into every school day. Quantitative data were analyzed using a series of paired and independent t-tests, and self-reports revealed students receiving yoga decreased scores in stress and fighting, but increased scores in anger. Qualitative data were coded for themes and revealed the student's behavior improved, in particular an increase in focus and attention, and students were less fidgety. Yoga participation and use of breathing techniques increased at home and school, particularly when nervous, afraid, to prevent fighting, decrease anger, and to calm students down.

Keywords: yoga, mindfulness, relaxation, Social Cognitive Theory, reciprocal determinism, Yoga Calm®

AUTOBIOGRAPHICAL STATEMENT

Erica received her undergraduate degree in Psychology from the University of Michigan. She received her Master's in Community Health Education, and will also move on to obtain her PhD in Kinesiology, both from Wayne State University. She is a NASM Certified Personal Trainer, with a passion for fitness and wellness.