

EFFECTS OF INCORPORATION YOGA INTO A CLASSROOM ON STUDENT
ENGAGEMENT DURING LITERACY LESSONS
by
Damia E. Toyras

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APPROVED BY: Derek L. Anderson, Ed.D.

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Abstract

The purpose of this review of literature was to describe yoga and its possible effects on the engagement of students during literacy lessons. The literature reviewed included studies utilizing students in elementary, middle, and high school. The methods used included yoga poses, breathing, relaxation, and positive thoughts. Results and conclusions from the studies indicated that although many of the studies yielded positive results in students, the overall question of whether yoga will increase student engagement is still undetermined.

Recommendations for improving the effectiveness of yoga increasing student engagement include performing a study involving a larger group of participants, certified yoga instructors, unbiased data collectors, and a control group for comparison.

Chapter 1: Introduction

Yoga, according to Galantino, Galbavy, and Quinn (2008), can increase our students' ability to concentrate, focus, and improve memory. Yoga can provide our students a means to handle stress (White, 2009) and can give our students an opportunity to be present in the moment. Yoga can allow our students space to become self-aware and can give them emotional strength, physical strength, and mental strength (Gillen & Gillen, 2007).

Incorporating physical activity into the daily lives of our students is essential to their health and wellbeing. School physical education programs have been cut because of curriculum time, funding, or staffing (Metzler, McKenzie, Mars, Barrett-Williams, & Ellis, 2013). Children spend the majority of their school day sitting at desks. Our students need movement to focus their bodies, clear their minds, and prepare to engage in our teachings (Gillen et al., 2007). Schools need to take a leadership role in keeping students physically active. (Turner, Chriqui, & Chaloupka, 2013). One form of physical activity entering schools is yoga. In this paper, I examine research on the possible benefits of incorporating yoga into a school setting as a means to help student engagement.

Background

Children ages 8-18 watch an average of four hours of television and spend almost two more hours on other electronics each day (Dowshen, 2011). The amount of obesity among elementary school children has more than quadrupled, from 4% in the late 1970s to nearly 20% in 2009-2010 (Turner et al., 2013). Our children are facing devastating problems from their lack of physical activity and from the rising rate of obesity. Physical activity is not only beneficial for the health of our bodies; physical activity increases academic performance and stimulates our brain (Harr, Doneyko, & Lee, 2012). As teachers, we cannot control what happens when children

leave our schools. We can control some of what happens when our students are with us. Therefore, we should seek opportunities to engage our students in physical activities during the school day, and particularly within the classroom since additional staffing would not be required.

Statement of the Problem

One problem identified by Harr, Doneydo, and Lee (2012) lies in the relationship between physical activity and academic gain. Physical activity excites the brain and causes growth in academic performance (Harr et al., 2012).

Learning, in my classroom, seems to be increasingly challenging for students because of their lack of focus and energy. The rate of children diagnosed with attention problems is continuing to grow. As of today, the rate of students with ADHD is 5.9% (Banda & Kercood, 2012). Teachers need to find new ways to help students engage and become responsive to our teaching and their learning. Students need age-appropriate movement. We need to look at cost-effective sustainable methods to help our students. One solution may be yoga.

Research Question

In this paper, I analyze published research, as well as an action research project I conducted in my classroom with the goal of seeking answers to this question: What are the effects on student engagement of incorporating intermittent yoga into an early elementary classroom during Literacy Lessons?

Theoretical Framework

I will use the Information Processing Model to frame this research. This model draws attention to how our information moves from sensory memory to working and long-term memory processes. To learn new information, we must consciously attend to the task (Culatta, 2011).

Students with attention concerns are more likely to score lower on tests and have a more difficult time fitting into social situations (Antshel, Eiraldi, Gordon, McConaughy, & Volpe, 2011). The Information Processing Model offers a framework of attention, meaningful learning, organization, and elaboration as a framework for understanding attention and learning processes while attending (Culatta, 2011).

The information Processing Model suggests a possible association between Yoga and sensory memory, as elementary students engage in learning, working, and long-term memory processes.

Definition of Terms

The following terms relate to yoga and its effect on student achievement. These definitions will lead us to a better understanding of yoga as a form of exercise.

Yoga. An art of living started in India thousands of years ago, now practiced by millions worldwide; a word meaning “union”. Yoga is a modality used by health care systems for its stress-reduction and health-promotion benefits. Yoga is a physical practice of moving the body in six directions, promotes physical as well as mental flexibility, and strength. At its heart, yoga is the desire to be healthy and whole, and to integrate the various aspects of our human nature (www.1000-petals.com).

Literary lessons. Classroom teaching and practice of reading, writing, and word work.

Chapter 2: Review of Literature

Morgan (2011) argued that in order to create a learning classroom, teachers must first reduce stress, anxiety, and negative competition within students. In an attempt to decrease these factors, researchers have incorporated yoga into classroom settings. The purpose of this review of literature is to describe the effects of yoga in classrooms. In what follows, I first analyze and review research on yoga programs for elementary students, middle grades, and high school classrooms. Last, I conclude with a summary of strengths and limitations to the research.

Yoga

Gillen and Gillen (2007) claimed that incorporating yoga into a school setting would increase students' academic performance, self-esteem, emotional balance, reduce fears, and decrease oppositional behaviors and attention concerns. Yoga includes poses, breathing, relaxation, and positive thoughts. Several studies conducted with elementary students use these techniques. The following studies show the possible overall health benefits of incorporating this form of exercise into a school day.

Yoga Programs for Elementary Students (ages 5-10)

The Physical Activity Guidelines for Americans states that children and adolescents should receive at least 60 minutes of physical activity per day. In 2006, the Center for Disease Control (CDC) discovered that 81.5% of elementary schools withhold recess as a form of punishment (Turner et al., 2013).

In an attempt to investigate the effects of adding physical activity to a task of listening comprehension for children with and without attention problems, Banda and Kercood (2012) four children aged 10 to 12. Of the four participants, two had a prior diagnosis of attention

deficient (one girl and one boy). The two boys and two girls all attended school in a general education classroom.

Each student took four WJ-III subtests. The four children sat together in a quiet classroom and listened to a story on a recorder. While listening to the story, the children did not receive paper, pencil, or an exercise ball. Once the story was completed, the children took a multiple-choice test about the story.

The intervention phase of the study involved each child listening to a story while either doodling on a clipboard or sitting on an exercise ball. Once the story was finished, the students took a multiple choice comprehension test. Participants were asked which was preferred, the doodling or the exercise ball. Three participants preferred doodling. One participant preferred the exercise ball.

During each of the intervention phases of this study, the participants completed their work with greater accuracy and speed. One of the participants in the first trial took 193 seconds to complete the task. When given the exercise ball, the task was completed in 146 seconds and when doodling took 131 seconds. The accuracy percentage also increased from 45% in the beginning to 52% with the exercise ball and 50% while doodling. After analyzing the data, Banda and Kercood (2012) concluded that their intervention was successful and could be used within an inclusive classroom to help children with or without attention or learning problems.

There were several limitations in this study. The task of listening comprehension was less than 10 minutes long, they used quantitative measures with only four participants, and they assessed comprehension using multiple-choice questions. Suggestions for future research include longer listening tasks, and a comprehension test involving descriptive responses.

This research indicates that using exercise could increase attention of students with ADHD. Coupling regular education with physical activity may enhance performance rate and comprehension. This data also suggests that it may be possible to increase student engagement by incorporating yoga into literacy lessons.

Koenig, Buckley-Reen, and Garg (2012), focused on incorporating a program called *Get Ready to Learn* into classrooms. This program uses yoga postures along with breathing and relaxation exercises with elementary school students with ASD. Over the past two decades, the number of children with Autism has increased 600% (Koenig et al., 2012). This program is a daily curriculum designed to enhance the daily lives of children with ASD.

In a pretest-posttest control group design, a convenience sample came from a large urban public school containing 700 students with Autism. Selected participants had a diagnosis of ASD, were aged 5-12, and had no known medical condition that would prevent their participation in the program. Of the 46 participants chosen, 24 were for intervention and 22 were for the control group. All participants took an Adaptive Behavior Scales-II to test their adaptive functioning and an Aberrant Behavior Checklist to gauge challenging behaviors. The parents took a VABS-II interview to monitor the students' lives at home.

The classroom teachers participating in the study received an in-service training about the program. When the teachers began implementing the program, a team of assistants recorded the student behaviors in four-minute periods. The control group teachers videotaped their first structured activity of the day for 2-3 days for the pretest.

The program lasted for 16 weeks. During this time, they rated the room atmosphere in five categories: environment, organization, implementation by teacher, DVD routine and support, and program conclusion.

Students who participated in the program showed significant differences ($p=.029$) in irritability, agitation, and crying. The parent checklist also showed the students in the control group rated more challenging at the end of the 16 weeks than the students in the intervention group. Both the control group and the intervention group showed improvement in off-task behaviors and teacher redirection.

Koenig et al. (2012) used a convenience sample of an intact group instead of a random sampling or sample size estimation group; this may have caused study limitations. Another limitation may be in the group selection. The selected classrooms, by school administrators, may have included biases. In addition, only 77% of parents completed the posttest ABC-Community.

Yoga may offer teachers strategies to help students succeed. The *Get Ready to Learn* program is one potential solution. Since this study focused on students with ASD specifically, while my study focused on all students and because both the intervention and control group increased performance in the area of on-task behaviors, it is unclear if yoga would increase engagement of students during literacy lessons.

Rosenblatt et al. (2011) conducted a similar study involving children with autism. Their objective was to create and assess the effects of a movement-based complementary and alternative medicine approach to children with an autism-spectrum disorder.

Chosen participants met three criteria: aged 3-18 with a diagnosis of ASD, referred by Dr. Levine, and had availability to participate. Of the sixty referred, 33 enrolled, and 24 completed the study. The treatment groups each contained two to five participants. A caregiver to give assistance as needed accompanied all children.

The students were given a pre- and post-test on the BASC-2 to measure psychiatric function and the Aberrant Behavioral Checklist. There were eight treatment sessions of 45

minutes. Rosenblatt, also certified in yoga and dance therapy, led the sessions. Each session included breathing, yoga postures, music and dance, and relaxation. Parents received a music CD and guidelines to practice at home.

The pre- and post-test data were analyzed using *t*-test comparisons. When looking at the data for all children in regards to the BASC-2 the only area to show improvement was the BSI ($p=0.04$). When looking at results for children of latency age, all three categories showed improvements: externalization ($p=.04$), internalization ($p=.02$), atypicality ($p=.003$), and depression ($p=.02$). The results showed a trend toward improvement for the irritability scale and the BASC-2 scale for the latency aged children ($p=.024$).

Rosenblatt et al. (2011) concluded that this study suggests a positive impact on behavior and cognitive symptoms from using a multimodal relaxation program. They would like to see a larger number of people studied, additional assessment tools, and a more systematic analysis of the findings. Not enough data were gathered to draw a conclusion of whether yoga could increase student engagement. This study focused mostly on student behavior of children with ASD.

A similar study involving children with emotional and behavioral disorders had a goal of making accommodations for specific needs of special education students. Steiner, Sidhu, Pop, Frenette, and Perrin (2012) were on a mission to find feasible strategies to help their students attend. Their tool was Yoga Ed. Yoga Ed is a national yoga curriculum for children. Thirty-seven 4th and 5th-grade children with emotional and behavioral disorders (EBD), aged 8-11, participated in the intervention. The students, chosen by the special education director and the teaching staff because of their emotional and behavioral disorders, met in groups of 7-10, two times per week, for 3.5 months. The teachers, parents, and students completed a systematic pre-

and post-intervention assessment. The certified yoga instructors completed attendance and behavior checklists. Of the responders, 80% were very satisfied with the program. Teachers reported an increase of attention in class ($p = 0.01$), adaptive skills ($p = 0.03$), a reduction in depression symptoms ($p = 0.03$), behavioral symptoms ($p = 0.01$), and internalizing symptoms ($p = 0.04$) (Steiner et al., 2012).

No significant changes were found in the analyzed parent data, and many students reported having higher anxiety. It is possible that the reason teachers reported a change in study behavior was because they were expecting change. The parent data may have been skewed because their response rate was lower compared to the student and teacher responses. The students may have had more stress due to external factors, such as when the school was shut down for one week due to an outbreak of H1N1. Like the study done by Rosenblatt et al. (2011), Steiner et al. (2012) focused primarily on the behavioral benefits of yoga. Student engagement was not studied. It remains unclear as to whether yoga will increase student engagement during elementary literacy lessons.

In a study involving 110 fifth-grade students, Stueck and Gloeckner (2005) had a goal of teaching children to reduce stress and optimize their response related to high psychological stresses and everyday life pressures. After receiving the Wiczerkowski anxiety questionnaire, 48 students who showed increased anxiety continued with the study. The experimental group contained 21 students, and 27 were the control.

During 15 sixty-minute meetings, the lessons focused on relaxation, 23 different yoga exercises, and community building activities that involved massage, meditation, sensory exercises, interactive exercises, and imagery techniques. The students used the learned exercises

and techniques before, during, and after stressful situations. They also used the techniques at home.

This qualitative study began with an interview of the parents and students. Of the students who received intervention, 47.6% expressed an improvement in the control of emotions. Improvements of active engaged behaviors and of acceptance by the school friends were not verified statistically. In the experimental group, 71.4% of parents reported that their child appeared to have an increase in balance, as well as less impulsiveness and aggression. The parents also reported that 38.1% of their children were able to better concentrate and 38.1% of the children had a decrease in complaining.

Because the effect variable for self-efficacy could not be verified statically ($p > .10$), Stueck and Gloeckner (2005) could not verify their hypothesis of self-efficacy. In the area of psychological process, their hypothesis was verified ($p \leq .05$). The students had a decrease in aggression, helplessness in school, and physical complaints. The students showed increases in static balance and in the ability to deal with stress. The researchers concluded that through this study the participants were able to cope more efficiently with demands and reduce stress.

A limitation of this study includes the fact that the authors had a goal for this study rather than a question to answer. This may have created biases in their work and results. This data suggest that yoga may be suitable as a relaxation technique to use with children with anxiety. The area of student engagement was not researched during this study.

In another study involving fourth and fifth graders, Mendelson et al. (2010), wanted to test a hypothesis that a 12-week intervention involving yoga would reduce stress, improve mental health, and enhance social adjustments in elementary students. This study involved 97 students from four different elementary schools. All students in the fourth and fifth grade were

invited to participate. Of the returned permission slips, 55 fourth-graders and 42 fifth-graders were randomly selected.

Pre-tests and post-tests were administered. The Responses to Stress Questionnaire was used to assess their responses to stress. This assessment is a 57-item checklist testing their voluntary and involuntary responses to social stresses. The students also were given the Involuntary Engagement Coping Scale, the Short Mood and Feelings Questionnaire, the Emotion Profile Inventory, and the Relations with Peers and School People in my Life. Each of these data collection tools were self-report assessments.

The participating students attended the yoga program during school, four days per week for 12 weeks. Each session lasted 45 minutes. Each class had approximately 25 students and 2 instructors. The sessions included yoga-based physical activity, breathing techniques, and guided mindfulness practices. Each class ended with the students lying on their backs as the instructor led them through practices that involved breathing and sending positive thoughts to others.

The control and experimental group showed no significant differences in the pre-test data. In the post-test data the intervention group showed significant improvements in the area of Involuntary Engagement compared to the control ($p < 0.001$). There were also significant differences found on three of the five subscales including rumination ($p < 0.01$), intrusive thoughts ($p < 0.05$), emotional arousal ($p < 0.01$), and a trend in the predicted direction for impulsive action ($p = 0.07$). The two groups did not differ significantly in regards to changes in positive affect or in relationships with peers and teachers. Mendelson et al. (2010) concluded that their findings suggest that a yoga-based intervention can practically be executed into a school setting. They believe that their findings also show promise in decreasing challenging physiological and cognitive patterns of response to stress among students (Mendelson et al., 2010).

The small size of the sample limits the ability to gauge group differences. It is also likely that this sample was biased toward more highly motivated students because in order to participate, parents needed to turn in the consent form. This study also measured its data through self-report assessments. The results would show more validity if observable data had also been used. Although it has limitations, this study suggests that a mindfulness-based approach such as yoga may be beneficial for students. Student engagement was not studied during this project.

School-age children have many life stressors including homework, bullying, peer pressure, grades, tests, family issues, and teasing. Girls have a higher risk factor in the area of low self-esteem, stress, social relationships, and depression (White, 2012). In an attempt to reduce these stressors in school-age girls, White (2012) performed a study using mindful yoga. A sample size of 155 fourth and fifth grade girls were chosen (70 for intervention and 85 for control) if they were willing to participate in weekly classes, willing to complete daily homework, were able to speak, read, and write the English language, were able to pay attention for one hour and were able to participate in physical poses. Students with prior yoga experience were eliminated. A randomized, clustered, repeated measures research design randomly assigned two public schools to either the control group or the intervention group.

The students were assessed using self-report questionnaires before the intervention began and upon completion of the program. The assessment tools were the Feel Bad Scale that measures 20 perceived stressors, the Schoolagers' Coping Strategies Inventory, the Global Self-Worth subscale of the Self-Perception Profile for Children, and the Healthy Self-Regulation subscale of the Mindful Thinking and Action Scale for Adolescents.

The intervention group met for 60 minutes after school one day per week. Each participant completed 10 minutes of yoga homework six days per week. The sessions included breathing, meditating, homework discussions, and yoga.

The results indicate that the two groups had no significant difference in perceived stress ($p=.806$), although the interaction between time and group approached a $p=.05$ level of significance. In the area of coping strategies, no significant difference between the groups was found ($p=.64$). The control group was more likely to increase their frequency of coping score with an interaction between group and time ($p=.04$). No significant differences were found in self-esteem or self-regulation. Both groups reported an increase in self-esteem. The scores could have been affected by the timing of the test. This study began at the beginning of the school year. The increase in self-esteem could have been attributed to the students feeling of proficiency as the school year moved forward. The limitations of this study include intervention, measurement, and sampling. This data suggests that we still may be unclear as to whether yoga will increase engagement in students during literacy lessons.

Along with student stress, another area of concern for children is the ability to attend. Peck, Kehle, Bray, and Theodore (2005) argued that students with attention problems are easily distracted, often fail to finish class work, have difficulty listening and concentrating, and often struggle to stay organized. They wanted to investigate the effectiveness of yoga for improving those skills for elementary-age students.

The school psychologist chose 10 students from grades 1, 2, and 3 with attention concerns and made contact with each parent for consent. The chosen students were observed using a Behavior Observation Form to assess time on-task. They were observed for 10 minutes using momentary time sampling with 10-second intervals. The students chosen for the

intervention had less than 80% time on-task. The children received 30 minutes of yoga, two times per week, for three weeks. A yoga video was used to ensure training consistency.

Students were observed after each yoga session, in their original classroom, using the same Behavior Observation Form. Before treatment of the first grade students, their average baseline was 65.48, during the intervention it was 85.28, for the following the yoga session it was 75.56. Grade 2 had an average baseline of 60.94, during intervention it was 81.31, and for the follow up it was 72.75. Grade 3 had an average baseline of 68.92, during intervention it was 84.58, and for the follow up it was 80.77. Peck et al. (2005) conclude that the data suggests on-task behaviors increased subsequent to the yoga practice and that yoga can be used as a positive intervention for children with attention problems.

When the data were collected after the yoga sessions, each classroom was involved in different activities. Some classes were busy in whole group activities and some classrooms were involved in independent seatwork. This may have altered the results. Another limitation of this study is that the investigator was also the implementer of the intervention and the observer of the participants. This could have created bias. This study also could have benefited from a control group. The results of this study suggest that engagement of students during literary lessons may increase due to yoga.

In an effort to answer a similar question regarding the relationship between yoga and attention concerns, Jensen and Kenny (2012) conducted a study involving students with attention disorders. The participants were boys aged 8-13. Boys diagnosed as having ADHD, Anxiety Disorders, and Learning Disabilities, spoke fluent English, were free of severe family troubles (depression, alcoholism), and able to attend weekly classes for 20 weeks were included in the study. At the start of the study, 14 boys participated. Six were in the yoga group and eight were

in the control group. As the study continued, five of the students within the control group moved into the intervention group and another three (for intervention) left the study. In the final group, eight were in intervention and three were in control.

Before the study began, the participants were given the Conners' Teacher Rating Scale (to gauge the teacher's views of the students' ADHD and other behavioral problems), the Conners' Parent Rating Scale (to assess the parent's perception of the student's ADHD and other behavioral problems), the Test of Variables of Attention (TOVA) (to measure short-term memory skills), and the Actigraph (which provides an objective indicator of motor activity).

For twenty weeks, one-hour of yoga instruction was given to the boys. They received respiratory training, postural training, relaxation training, and concentration training. Each boy attended an average of 13.9 classes out of the 20. The boys in the control group met one time per month and engaged in cooperative games and activities that involved listening, talking, taking turns, and sharing.

The TOVA assessment showed no significant effects for either group. The Actigraph motion logger had many technical problems throughout the test. They failed to give data and were removed from the study.

The yoga group showed significant gains from pre-test to post-test on Conner's Parent Rating Scales subscales in the area of: Oppositional ($p=.003$), Global Index Emotional Liability ($p=.001$), Global Index Total ($p=.019$), Global Index Restless/Impulsive ($p=.008$), and ADHD Index ($p=.019$). The control group showed significant effects in the area of hyperactivity ($p=.004$), anxiousness/shyness ($p=.028$), and social problems ($p=.034$); which could have been due to the cooperation games that they participated in. Because of the growth shown in the results, the authors concluded that yoga could be used as a complementary tool to medication.

This study may have produced results that are more accurate if it had involved both boys and girls.

The results (from the Global Index Restlessness/Impulsiveness, the ADHD Index, Hyperactivity, Hyperactive-Impulsive subscale, and the TOVA/ADHD score) suggest that due to the yoga program, some of the children's behavior became more controlled and their engagement in school activities increased. The boys who attended the most sessions showed the most improvement. These data suggest that yoga holds the potential to increase student engagement in literacy lessons for male students with ADHD.

Yoga Programs for Middle School Age Children (Ages 10-14)

According to Galantino et al. (2008), some children can be described as sedentary, stressed out, and malnourished. Yoga may provide these children tools to become active and more self-aware. Schachter (2013) suggested that physical activity programs in schools today are beginning to focus on personal challenges rather than team competition. Teachers are beginning to look at and incorporate skills students can use for a lifetime. The Physical Activity Guidelines for Americans states that middle-school children, as well as elementary-aged students should be physically active for 60 minutes each day (Turner et al., 2013).

Accurate depth perception is an extremely important visual skill for several physical activities and sports (Tong & Ng, 2013). Raghuraj and Telles (2003) researched the possible effects of yoga on depth perception of 32 girls aged 10 and 11. Each girl, chosen because she had an understanding of the test procedure and paired with another girl similar in age (within six months apart), received a depth perception test before the investigation began measuring errors in five trials. The test included an electronic apparatus placed inside a box. The girls were

required to align two rods, viewed through an aperture, while sitting at a distance in a dark room, and using a remote control device.

The students in the intervention group received yoga training. They had 20 minutes of loosening exercises, 15 minutes of controlled breathing, 20 minutes of visual exercises, and 20 minutes of meditation and relaxation. They received one yoga session each morning for 30 minutes and one in the evening for 45 minutes, for seven days a week. The students in the control group received physical training without yoga. Their exercises had the same duration as the yoga exercises. This training lasted for 30 days.

When this study began, 95% of the participants made errors of depth perception. After the intervention period, each participant received the same depth perception test. The control group showed no improvement in depth perception. On day 30, the yoga group showed significant reduction in the error for distance between the following trials: Trial 1 versus Trial 2 ($p < 0.02$), Trial 1 versus Trial 4 ($p < 0.01$), and Trial 1 versus Trial 5 ($p < 0.01$). The comparison between Trial 1 versus Trial 3 did not show any significant change. The Kruskal-Wallis test showed a significant decrease in the error for distance in the yoga group ($p = .025$). These data suggests that the use of yoga helped the children grow in the area of depth perception. Raghuraj and Telles (2003) concluded that the practice of yoga has been shown to improve aspects of visual perception and that future research is needed to understand why.

On the first day of this study, the yoga group showed a decrease in the error for distance, the physical training group showed no decrease. These data may suggest that the yoga group was more motivated during this study. The results of this study may also have been skewed because of the gender limitations. It is unclear whether yoga could increase student engagement in literacy lessons. This study focused primary on physical gains.

According to Raghuraj and Telles (2003), it is possible to increase depth perception by practicing yoga. Jensen, Stevens, and Kenny (2012) also wanted to study the effects of yoga. Their focus was breathing rates, heart rate, and blood pressure. These three things affect our nervous system and are associated with Anxiety Disorders. They investigated the effects on breathing patterns from using Yoga Nidra, a relaxation technique, on boys with disruptive behaviors. These behaviors include inattention, hyperactivity, non-compliance, impulsivity, and risk taking behaviors linked to Attention Deficit Hyperactivity Disorder, Oppositional Defiant Disorder, and Conduct Disorder. Children with these disruptive disorders often have an increased breathing rate.

Jensen et al. (2012) studied seven boys aged 10-15 attending a special school for disruptive behaviors. They had previously participated in a school-based 13-week yoga program. Data collected from children of the same age, without disruptive behaviors, who did not participate in the yoga program, attending a regular school, were compared to the participants.

Each child lay on the floor facing upwards for five minutes before, 10 minutes during, and five minutes after the yoga practice. During this time, the students received coaching through a series of yoga techniques to become relaxed, lie still, and to have awareness of their bodies. Each child was tested and data analyzed using Compumedic's thoracic and abdominal respiratory Inductive Plethysmography (RIP) and "Summit IP" software on a Compumedics Siesta with "Profusion PSG". RIP bands secured around the chest and abdominal measured the movements from breathing.

In the analysis of the data, a Plyman EDF + software to display data exported from Compumedics "Profusion PSG" software took one-minute screen shots to examine the breathing

in detail. Six out of seven of the students showed significant change during the Yoga Nidra practice. When comparing the screen shots of their breathing patterns, their breath became stable, slower, and deeper.

The fact that students were more aware of their breathing, may have affected the results, although, it can be argued that awareness of breath is also a relaxation technique (Jensen et al., 2012). Although screen shots of breathing patterns were taken throughout the study, no pre-data were collected at the beginning for behaviors and the number of participants in the study was small. The control group provided a poor comparison due to a limited number of participants, age difference, mixed gender, and experience. A lack of pre-yoga program data on breathing patterns is also a limitation. Pre data was determined to be too difficult to collect due to the boys' inability to lie still for an extended period prior to the 13-week yoga-training period.

Despite the limitations, it appears that because of this study, boys with disruptive behaviors had continuously unstable breathing patterns throughout the pre yoga period, had more stability during the yoga practice, and increased stability in the final stage of exercise. The correlation between heart rate and student engagement is still unclear. Furthermore, we do not yet know if practicing yoga will increase student engagement in literacy lessons, which is the central question of this paper.

Powell, Gilchrist, and Stapley (2008) also wanted to research the effects of yoga on students. Like the study done by Jensen et al. (2012), Powell et al. focused on children with emotional and behavioral difficulties, aged 8-11 in four different schools in England with intention of giving students early intervention was called the Self-Discovery Program (SDP). The chosen group included those who completed the required entrance paperwork. This program was designed for pupils with extra needs set within the theoretical framework of self-efficacy.

The pupils in this program were trained to perform simple yoga postures and relaxation techniques.

This program consisted of 12 sessions delivered each week and lasted 45 minutes. The main topics of each session involved sensory awareness, touch therapy, yoga, breathing, communication, and relaxation.

The children were placed in either a control group or the experimental group according to age and class. The study involved 107 children (53 in the intervention group and 54 in the control). The children in the intervention group were divided by the head teacher into eight different groups.

Behavioral profiles were completed (self and social confidence, communication, interaction abilities, the ability to control themselves within school, and attention span) along with standard behavior measures (nine questions each rated 1-7, with low scored indicating no confidence, great difficulty in communication, no eye contact, and no contribution in class, questions also including self-talk, listening skills, attention span, breathing techniques, fidgeting, appearing happy, pausing before reacting during challenging behaviors and degree of relaxation). Both assessments were completed by teachers before and after the program began.

The results showed that the intervention group had significant improvements in mean scores on self-confidence ($p=0.029$), social confidence with teachers ($p=0.042$), communication with peers ($p=0.050$), communication with teachers ($p<0.001$), and contributions in the classroom ($p<0.001$). There were also significant improvements in the area of restless impulsiveness ($p=.008$). There was no difference between the control group and the intervention group in the area of “being happier in themselves” (Powell et al., 2008).

During the study, the control group made improvements in self-control and attention and concentration skills. This creates a limitation of this study, as it is challenging to control other variables that may have facilitated change in both of the groups. Students did show significant improvement in the area of restless impulsiveness. If we are able to compare a decrease of restless impulsiveness to an increase in engagement, these data may suggest that yoga may help middle-school-aged boys during literary lessons.

Yoga Programs for High School Age Children (Ages 15-19)

According to Khalsa, Hickey-Schultz, Cohen, Steiner, and Cope (2012) one-half of the adult population will at some point experience a mental health disorder. The majority of these disorders surface during childhood and adolescence. These behaviors include anxiety, depression, and behavioral problems. This suggests that more time should be spent intervening for treatment of these disorders. The key to preventing problems of behavior is early intervention (Powell et al., 2008). High school students are facing a variety of stressors, both at home and school.

Steiner et al. (2013) used the Yoga Ed program with elementary-aged students. Khalsa et al. (2012) used a modified version of the same program with high school students. Khalsa et al. (2012) had the purpose of assessing prospective mental health improvements after incorporating yoga into the school day. The study included all 112 15-19- year-old students.

The participants attended two to three yoga sessions per week, for 30-40 minutes. For 11 weeks, they used breathing exercises, yoga poses, posture, visualization, and games focusing on entertainment and relaxation (Khalsa et al., 2012). Each session began with five minutes of warm up, 15 minutes of yoga poses, and ended with five minutes of relaxation.

Seventy-four students divided into four Yoga Ed classes and the remaining 47 entered three control groups. Each of the yoga instructors attended formal training in Yoga Ed. Each participant received several self-report questionnaires before the program began and then again, when the program was completed. They received the Self-Report of Personality version of the Behavior Assessment Survey for Children Version 2, the Profile of Mood States short form, the Resilience Scale (as a measure of behavior), the Perceived Stress Scale, and the Inventory of Positive Psychological Attitudes.

During the data analysis, the researchers conducted an Analysis of Variance (ANOVA) on each outcome variable and all global and analyzed subscale scores of the questionnaires with a series of independent-sample *t* tests. The results show that the amount of change in resilience as measured by the RS was significantly different between the yoga and control groups ($p=0.014$). The yoga group had an insignificant increase in resilience from 131.5 (SD=15.4) to 133.6 (SD=16.0), ($p=0.192$), the control group significantly decreased in resilience from 131.2 (SD=18.5) to 126.5 (SD=21.9), ($p=0.040$). The Anger Control also showed a significant difference between both groups ($p=0.028$). The largest difference was shown in the area of Fatigue/Inertia ($p=0.022$). The yoga intervention group had more stamina at the end of the study. The researchers concluded that although only a few outcomes measured showed statistically significant differences, each of the differences favored the yoga group.

The duration of the intervention being one semester long, may have limited the study outcome. There were also a number of irregularities in the study execution due to constraints of incorporating the study into an ongoing curriculum (session frequency, duration of sessions, cancelled sessions). Although a statistically significant difference between the groups was found for only a few outcome measures, this study suggests that yoga may benefit the inertia, anger

control, and attitudes about school for our students. This study does not answer my question as to whether yoga will increase student engagement during literacy lessons. Student engagement was not studied.

Similarly, Noogle, Steiner, Minami, and Khalsa (2012) had a goal of testing the feasibility of yoga within a high school curriculum. They evaluated preventative efficacy for students' psychosocial well-being. The 52 participants were 11th and 12th graders at a public school in Massachusetts. The chosen participants had to be enrolled in a PE class, have the ability to participate in a yoga program without individual instruction, and not have taken a yoga course the prior semester. They received yoga intervention that contained two to three yoga sessions per week for 10 weeks. The control group attended regular PE class. The two trained yoga instructors who led the classes, focused each yoga session on slow breathing, posture, relaxation, meditation, and awareness. The goal of this program was to provide a tool of life long wellness to the students.

Each student completed questionnaires one week before the program began and one week following the program. Each participant took the Profile of Mood States-Short Form, the Positive and Negative Affect Schedule for Children, the 10-item Perceived Stress Scale, the Inventory of Positive Psychological Attitudes, the 25-item Resilience Scale, the State-Trait Anger Expression Inventory, and the Child Acceptance and Mindfulness Measure.

The results of the study show that in the area of Tension-Anxiety, the subscale was significantly better in the yoga group with a large effect size = 0.870. The Affect results improved with the effect size = 0.659. The Total Mood Disturbance had a medium effect size = 0.870. The results of the perceived stress, positive psychology, resilience, anger expression, and mindfulness tests all showed insignificant differences. Noogle et al. (2012) suggested that

yoga would increase overall well-being by lessening negative and growing positive facets of mental health. . Noogle et al. asserted that their predictions are partially supported by the results. Negative affect, total mood disturbance, and Tension-Anxiety were all positively impacted by the intervention. Yet, no changes were observed in positive affect, perceived stress, positive psychological traits, resilience, or anger expression (Noggle et al., 2012).

Limitations in this study include program consistency. The same size used was very small and did not allow for the evaluation of clustering. Although it had limitations, this study seems to indicate that yoga may play a preventative role in adolescent mental health in the area of tension, anxiety, mood disturbances, and affect. This study did not research student engagement, or use elementary-aged students; therefore, it is unclear as to whether yoga may increase student engagement during literacy lessons.

Just as the Noggle et al. (2012) study focused on the psychosocial well-being of students, Venkataramana et al. (2008) conducted a similar study with an objective of investigating the influence of yoga the academic stress of high school students. The study was conducted on 139 students, randomly chosen, aged 11-16 using a self-report Student's Academic Stress Scale (SASS). This test contains 40 Likert items divided into five components. The areas that it tests are personal inadequacy, interpersonal difficulties with teachers, teacher-pupil relationship-teaching methods, and inadequate study facilities.

After scoring the SASS, the students were divided into two equivalent groups (the experiment group and the control group). The students in the experimental group received yoga practice for one hour per day continuously for 90 days. After the 90-day period, the SASS was given again to both groups to test differences in performance.

An independent sample *t*-test was used to compare the scores. There were no significant differences between both groups on the pre-test. The post-test scores show significant differences in all areas except teacher-pupil relationships.

In the post yoga group, the differences between the experimental and the control groups ($p < .05$) were significant in three areas of the SASS: personal inadequacy ($t=5.68$), fear of failure ($t=2.64$), and inadequate study facilities ($t=2.64$). There were no significant differences in the area of teacher-pupil relationships ($t=1.15$) or interpersonal difficulties ($t=2.51$).

This study used only the self-reporting SASS as a measuring tool. The results may have been more reliable if the researchers had used an observable tool also to gauge and test results in a more concrete manner.

Venkataramana et al. (2008) began the study with a hypothesis if high school students practiced yoga their level academic stress would decrease. After reviewing the results, they have concluded that the findings of the study reiterate that yoga can be used as a tool and technique to eliminate stress. In essence, yoga may provide the tools to expand conscious awareness and to eliminate stress. This study focused on student stress and not student engagement; therefore, it is still unclear if yoga would also increase student engagement.

Like the study using the SDP by Powell et al. (2008) involving middle school children, Powell and Potter (2010) also used the SDP, but with high school students. Their goal was to determine the feasibility of providing intervention involving yoga and massage into a school exclusively for disadvantaged male adolescents with emotional and behavioral difficulties.

The head teacher identified 36 11-15 year-old students to participate in the study. They were chosen based upon attendance rate, parental consent, and pupil assessment forms. The study had a pre-test and post-test design. Students and teachers completed self-administered

questionnaires, behavioral profiles, and a strengths and difficulties questionnaire. Qualitative data were also collected at the completion of the program. Students were asked open-ended questions including: Did you enjoy taking part in the SDP? Name one activity or skill learned on the SDP that you liked. Name one activity or skill that you learned on the SDP that you disliked. Have you used any of the techniques learned on the SDP during the school day?

The program consisted of 12 one-hour sessions (totaling 24 hours) over two school terms (spring and summer). The students were divided into five groups. The activities included self and peer hand massages, and yoga postures.

The results indicate an increase in self-confidence, social confidence with peers ($t=.83$) and with teachers, communication with peers and with teachers, self-control, and attention span ($t=.37$) and eye contact with teachers. Contribution in class had no improvement. The total mean behavioral score before the SDP was 36.1 and was 38.4 when the SDP completed, showing an overall improvement in behavior.

Limitations of this study include the small number of participants and the lack of a control group. Most of the focus of this study was behavioral. The area of contribution in class showed no improvement. It is unclear as to whether I can compare contribution in class to engagement. Therefore, my answer as to whether yoga will increase student engagement during literacy lessons is unanswered.

A large number of these studies show an increase in student achievement or positive behavior because of the intervention received. Most of growth that happened was in the area of mental well-being. This research suggests that that increase may be because of the incorporation of yoga.

Synthesis

In the elementary classroom, there is an increased struggle for teachers to get their students to focus. Researchers have noted that yoga may offer teachers strategies to help students succeed. Several studies involving elementary-aged students focused on ways in which yoga effects relaxation, breathing techniques, massage, meditation, sensory exercises, and community building in and out of the classroom. Numerous participants included students with and without attention problems, students with Autism, students with emotional and behavioral disorders, students with increased anxiety, and students with learning disabilities. Overall, the students who participated in a yoga-based program showed significant improvements in some areas. Results revealed an increase in time on-task, improvements in the ability to control emotions, increase in balance, increase in self-esteem, increase in school engagement, better concentration, less impulsiveness, less aggression, decreased complaining, decline in irritability, agitation, and crying, and a decrease in feelings of depression. Limitations include possible bias in student selection, external factors, and timing of the studies.

Yoga is for the mind, body, and soul. Researchers have identified numerous ways in which yoga has been beneficial for students of all ages. While Raghuraj et al. (2003) researched depth perception, Jensen et al. (2012) and Powell et al. (2010) studied the emotional and behavioral effects of participating in yoga on students. Within all three middle school studies, yoga was deemed beneficial for most students who actively participated. Students not only improved their depth perception, they also improved in their self-confidence, social abilities, and peer-teacher communications. Each study would have been more valid if it had more participants, an equal balance of gender, and pre-data.

There appears to be evidence that supports yoga as a way to help students mentally and physically. Students that participated in yoga had more stamina, resilience, increased self and social confidence among peers, self-control, attention spans, a decrease in anxiety and mood disturbances, and improved affect. Some limitations included that there were certain areas showing insignificant differences, such as peer-teacher relationships. It would be helpful to have more data entailing the effects of yoga on peer-teacher relationships, since this relationship is crucial to a child's educational success. Overall, the results of all four studies involving high school children suggest that yoga is a tool and technique to expand conscious awareness and allow us room to eliminate stress (Venkataramana, Poomalil, & Shobhasree, 2008).

Chapter 3: Incorporating yoga into a classroom on student engagement during literacy lessons?

Setting

I performed a yoga study with the intention of finding the possible effects on student engagement from the incorporation of yoga into my classroom literacy time. I am a second grade teacher in a general education classroom. I have taken step one of four to become a certified yoga instructor. I performed all of the yoga instruction for this class. My hypothesis was that by incorporating yoga in my classroom literacy lessons, I would increase student engagement.

Participants

The sample for this study included 25 Caucasian 2nd grade students (ages 7-9) attending a public school in Michigan.

Methods

Each participant received 15 minutes of yoga prior to the start of literacy time, including: breathing, yoga poses, relaxation, and positive thoughts. The literacy time was broken into three different activities. Each activity lasted approximately 20 minutes. The participants also received two to five minutes of yoga between each activity. The yoga consisted of breathing, yoga poses, relaxation, and positive thoughts.

Data Collection

The observer was a colleague with experience in research. Observations were held during their classroom literacy time (reading, writing, word work). During this time, students were moving throughout 20-minute literacy stations, each of which included a mini-lesson.

To calculate the students' time on-task, the data collector, using a Behavioral Observation Form, observed four individuals, one at a time, for 15-second increments. Each student was

observed 20 times during a 20-minute period. Time on-task was defined as the percentage of intervals observed where the student was engaged in the activity and completed the assigned activity. They were rated with either a + (completely on-task for the 15 seconds), an M (off-task due to motor movement), a V (off-task due to verbal communication, or a P (passively off-task). A pre-treatment measurement was done before the incorporation of yoga. The post-treatment measurement took place three months later.

Data Analysis

The results were analyzed using descriptive statistics, as well as paired t-test comparisons between the pre- and post-treatment measurements.

Findings

The pre-treatment scores show that 80% of the students were engaged in their literary lessons. The post-treatment measurement shows an increase of 8%, bringing the total number of students in engagement to 88%. Motor off-task behaviors had a 9% decrease. Verbal off-task behaviors showed a 4% decrease. Passive off-task behaviors increased 1%. These results were analyzed using paired t-test comparisons between the pre and post-test scores. Although engagement increased, the results are insignificant because of the t-score which was .63 (p=.53).

| Pre-Test | | | | Post-Test | | | | Difference (pre-post) | | | |
|----------|----------------|-----------------|------------------|-----------|----------------|-----------------|------------------|-----------------------|----------------|-----------------|------------------|
| On-task | Motor off-task | Verbal off-task | Passive off-task | On-task | Motor off-task | Verbal off-task | Passive off-task | On-task | Motor off-task | Verbal off-task | Passive off-task |
| 80% | 20% | 9% | 10% | 88% | 12% | 5% | 11% | 9% | -9% | -4% | 1% |

When looking at the individual student results, I see an increase in on-task behavior from a student with Autism. In the pre-treatment measurement, he was on-task 50% of the time. He

was off-task because of motor 40% and verbally off-task 10%. In the post-treatment measurement, he showed an increase in on-task behavior of 25%. He was off-task due to motor 15% and passively off-task 10%. He had a 25% decrease in motor off-task time. This result is similar to the studies by Koenig et al. (2012) and Rosenblatt et al. (2011). They each conducted studies involving students with Autism that showed student improvements in a variety of areas. I would suggest that more research be done to study the positive effects of yoga on students with Autism.

Individual results of a student with Autism

| Pre-test | | | | Post-test | | | | Difference (pre-post) | | | |
|----------|----------------|-----------------|------------------|-----------|----------------|-----------------|------------------|-----------------------|----------------|-----------------|------------------|
| On-task | Motor off-task | Verbal off-task | Passive off-task | On-task | Motor off-task | Verbal off-task | Passive off-task | On-task | Motor off-task | Verbal off-task | Passive off-task |
| 50% | 40% | 10% | | 75% | 15% | | 10% | 25% | -25% | -10% | 10% |

Limitations

This study had several limitations. I was one of the researchers and the classroom teacher. This could have created bias in the data. Though, I taught the yoga lessons in my classroom, I was not a certified yoga instructor. Would the results have been different if someone trained in the field had taught the yoga? Due to classroom time, all of the students were unable to be observed on the same day. This may have altered the results. Because of scheduling difficulties, the post-treatment measurement was done very close to the end of the school year. This also may have altered the results.

Conclusions

Although the students showed growth in several areas after the intervention of yoga, the overall results prove to be insignificant. Many factors may have contributed to these findings. Before the incorporation of yoga, student engagement was 80%. After the yoga intervention, student engagement was 88%. This 8% increase does not measure high enough to be statistically significant; however, as the classroom teacher who conducted this study, I am satisfied with an 8% increase. I am left wondering if achieving student engagement above 88% in an elementary general education classroom is possible. With challenges students face in the area of Autism, attention disorders, and anxiety, can we expect student engagement of more than 88% during a 90-minute period?

Chapter 4: Recommendations and Conclusion

Recommendations

A large number of research projects involving yoga have shown inconclusive results as to whether yoga benefits students and in what ways. Each of these studies has been limited by bias, lack of control group, reliance on self-reported rather than observational data, inconsistent data analysis, and untrained yoga instructors. I suggest that schools and researchers who are seeking answers to whether yoga will increase student engagement, either create a research project themselves or look deeply at the ones already created and modify where the weaknesses have occurred.

Before beginning yoga in a school setting, it would be wise to determine which yoga program will be used, who will implement it, and how often the intervention will take place. I would suggest that schools either hire a certified yoga instructor or offer professional development in the area of yoga instruction to their staff.

The yoga instruction could take place at the beginning of the school day (10 minutes), at transitional classroom times (5 minutes), after lunch (10 minutes), and at the close of the school day (5 minutes). During each yoga session the classroom lights should be turned off.

The yoga instruction at the beginning of the school day and after lunch should focus primary on awakening and breathing. Here is a suggested routine. Each pose should be held for approximately five seconds.

- Five breaths (a Hoberman Sphere is recommended)
- Child's pose
- Downward dog
- Forward fold

- Mountain
- Upward mountain
- Crescent moon
- Three volcano breaths (On the second breath the students should be asked to think positive thoughts, such as, “Think of someone you care about.” On the final breath, the name should be whispered into the classroom.)
- Mountain
- Downward dog
- Child’s pose
- Five breaths

During classroom transitional time, the focus of yoga should be to calm and refocus the students. Here is an example of a yoga routine. Each pose should be held for approximately five seconds.

- Three volcano breaths
- Hoberman Sphere, 8-10 breaths
- Forward fold
- Chair dog
- Forehead on stacked hands
- Five breaths

Students should be encouraged to try each pose with awareness of how the body feels. They should be encouraged to stop if something hurts and to be brave is something feels challenging.

Another factor that needs to be considered and addressed while planning the incorporation of yoga into a school setting is religion. It is important that all religious elements of yoga be eliminated from the instruction and delivery with children.

To create an effective and worthwhile yoga program, the duration and quality of the intervention must be consistent. In reviewing the literature on using yoga in the classroom, I found that the studies yielding the most positive results included yoga for at least three months.

Areas for Further Research

Although the action research study I conducted in my own classroom yielded inconclusive results, I still see the positive impacts on yoga in my elementary classroom on a daily basis. If I were to further research the impact of yoga on student engagement during literacy time, I would construct a research design as follows.

Setting

The yoga study will take place in 20+ elementary classrooms. At least four classrooms, at each grade level, will be randomly chosen to participate. Half of the classrooms will be randomly selected as the control group. The remaining half will be for the intervention. The yoga will take place inside each classroom.

Participants

The sample for this study will include students of all races and genders (grades K-5) attending elementary school. The yoga instructors will be certified in yoga with a focus in childhood practice. The data collectors will have experience in research collection and will have no other roles in the study. The classroom teachers will continue to teach as they would normally.

Methods

Each participant will receive 30 minutes of yoga instruction, done by the certified instructor, at the beginning of each school day. This will include breathing, yoga poses, relaxation, and positive thoughts. The participants will also receive 15 minutes of yoga instruction prior to the start of literacy instruction. The control group will not receive any yoga instruction.

Data Collection

Observations will be held during the classroom literacy time (reading, writing, and word work). To calculate the students' time on-task, the data collector, using a Behavioral Observation Form, will observe four individuals, at a time, for 15-second increments. Time on-task will be defined as the percentage of intervals observed where the student was engaged in his/her activity and completed the assigned task. Each student will be observed 20 times during a 20-minute period. They will be rated with either a + (completely on-task for the 15 seconds), an M (off-task due to motor movement), a V (off-task due to verbal communication, or a P (passively off-task). Pre-tests in all areas will be done before the incorporation of yoga. The students will be observed, with data collection, every four weeks in all tested areas. The post-test will take place three months from the start of the pre-test.

Data Analysis

The results will be analyzed using paired t-test comparisons between pre, during, and post-test scores.

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